



CITY OF IRVINE
ORANGE COUNTY, CALIFORNIA

**NOTICE INVITING BIDS, PROPOSAL,
CONTRACT AND SPECIAL PROVISIONS
FOR**

**WILLIAM WOOLLETT JR. AQUATIC CENTER EXPANSION (PART A) AND
HERITAGE PARK PARKING LOTS (PART B)
HERITAGE PARK, IRVINE, CALIFORNIA
CIP 362604 AND 362605
BID NO. PK-26-0047**

**CITY OF IRVINE
1 CIVIC CENTER PLAZA
P.O. BOX 19575
IRVINE, CALIFORNIA 92623-9575**

PREPARED BY:

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AND

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JANUARY, 2026

WILLIAM WOOLLETT JR. AQUATIC CENTER EXPANSION AND
HERITAGE PARK PARKING LOTS
HERITAGE PARK, IRVINE, CALIFORNIA
CIP 362604 AND 362605

THE SPECIAL PROVISIONS CONTAINED HEREIN HAVE BEEN PREPARED BY OR
UNDER THE DIRECTION OF:



Rafael Chavez, P.E.
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R.C.E. No. 87228

12/16/2025

Date



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Date

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1/21/2026

Date

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CITY OF IRVINE, CALIFORNIA
NOTICE INVITING BIDS
BID NO. PK-26-0047

NOTICE IS HEREBY GIVEN that sealed bids with online bid price submittal will be received by the Purchasing Representative of the City of Irvine, California, for furnishing all labor services, materials, tools, equipment, supplies, transportation, utilities, and all other items and facilities necessary therefore, as provided in the contract documents for **William Woollett Jr. Aquatics Center Expansion (Part A) and Heritage Park Parking Lots (Part B)** together with appurtenances thereto, in strict accordance with the specifications on file at the Department of Public Works and Sustainability, 17101 Armstrong Ave, Irvine, California 92614.

DATE OF OPENING BIDS: Bidders shall submit a single electronic bid through the BidsOnline system for the combined project consisting of William Woollett Jr. Aquatics Center Expansion (Part A) and Heritage Park Parking Lots (Part B).

The Lump Sum bid price for Part A, Part A additive bid, the unit prices for Part B, and Part B additive bid shall be entered separately in the Schedule of Work. All other required documents for the bid proposal packet, including the Letter of Assent, must be uploaded to the BidsOnline system in accordance with the instructions beginning on page 18 no later than **11:00 a.m. on February 23, 2026**. No late bids will be accepted. No other method of bid submittal will be accepted.

Bids will be made publicly available via BidsOnline at the date and time specified above.

LOCATION OF THE WORK: The work to be performed hereunder is located in the City of Irvine, County of Orange, on **Walnut Avenue from Yale Ave to Escalar and Heritage Park, 14301 Yale Avenue, Irvine, California 92604.**

MANDATORY PRE-BID MEETING: There will be a **mandatory** pre-bid meeting on **February 5, 2026, at 11:00 a.m. at the Woollett Aquatics Project site.** Failure to attend will result in your bid being declared non-responsive.

DESCRIPTION OF WORK: The work to be performed shall include, but not be limited to:

William Woollett Jr. Aquatics Center Expansion (Part A):

Construction of the following: pool, splash pad, training and locker room building, pool equipment building, bleachers, Ninja Cross obstacle course system, Musco sports lighting, and associated structural, mechanical, electrical, plumbing, and fire alarm work. Scope of work also includes associated site work, ground improvements, soil export and import, demolition, utilities, and other items not mentioned here, but are required by the plans, specifications, and the Special Provisions. The Engineer's construction cost estimate for Part A of the project is above **\$30,990,000** (rounded to the nearest ten thousand).

Heritage Park Parking Lots (Part B):

Construction of two parking lots consisting of: Grading including excavation and cut/fill operations; constructing asphalt, base and finish course pavement; removing and replacing concrete curb, gutter, and sidewalk; constructing new concrete curb, gutter, sidewalk, curb ramps, and local depressions; constructing concrete drainage inlets, constructing HDPE and RCP drainage lines, construction drainage junction structures; relocating and/or constructing new irrigation mainlines and associated electrical, relocating and/or constructing new electrical conduit; Asphalt concrete pavement surface course overlay; install signing, striping, markers, and pavement markings; modify and/or install new landscape and irrigation, modify and/or install new electrical and lighting , and other items not mentioned here, but are required by the plans and the Special Provisions. The Engineer's construction cost estimate for Part B of the project is above \$6,500,000 (rounded to the nearest ten thousand).

MINIMUM QUALIFICATIONS: LEED Construction Experience; The bidder shall have completed, as the prime contractor, within the last five (5) years, at least one (1) project with LEED certification and at least two (2) public building facilities over \$10 million.

LICENSE REQUIREMENT: Prime Contractor must possess a valid Class A license.

At the time of submitting the bid, the Bidder shall be licensed as a contractor in accordance with the provisions of California Business and Professions Code Chapter 9, Division 3. Work under this Contract shall be considered specialty in nature. Any Contractor and/or subcontractor proposing to perform this specialty work must possess a valid **Class C-53** license for Pool, **Class C-10** license for Electrical, **Class C-36** license for plumbing, and **Class C-8 & C-12** for Site work, prior to award of contract. Persons performing the work of an electrician shall be certified in accordance with California Labor Code Section 3099. Proof of Certification shall be provided to the City prior to commencement of work.

DEBARRED CONTRACTORS: The City of Irvine Municipal Code Section 2-12-101 *et seq.* sets forth procedures to debar Contractors from bidding or performing work on City of Irvine contracts at any tier, whether prime, subcontractor, etc. Accordingly, certain Contractors have been debarred and are listed on the City's website at www.cityofirvine.org/purchasing. Click on the link which states: "For a list of Debarred Contractors, please [click here](#)."

COMPLETION OF WORK AND LIQUIDATED DAMAGES: All work shall be completed in a total of Four Hundred Twenty (420) Working Days (excluding plant establishment) and Five Hundred Twenty (520) Working Days (including one hundred (100) Working Days for plant establishment) from the date specified in the Notice to Proceed. Failure to complete the Work within the time limits specified herein shall subject the Contractor to the assessment of Liquidated Damages, as described below.

Liquidated damages for failure to complete plant establishment work within the specified time shall be assessed at a rate of One Thousand Dollars (\$1,000) per Working Day, for

each and every Working Day of delay beyond the number of Working Days prescribed above. In no case shall liquidated damages assessed for delays in plant establishment work be cumulative with liquidated damages assessed for delays in achieving Substantial Completion. In no case will liquidated damages be assessed at more than Twelve Thousand Five Hundred Dollars (\$12,500) per Working Day.

LIQUIDATED DAMAGES BY MILESTONE: Milestone dates identified below are measured from the Notice to Proceed date and represent required completion points for critical phases of the Work. These milestones are intended to maintain proper sequencing, facility access, and coordination with City operations.

Failure to achieve any interim milestone by its specified completion date shall subject the Contractor to the assessment of interim milestone liquidated damages, as set forth below. Assessment of interim milestone liquidated damages shall not relieve the Contractor of the obligation to achieve Substantial Completion within the Contract Time.

Milestone	Scope	Working Days	LD Rate
Milestone 1	Phase 1 – Ground Improvements (Geopiers)	40 Working Days from NTP	\$5,000 per Working Day
Milestone 2	Phases 2 & 3 – Over-Ex, Grade Pads, Underground Utilities	50 Working Days from Completion of Milestone 1	\$5,000 per Working Day
Milestone 3	Phase 4A – Pool and Bleachers	180 Working Days from Completion of Milestone 2	\$7,500 per Working Day
Milestone 4	Phase 4B – Buildings and Splash Pads	105 Working Days from Completion of Milestone 3	\$7,500 per Working Day
Milestone 5	Phase 5 & 6 – Substantial Completion (Walnut Parking Lot & Project)	45 Working Days from Completion of Milestone 4	\$12,500 per Working Day

AWARD OF CONTRACT: The award of the Contract, if it is awarded, will be to the lowest responsive and responsible Bidder whose bid complies with all the requirements prescribed. The City reserves the right, after opening bids, to reject any or all bids, to waive any informality in a bid, to make awards in the interest of the City, and to reject all other bids.

PROPOSAL GUARANTEE AND BONDS: Each bid shall be accompanied by a scanned copy of a certified or cashier's check or corporate surety bond issued by a surety company, admitted to do business in the State of California, on the form furnished by the City as guarantee that bidder will, if an award is made to him in accordance with the terms of his bid, promptly secure Workers' Compensation insurance and liability insurance, execute a contract in the required form, and furnish satisfactory bonds for the faithful performance of the contract ("Performance Bond") and for the payment of claims of materialmen and laborers thereunder ("Payment Bond"). Said check or bidder's bond shall be in an amount of not less than ten percent (10%) of the amount of the bid. **Bidders with the three lowest responsive bids shall deliver an original hard copy of the certified check, cashier's check or surety bond to the Purchasing Representative at 1 Civic Center Plaza, Irvine, CA 92606 within five business days of the bid opening date.**

Failure to submit the original check or bidder's bond may result in the bid being declared non-responsive.

The Performance and Payment Bonds shall be not less than one hundred percent (100%) of the total amount of the bid price named in the contract. Only bonds issued by companies admitted to do business in the State of California will be accepted in accordance with the Code of Civil Procedure Section 995.311. Failure to submit acceptable Payment and Performance Bonds as required shall result in a rejection of the bid and a forfeiture of the proposal guarantee.

PREVAILING RATES OF WAGES: Prevailing wage requirements apply to public works projects with a value exceeding \$1,000.00. The definition of "public works" is found at Labor Code Section 1720, *et seq.*

The CITY is subject to the provisions of law relating to public contracts in the State of California. It is agreed that all provisions of law applicable to public contracts are a part of this Agreement to the same extent as though set forth herein, and will be complied with by CONTRACTOR. CONTRACTOR shall abide by all applicable Sections of the California Labor Codes including Sections 1770 - 1781, *et seq.* In accordance with the provisions of Section 1773 of the California Labor Code, the general prevailing rates of per diem wages and holiday and overtime work in the locality in which the Work is to be performed shall be in accordance with the rates posted on the Department of Industrial Relations website, found at <http://www.dir.ca.gov/dirdatabases.html>. The CONTRACTOR, and any subcontractor under him, shall pay not less than the specified prevailing rates of wages to all workers employed in the execution of this Agreement.

The CITY reminds all contractors and subcontractors of the adoption of Senate Bill 96 – Amendments to California Prevailing Wage Law Requires Additional Measures by Public Agencies, Contractors and Subcontractors, and encourages them to understand and comply with the requirements as set forth on the Department of Industrial Relations (DIR) website at <http://www.dir.ca.gov/Public-Works/PublicWorks.html>. All contractors and subcontractors who plan to bid on a public works project when the project is for construction, alteration, demolition, installation, or repair work with a value exceeding \$25,000.00 must first be registered and pay an annual fee with the DIR. Additionally, all contractors and subcontractors who plan to bid on public works projects involving maintenance work with a value exceeding \$15,000.00 must first be registered and pay an annual fee with the DIR. The CITY requires all contractors and subcontractors to be registered with the DIR prior to submitting a bid meeting these parameters. Subject to the exceptions set forth in Labor Code Section 1725.5, bids from contractors that are not currently registered will be deemed nonresponsive. Further, the CITY will not award a contract to and no contractor or subcontractor will be allowed to work on a CITY public works project meeting these parameters unless they are registered with the DIR pursuant to Labor Code Section 1725.5. Please visit the DIR website for further information.

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.

LABOR REGULATIONS: The Contractor shall comply with all applicable requirements of the California Labor Code and the City of Irvine Municipal Code.

COMMUNITY WORKFORCE AGREEMENT: This project is subject to the Community Workforce Agreement (CWA) between the City and the Los Angeles/Orange County Building and Construction Trades Council (Trades Council). The CWA establishes labor relations policies and procedures for the Contractor and subcontractors of all tiers – including a local hire goal, payment of employee fringe benefits through a union trust fund and registering employees through a union hall. A signed Letter of Assent must be submitted with Bid proposal packet. The City of Irvine will utilize a CWA Administrator who will work with the Contractors and the Trades Council to oversee the provisions of the CWA. A copy of the CWA is included in Appendix D.

Prior to any work being done on the project, Contractors that are not signatory with one of the unions that are signatory to the CWA shall register each of their own workers (Core Employees) with the appropriate union hall and must provide a listing (Core Employees List, see Appendix D) of their Core Employees to the CWA Administrator. The CWA contains a local hiring goal of 30%, calculated based on total hours worked. The local hire provision requires best efforts to utilize qualified workers first residing in the Local Zip Code List (see Appendix D), then to Veterans residing in Orange County, then to graduates from the Building Trades Multi-Craft Core Curriculum (MC3 Graduates) residing in Orange County, and finally other residents of Orange County. When requesting workers from the union hiring hall, the Contractor shall use the Craft Request Form (see Appendix D). This form must be sent to the union hiring hall 48 hours prior to when the worker is needed. The Contractor must hold a Pre-Job Conference that is to be attended by all subcontractors and those attending will disclose their scope of work and union assignments to the Building Trades. The Contractor must fill out the Pre-Job Conference Form (see Appendix D) and submit to the CWA Administrator a week prior to scheduling the Pre-Job Conference.

PLANS AND SPECIFICATIONS: A full set of bid documents consisting of Notice Inviting Bids, Proposal, Contract, Special Provisions and Contract Plans are available for inspection without charge at the Department of Public Works and Sustainability, 17101 Armstrong, Irvine, California 92614.

To obtain a copy of the bid documents, please visit the City of Irvine's website at www.cityofirvine.org/purchasing. Click on the "Supplier Registration and Bid Opportunities" link and review the information about our online system. Next, click on the "BidsOnline" link. If you are not currently registered with the City of Irvine, please click on the "New Vendor Registration" button and then complete the electronic supplier registration process, including selecting Category Code(s) describing the goods and/or services you provide, as well as entering your Contractors State License information. After registering your firm, click on the "Bid Opportunities" button to view and download the Bid

Documents. Interested firms must be registered on the City's website and download the Bid Documents in order to submit a bid. Firms must also check the website periodically for addenda information as failure to download any and all addenda will result in bid disqualification.

SECURITY FOR COMPLETION OF WORK: The Contract Documents establish a provision for monthly progress payments based upon the percentage of work completed as determined by the Engineer. The City will retain a portion of each progress payment as security for completion of the balance of the work. At the request and expense of the successful bidder, the City will pay the amount so retained upon compliance with the requirements of California Public Contract Code § 22300 and the provisions of the Contract Documents, Special Provisions Subsection 9-3.2.2 pertaining to "Substitution of Securities."

PROJECT ADMINISTRATION: All questions relative to this project prior to opening bids must be submitted via PlanetBids no later than five (5) business days prior to the bid opening date as this would not allow time to respond to all plan holders. No verbal requests or requests made in any other format will be accepted. Questions must be submitted individually and not in a paragraph format nor combined in a single submission.

Requests submitted for City's consideration of proposed terms and conditions, including modifications to the City's IFB and/or Contract terms and conditions must be submitted by the deadline for questions. Such requests should include an attachment in Word or PDF format on formal company letterhead that shows the requested modifications.

Significant interpretations or clarifications and responses to questions received by the deadline will be addressed via addenda to this FIB, which will be released and posted on PlanetBids under the "Addenda/Emails" tab.

General process questions may be directed to the following:

Michelle Cardona
Purchasing Representative
mcardona@cityofirvine.org

CITY OF IRVINE

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INSTRUCTIONS TO BIDDERS, PROPOSAL REQUIREMENTS AND CONDITIONS

1. CONTRACT DOCUMENTS: The Contract Documents shall consist of:

- a) Permits and Agreements
- b) Contract
- c) Addenda
- d) Instructions to Bidders, Proposal Requirements and Conditions
- e) Special Provisions
- f) Appendices
- g) Contract Plans
- h) Standard Plans
- i) Standard Specifications
- j) Reference Specifications,

all of which are on file at the City of Irvine in the Department of Public Works and Sustainability, 17101 Armstrong, Irvine, California 92606, and are hereby referred to and made a part hereof.

2. BID PROPOSALS: To be considered, bids shall be made in accordance with the following instructions:

- a) For the convenience of bidders, the "SCHEDULE OF WORK" has been posted on the City's BidsOnline system. Bidders must enter their Lump Sum bid price for Part A, Part A additive bid, the unit prices for Part B, and Part B additive bid information online in accordance with the INSTRUCTIONS FOR ENTERING ELECTRONIC BIDS included herein. Unit prices must be entered online and then the extended prices and total bid price will be automatically calculated.
- b) Bids shall be submitted only on bid items stated in the Bid Documents; bids on other bases will not be considered. Bids that are not submitted on the prescribed forms, and in accordance with the INSTRUCTIONS FOR ENTERING ELECTRONIC BIDS may be rejected.
- c) Unless called for, additive bids will not be considered.
- d) Pursuant to the provisions of Public Contract Code § 4101 to 4108, inclusive, every Bidder shall set forth in its bid:
 - 1) The Bidder shall list the name, license number, and location of the place of business of each subcontractor performing work in an amount in excess of one-half of one percent (1/2%) of the prime contractor's total

bid, or, in the case of bids or offers for the construction of streets or highways, including bridges, in excess of one-half of one percent (1/2%) of the prime contractor's total bid or ten thousand dollars (\$10,000), whichever is greater.

- 2) The bid item numbers and the percentage of the bid item subcontracted.
- e) In the event additive bids are called for and the Bidder intends to use different or additional subcontractors on the additive(s), the Bidder shall fill out additional forms of the list of subcontractors and shall identify such forms with relation to whether they apply to the base or additive bids.
 - f) If the Bidder fails to specify a subcontractor for any portion of the work to be performed under the contract in excess of one-half of one percent (1/2%) of the Bidder's total bid, or, in the case of bids or offers for the construction of streets or highways, including bridges, in excess of one-half of one percent (1/2%) of the Bidder's total bid or ten thousand dollars (\$10,000), whichever is greater, the Bidder agrees to perform that portion of work himself. The successful Bidder shall not, without the consent of the City, either:
 - 1) Substitute any person, firm or corporation as subcontractor in place of the subcontractor designated in the original bid, or
 - 2) Permit any subcontract to be assigned or transferred or allow the work to be performed by anyone other than the original subcontractor listed in the bid.
 - g) If required in the Notice Inviting Bids, bids shall be accompanied by a certified or cashier's check or an acceptable corporate bid bond on the form furnished by the City for an amount not less than ten percent (10%) of the bid, made payable to the order of the City of Irvine. The check or bid bond shall be a guarantee that the Bidder will enter into a contract and provide all required insurance and bonds if awarded the work; and in case of refusal or failure to enter into the contract, the check or bid bond shall be forfeited. The City will return Bidder's check if the project is not awarded to Bidder.

Only bonds issued by companies admitted to do business in the State of California will be accepted, in accordance with Code of Civil Procedure § 995.311 and Insurance Code § 12090.

- h) Before submitting a bid, bidders shall carefully examine the work site, the Contract Documents and the form of Contract and shall fully inform themselves about all existing conditions and limitations. Bidders shall include in their bids a sum to cover the cost of all work included in the Contract.
- i) Bid prices must be entered and the bid proposal packet must be uploaded to the BidsOnline System on or before the day and hour set for the bid opening in the Notice Inviting Bids. No other method of bid submittal will be accepted. Bidders with the three lowest responsive bids shall deliver an original hard

copy of the certified check, cashier's check or surety bond to the Purchasing Representative at 1 Civic Center Plaza, Irvine, CA, 92606 within five business days of the bid opening date.

- j) A bid may be considered non-responsive if it does not comply with the requirements set forth in these bid documents. A responsive bid is one that complies with the solicitation in all acceptability and material respects and contains no material defects.
- 3. WITHDRAWAL OF BIDS: Bids may be withdrawn at any time before the bid deadline, by going back into the BidsOnline system and selecting "Withdraw."
- 4. INTERPRETATION OF DRAWINGS AND DOCUMENTS; REQUESTS FOR CLARIFICATION: If any person contemplating submitting a bid for the proposed Contract is in doubt as to the true meaning of any part of the plans and specifications, or other proposed Contract Documents, or finds discrepancies in, or omissions from, the drawings or specifications, he shall submit to the Purchasing Representative a written request for all interpretations or corrections thereof via email to the Project Manager and Purchasing Representative prior to the deadline for submitting questions, as set forth in the Notice Inviting Bids section herein. Any clarification or correction of the proposed documents will be made only by Addendum duly issued, with notice provided to all firms who downloaded the bid documents from the City's website. The City is not responsible for any other explanations or interpretations of the proposed documents.
- 5. ADDENDA TO THE CONTRACT DOCUMENTS: Any addenda issued during the time of bidding, or forming a part of the Contract Documents after the Bidder has downloaded the bid documents from the City's website, shall be taken into account in the bid and shall be made a part of the Contract.

Addenda may be issued by the City of Irvine for any reason, including but not limited to, clarifying or correcting the Notice Inviting Bids, Special Provisions, Plans, or Bid.

Bidders will be notified of such Addenda during the period of advertising either by email or posting on the City's website, provided however, each Bidder shall be solely responsible for obtaining any such Addenda.

The Bidder shall acknowledge the receipt of Addenda on the City's BidsOnline system.

- 6. BIDDER RESPONSIVENESS: Failure of the Bidder to provide requested information in a complete and accurate manner may be considered non-responsive resulting in rejection of the bid. The use of "N/A" or "n/a" in response to any request for information without an explanation as to why that abbreviation is being used may render the bid non-responsive.

7. **BIDDER RESPONSIBILITY:** Bidders are hereby notified that, in accordance with the City of Irvine Municipal Code § 2-12, the City may make a determination that the Contractor is non-responsible if the hearing officer finds evidentiary support that the Bidder has committed any of the following: (1) violated a term of a contract, present or past, with the City or other entity; (2) committed an act or omission which negatively reflects on the Contractor's quality, fitness, or capacity to perform a contract with the City or any other entity or engaged in a pattern or practice which negatively reflects on the same; (3) committed an act or omission which evidences a lack of business integrity or business honesty; (4) made or submitted a false claim against the City or any other entity; or (5) received a fine or citation for performing work in an unsafe manner; or (6) violated a condition, rule, regulation, permit, or standard applicable to a contract with the City or any other entity. In arriving at his or her determination, the hearing officer may consider Bidder's past conduct on City projects or on any other public or private projects upon which Bidder performed work.
8. **BIDDER DEBARMENT:** Bidders are hereby notified that, in accordance with the City of Irvine Municipal Code § 2-12, the City may make a determination that the Bidder shall be debarred if the hearing officer finds evidentiary support that the Bidder has committed any of the following: (1) violated a term of a contract, present or past, with the City or other entity; (2) committed an act or omission which negatively reflects on the Contractor's quality, fitness, or capacity to perform a contract with the City or any entity or engaged in a pattern or practice which negatively reflects on the same; (3) committed an act or omission which evidences a lack of business integrity or business honesty; (4) made or submitted a false claim against the City or any other entity; (5) received a fine or citation for performing work in an unsafe manner; or (6) violated a condition, rule, regulation, permit, or standard applicable to a contract with the City or any other entity. In arriving at his or her determination, the hearing officer may consider past conduct of the Contractor on City projects or on any other public or private projects which Contractor performed work.
9. **OPENING BIDS:** Bids will be publicly available via BidsOnline at the time and date set in the Notice Inviting Bids.
10. **BID PROTEST PROCEDURES:**
 - a) **BASIS FOR PROTEST:** It is the policy of the City to ensure that free and open competition takes place in all procurement activities. If, in the course of a procurement action, an interested party has reason to believe that these conditions do not exist, the interested party may file a protest in accordance with the provisions of these procedures with the City of Irvine Purchasing Representative requesting a review of the claim and a timely resolution of the issue. Any bidder on a project for which it submitted a timely bid may protest the contract award for that project; however, subcontractors, suppliers or other third parties may not protest contract awards. Moreover, complaints

about alleged ambiguity of the bid documents and/or estimates are not appropriate subject matters for bid protests.

- b) **BID PROTEST CONTENTS:** The bid protest shall be submitted in writing via email to the attention of the Purchasing Representative. The written protest shall include:
 - 1) The solicitation number and project description.
 - 2) The name, address, phone number, and email address of the protesting party.
 - 3) A detailed statement of all the legal and factual grounds for the protest and all relevant, supporting documentation (including all written documentation). The grounds for protest must be fully supported.
 - 4) Statement of the form of relief requested from the City.
 - 5) Signature of an authorized representative of the protesting party.
- c) **DEADLINE TO SUBMIT BID PROTESTS:** Bid protests must be filed within five (5) business days after the deadline for receiving bids.
- d) **WHERE TO FILE:** All protests are to be directed to the City of Irvine Purchasing Representative. Protests must be submitted in writing via email to: mcardona@cityofirvine.org. A copy of the email must also be sent to the project manager whose email address is set forth in the bid documents. (A document is considered filed on a particular calendar day when it is received via email by the City of Irvine Purchasing Representative by 5:00 p.m., Pacific Standard Time, on that calendar day.) Although not required, in addition to submitting a protest via email, an original protest letter may be sent via United States Postal Service to: Attn: Purchasing Agent, City of Irvine, P.O. Box 19575, Irvine, CA 92623-9575.
- e) **BID PROTEST REVIEW:** Upon receipt, the Purchasing Representative shall consider the protest and may give notice of the protest and its basis to other persons including bidders involved in or affected by the protest. A protest shall be dismissed for failure to comply with any of the requirements set forth in the "Bid Protest Contents" section above. The Purchasing Representative shall review all material submitted with the protest. No additional material will be accepted for consideration from the protesting party unless specifically requested by the Purchasing Representative. If additional material is requested, it must be submitted by the requested date. The Purchasing Representative shall respond to the protesting party via email within ten (10) business days after receipt of the protest. Final determinations shall be binding, except as otherwise provided below.
- f) **RECONSIDERATION OF PROTEST DECISION:** A protesting party may request the Purchasing Representative's reconsideration of a decision prior to contract award only if one or both of the following conditions are met:

- 1) New information becomes available that was not previously known, or could not have been reasonably known, at the time of the original protest; and/or
- 2) The Purchasing Representative's decision contains an error of law.

Any request for reconsideration of a protest decision must be submitted in writing via email to the Purchasing Representative within three (3) business days from the date of issuance of the initial decision. The request must include a detailed explanation of the basis for reconsideration as set forth above. The Purchasing Representative shall respond to the request for reconsideration within seven (7) business days from receipt of the request.

- g) **CONTRACT AWARD:** At its discretion, the City may delay the execution of any proposed agreement pending the resolution of a protest unless one or both of the following conditions are present:

- 1) The project or service being procured is urgently required; and/or
- 2) Failure to make prompt award will otherwise cause undue harm to the City.

- h) **REMEDIES:** There shall be no limitation on remedies selected by the City. Nothing contained herein shall be considered to either act as a limitation on the City's choice of remedies or confer any right upon any interested party to a remedy. In determining the appropriate remedy, the City shall consider all the circumstances surrounding the solicitation, the contract selection, and/or the contract award, including, but not limited to: the seriousness of any deficiency found to exist in the contracting process; the effect of the action of the competitive process; any urgency surrounding the contract requirement; and the effect that implementing the remedy will have on the City's overall ability to accomplish its mission. If the City determines that the award or proposed award was not made in accordance with the applicable City statutes, regulations, policies, and procedures, the City may, in its sole discretion, grant any of the following or any other remedy it deems appropriate: If pre-award, reject all bids and issue a new solicitation, make a new contractor selection or award a contract consistent with applicable statutes, regulations, policies, and procedures; or if post-award, refrain from extending the term of the contract or awarding task orders under an existing task order agreement; or at its sole discretion, take no further action.

11. **AWARD OR REJECTION OF BIDS AND EXECUTION OF CONTRACT:** The award of the Contract will be as of the date specified in the Notice of Award issued by the City. The award of the Contract shall not constitute a binding obligation on City until the Contract has been lawfully executed by all parties and the Contractor has submitted all required insurance certificates and bonds to the City.

The Contractor shall not commence work in advance of the execution of the Contract, the delivery of the bonds and insurance certificates, as specified above and purchase order issuance.

The award of the Contract, if it is awarded, will be to the responsive and responsible Bidder who submitted the lowest Bid complying with these Proposal Requirements and Conditions and with the Notice Inviting Bids. The lowest bid shall be the lowest bid price on the base contract without consideration of the Additive Bid Items. Such award, if made, will be made within ninety (90) Calendar Days after the opening of the proposals. The ninety (90) Calendar Days period shall be subject to extension for such further period as may be agreed upon in writing between the City and the Bidder(s) concerned. All bids will be compiled on the basis of the estimated quantities of work to be done as shown in the Proposal. However until an award is made, the City of Irvine reserves the right to reject any and all bids or to waive any informality in bids received, if doing so is deemed to best serve the interest of the City.

12. **CONTRACT AND BONDS:** The Contract, which the successful Bidder, as Contractor, will be required to execute, is included in the Contract Documents and should be carefully examined by the Bidder.

The successful Bidder, simultaneously with his execution of the Contract, will be required to furnish a Payment Bond and a Performance Bond. Said bonds shall be in the form of the two (2) sample bonds included in these Contract Documents and based upon conditions specified in the Standard Specifications Section 2-4, "Contract Bonds," and as specified in the Special Provisions and shall be secured from a surety company satisfactory to the City.

Only bonds issued by companies admitted to do business in the State of California will be accepted, in accordance with Code of Civil Procedure § 995.311 and Insurance Code § 12090. Failure to submit acceptable Payment and Performance Bonds as required shall result in rejection of bid and forfeiture of the proposal guarantee.

All alterations, extensions of time, extra and additional work, and other changes authorized by the Contract Documents will be made without securing the consent of the surety or sureties on the Contract bonds.

The Contract shall be signed by the successful Bidder and delivered to the City together with the Contract bonds within ten (10) days of the date specified in the Notice of Award issued by the City, not including Saturdays, Sundays, and legal holidays. The Contractor shall submit insurance certificates electronically in accordance with 7-3 of the Standard Specifications and as set forth in the Contract Documents. The executed Contract, together with the required bonds, will be filed with the Clerk of the City of Irvine.

Failure of the lowest responsive and responsible Bidder to execute the Contract and file acceptable insurance certificates and bonds as provided herein within ten (10) days of award of the Contract, not including Saturdays, Sundays and legal holidays, shall be just cause for the forfeiture of the bid bond. The successful Bidder may file with the City a written notice, signed by the Bidder or his authorized representative, specifying that the Bidder will refuse to execute the Contract if presented to him. The filing of such notice shall have the same force and effect as the failure of the Bidder to execute the Contract and furnish acceptable certificates of insurance and bonds within the time herein before prescribed.

13. SPECIAL NOTICE: Bidders are required to inform themselves fully of the conditions relating to construction and labor under which the Work will be performed, and the Contractor must employ, so far as possible, such methods and means in the carrying out of this work as will not cause any interruption or interference with any other contractor.
14. BIDDERS INTERESTED IN MORE THAN ONE BID: No person, firm or corporation shall be allowed to make or file or be interested in more than one bid as prime contractor for the same work.
15. BIDS TO BE LEFT ON DEPOSIT: No Bidder may withdraw its bid for a period of ninety (90) Calendar Days after the time set for opening thereof. However, the City will return all certified checks within fifteen (15) days, not including Saturdays, Sundays, and legal holidays, after the award of the Contract or rejection of the bids, as the case may be, to respective Bidders whose bids are not accepted.
16. NON-COLLUSION DECLARATION: All Bidders shall submit with their bids an executed non-collusion declaration on the form provided in the bidding documents. Failure to provide completed form shall result in the bid being deemed non-responsive.

The U.S. Department of Transportation (DOT) provides a toll-free hotline to report bid rigging activities. Use the hotline to report bid rigging, bidder collusion, and other fraudulent activities. The hotline number is 800-424-9071. The service is available 24 hours 7 days a week and is confidential and anonymous. The hotline is part of the DOT's effort to identify and investigate highway construction contract fraud and abuse and is operated under the direction of the DOT Inspector General.

17. SUBSTITUTIONS: Where the Specifications or drawings specify any material, product, thing, or service by one or more brand names, whether or not "or equal" is added, and a Bidder wishes to propose the use of another item as being equal, he shall request approval therefor as set forth in 4-6 of the Standard Specifications and Special Provisions.
18. REPORTING SUSPECTED IMPROPRIETY, GROSS WASTE, FRAUD AND OTHER ACTS: Any City and/or Great Park official, employee, and/or contractor who suspects any type of impropriety relating to purchasing or contracting activities,

or gross waste, fraud, or abuse of City and/or Great Park funds or resources, a gross abuse of authority, a specified and substantial danger to public health or safety due to any act or omission of any City and/or Great Park official, employee, or contractor, or the use of a City and/or Great Park office or position, or of City and/or Great Park resources for personal gain, should report the act by calling the City's Integrity Line at 866-428-1509. All such reports shall remain anonymous if desired by the reporting party. Suspected fraudulent activities include bid rigging, product substitution, theft, overcharging, false certifications and representations, and the like. Any allegations of bribery, kickbacks, gratuities, and conflicts of interest involving City employees should also be reported.

19. ASSIGNMENT OF CONTRACT: No assignment by the Contractor of any Contract to be entered into hereunder or of any part thereof, or of funds to be received thereunder by the Contractor, will be recognized by the City unless such assignment has had the prior written approval of the City and the surety has been given due notice of such assignment in writing.

20. OTHER REQUIREMENTS: Before entering into a Contract, the Bidder to whom the Contract has been awarded shall satisfy all insurance requirements per Section 7-3 of the Standard Specifications and Special Provisions and such insurance shall be maintained in full force and effect at its own expense during the life of this Contract.

Upon request, the successful Bidder shall furnish to the City a statement of its financial condition and previous construction experience or such other evidence of his qualifications.

21. LABOR CODE:

PUBLIC WORKS CONTRACTOR REGISTRATION PROGRAM

All contractors and subcontractors who plan to bid on a public works project (the definition of "public works" is found at Labor Code Section 1720, *et seq.*) when the project is for construction, alteration, demolition, installation, or repair work with a value exceeding \$25,000.00 must first be registered and pay an annual fee with the DIR. Additionally, all contractors and subcontractors who plan to bid on public works projects involving maintenance work with a value exceeding \$15,000.00 must first be registered and pay an annual fee with the DIR. The CITY requires all contractors and subcontractors to be registered with the DIR prior to submitting a bid meeting these parameters. By submitting a bid for City of Irvine Department of Public Works and Sustainability project, the contractor acknowledges the above requirements and agrees to maintain a valid Department of Industrial Relations (DIR) Public Works Contractor registration during the term of this project.

a) 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.

- b) Pursuant to Labor Code Section 1771.4, all bidders are hereby notified that this project is subject to compliance monitoring and enforcement by the Department of Industrial Relations.

In addition to the requirement for submittal of certified payroll records **to the City**, contractors and subcontractors shall furnish electronic certified payroll records to the Labor Commissioner (**State of California, Division of Labor Standards Enforcement**).

Contractors and subcontractors shall be responsible for complying and staying current with all DIR requirements and regulations. More information can be found at <http://www.dir.ca.gov/Public-Works/PublicWorks.html>.

Attention is directed to Labor Code § 1735 of which reads as follows:

No discrimination shall be made in the employment of persons upon public works because of the race, religious creed, color, national origin, ancestry, physical handicap, medical condition, marital status, or sex of such persons, except as provided in the Government Code §12940, and every contractor for public works violating this section is subject to all the penalties imposed for a violation of this chapter.

The Contractor shall abide by the provisions of the California Labor Code § 1770-1781, *et seq.* In accordance with the provisions of the California Labor Code § 1773, the general prevailing rates of per diem wages and holiday and overtime work in the locality in which the work is to be performed has been obtained from the Director of the Department of Industrial Relations, a copy of which is on file in the office of the City Clerk of the City of Irvine and will be made available to any interested party upon request. The Contractor shall post a copy of the prevailing rate of per diem wages at the job site. The Contractor, and any subcontractor under him, shall pay not less than the specified prevailing rates of wages to all workers employed in the execution of the contract.

Failure to comply with the subject sections will subject the Contractor to penalty and forfeiture provisions of the Labor Code § 1775.

In accordance with of the Labor Code § 1773.1, the Contractor must make travel and subsistence payments to each worker employed in the execution of the Contract.

The City will not recognize any claim for additional compensation because of the payment by the Contractor of any wage rate in excess of the prevailing wage rate set forth in the Contract. The possibility of wage increases is one of the elements to be considered by the Contractor in determining his bid, and will not under any circumstances be considered as the basis of a claim against the City on the Contract.

The Contractor shall familiarize itself with the provisions of the Labor Code § 1777.5 regarding employment of apprentices, and shall be responsible for compliance therewith, including compliance by his subcontractors.

The Contractor and subcontractors shall comply with Labor Code § 1777.6 which stipulates that it shall be unlawful to refuse to accept otherwise qualified employees as registered apprentices solely on the grounds of race, religious creed, color, national origin, ancestry, sex, or age except as provided in Labor Code § 3077, of such employee.

The Contractor and subcontractors shall comply with Labor Code § 1810 and § 1811 which stipulates that eight hours labor constitutes a legal day's work, and § 1812 which stipulates that the Contractor and subcontractors shall keep an accurate record showing the name of and actual hours worked each calendar day and each calendar week by each worker employed by him in connection with the work performed under the terms of the Contract. Failure to comply with these sections of the Labor Code will subject the Contractor to penalty and forfeiture provisions of the Labor Code § 1813.

22. RESERVATION OF RIGHTS:

The City reserves the right to:

- a) Disqualify any Bidder in accordance with the instructions herein.
- b) Reject any bids, at its discretion, including bids found to be conditional or incomplete, contain irregularities, contain any interlineations or alterations, or found to be not responsive to this Invitation for Bids (IFB).
- c) Investigate the qualifications of any Bidder under consideration.
- d) Require confirmation or clarification of information furnished by the Bidder.
- e) Require additional evidence of Bidder's ability to perform the Work described in these bid documents.
- f) Contact the submitted references to confirm information provided in the bid.
- g) Postpone or cancel the entire IFB or a portion thereof.
- h) Postpone the bid opening or award for its own convenience.
- i) Award a Contract in part or in combination of items.

- j) Issue subsequent IFB.
- k) Seek the assistance of outside technical experts to review the bids.
- l) Disqualify a bid upon evidence of collusion, with intent to defraud, or other illegal practices on the part of the Bidder.
- m) Waive any errors or informalities in any bid to the extent permitted by law.
- n) Require bidder to provide proof as to the equality, substitutability, and compatibility of any items proposed as alternates or equals.
- o) Determine, at the City's sole discretion, the equality, substitutability, and compatibility of any items proposed as alternates or equals.
- p) Exercise any other rights under the City's charter or municipal code.

The City has no obligation to consider any bid unless it is responsive to this IFB and conforming in all respects to the Form of Contract. This IFB does not commit the City to enter into a Contract.

23. Construction contractors are encouraged to allocate the local sales and use tax derived from construction contracts of Five Million Dollars (\$5,000,000) or more directly to the local jurisdiction where the jobsite is located. This qualifying Contract Price applies to each contract or subcontract for work performed at the jobsite. The allocation is accomplished by obtaining a sub-permit of the seller's permit for a specific jobsite. To obtain the sub-permit, please contact the Irvine office of the State Board of Equalization located at 16715 Von Karman Avenue, Suite 200, Irvine, California 92606, phone 949-440-3473, fax 949-440-3482. Further information is available on the following website: www.boe.ca.gov, and in the attached State Board of Equalization Compliance Policy and Procedures Manual Section 260.020, Regulations 1802 and 1806.

CITY OF IRVINE

WILLIAM WOOLETT JR. AQUATICS CENTER EXPANSION (PART A) AND
HERITAGE PARK PARKINGS LOTS (PART B)

CIP 362604 AND 362605

BID NO. PK-26-0047

BIDDER'S PROPOSAL

HONORABLE MAYOR AND MEMBERS OF THE CITY COUNCIL
CITY HALL
IRVINE, CALIFORNIA

THE UNDERSIGNED, HAVING CAREFULLY EXAMINED ALL OF THE CONTRACT DOCUMENTS; PERMITS ISSUED BY JURISDICTIONAL REGULATORY AGENCIES; CONTRACT; CONTRACT ADDENDA; INSTRUCTIONS TO BIDDERS; PROPOSAL REQUIREMENTS AND CONDITIONS; SPECIAL PROVISIONS; THE PLANS FOR PART A (SHEETS A0.0 THROUGH MD2); THE PLANS FOR PART B (CIVIL SHEETS 1 THROUGH 26, LANDSCAPE SHEETS 1 THROUGH 13 AND ELECTRICAL SHEETS 1 THROUGH 19); STANDARD PLANS; STANDARD SPECIFICATIONS; REFERENCE SPECIFICATIONS; AND ALL OTHER INFORMATION PROVIDED BY THE AGENCY FOR THE CONSTRUCTION LISTED ABOVE IN AND FOR THE CITY OF IRVINE, IS FAMILIAR WITH THE CONDITIONS, HAVING PERSONALLY VISITED THE SITE OF THE WORK, AND HEREBY PROPOSES TO FURNISH ALL LABOR, MATERIALS AND EQUIPMENT, AND ALL INCIDENTAL WORK NECESSARY TO DELIVER ALL THE IMPROVEMENTS COMPLETE, IN PLACE AND IN STRICT CONFORMITY WITH THE CONTRACT DOCUMENTS, FOR THE UNIT PRICES NAMED IN THE FOLLOWING SCHEDULE OF WORK, ENTERED THROUGH THE BIDSONLINE SYSTEM.

Bidder's Company Name (please print or type)

Signature of Bidder

Print Name

CITY OF IRVINE

WILLIAM WOOLETT JR. AQUATICS CENTER EXPANSION (PART A) AND
HERITAGE PARK PARKINGS LOTS (PART B)

CIP 362604 AND 362605

BID NO. PK-26-0047

SCHEDULE OF WORK (PART A)

All applicable sales taxes, State and/or Federal taxes, and any other special taxes, patent rights or royalties are included in the prices quoted in this Proposal.

BID ITEM NO.	BID ITEM DESCRIPTION	UNIT	EST. QTY.
1	ALL WORK PER PLANS, SPECIFICATIONS, AND CONTRACT DOCUMENTS	LS	1

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CITY OF IRVINE

WILLIAM WOOLETT JR. AQUATICS CENTER EXPANSION (PART A) AND
HERITAGE PARK PARKINGS LOTS (PART B)

CIP 362604 AND 362605

BID NO. PK-26-0047

SCHEDULE OF WORK (PART A) – ADDITIVE BID

All applicable sales taxes, State and/or Federal taxes, and any other special taxes, patent rights or royalties are included in the prices quoted in this Proposal.

ADD. BID ITEM NO.	ADDITIVE BID ITEM DESCRIPTION	UNIT	EST. QTY.
1	NINJA CROSS SYSTEM	LS	1

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CITY OF IRVINE

WILLIAM WOOLETT JR. AQUATICS CENTER EXPANSION (PART A) AND HERITAGE PARK PARKINGS LOTS (PART B)

CIP 362604 AND 362605

BID NO. PK-26-0047

SCHEDULE OF WORK (PART B)

All applicable sales taxes, State and/or Federal taxes, and any other special taxes, patent rights or royalties are included in the prices quoted in this Proposal.

BID ITEM NO.	LOT 2 BID ITEM DESCRIPTION	UNIT	EST. QTY.
1	MOBILIZATION	LS	1
2	DEMOBILIATION AND CLEANUP	LS	1
3	SWPPP PREPARATION, IMPLEMENTATION AND MONITORING	LS	1
4	CLEARING AND GRUBBING	LS	1
5	EARTHWORK-CUT	CY	5,880
6	EARTHWORK-FILL	CY	790
7	18-INCH IMPORTED SUBGRADE	CY	8,760
8	DEMOLITION	LS	1
9	4-INCH THICK ASPHALT CONCRETE	TON	630
10	5-INCH THICK ASPHALT CONCRETE	TON	1530
11	5-INCH THICK AGGREGATE BASE	TON	735
12	5.5-INCH THICK AGGREGATE BASE	TON	1580
13	"TYPE D" CURB AND GUTTTER	LF	990
14	"TYPE B-6" CURB	LF	2,130
15	"TYPE C-6" CURB	LF	130
16	"TYPE B-6" TO "TYPE C-6" CURB TRANSITION	LF	50
17	PCC VALLEY GUTTER	SF	160
18	4-INCH THICK PCC SIDEWALK	SF	7,430
19	6-INCH THICK AGGREGATE BASE	TON	35
20	CATCH BASINS TYPE I (INCLUDE LOCAL DEPRESSION)	EA	4
21	CATCH BASINS TYPE II, W=10'/W=22' (INCLUDE LOCAL DEPRESSION)	EA	1
22	8-INCH HDPE STORM DRAIN LINE	LF	130
23	10-INCH HDPE STORM DRAIN LINE	LF	90
24	12-INCH HDPE STORM DRAIN LINE	LF	275
25	115-INCH HDPE STORM DRAIN LINE	LF	35

CITY OF IRVINE

WILLIAM WOOLETT JR. AQUATICS CENTER EXPANSION (PART A) AND
HERITAGE PARK PARKINGS LOTS (PART B)

CIP 362604 AND 362605

BID NO. PK-26-0047

BID ITEM NO.	LOT 2 BID ITEM DESCRIPTION	UNIT	EST. QTY.
26	STORM DRAIN CLEAN OUT	EA	7
27	JUNCTION STRUCTURE	EA	4
28	CONCRETE COLLAR	EA	1
29	4'X4' BIOFILTRATION INTERNAL BYPASS SYSTEM	EA	1
30	4'X4' BIOFILTRATION OFFLINE SYSTEM	EA	1
31	6'X4' BIOFILTRATION OFFLINE SYSTEM	EA	1
32	8'X6' BIOFILTRATION OFFLINE SYSTEM	EA	2
33	8'X8' BIOFILTRATION INTERNAL BYPASS SYSTEM	EA	1
34	CURB RAMP	EA	5
35	TRUNCATED DOMES	SF	115
36	WHEELSTOP	EA	45
37	U-CHANNEL	EA	1
38	THERMO SIGNING AND STRIPING	LS	1
39	ELECTRICAL UTILITY SERVICE	LS	1
40	PARKING LOT LIGHTS	EA	29
41	MAIN SWITCHBOARD	LS	1
42	RECEPTACLE PEDESTAL	LS	1
43	EV CHARGERS	EA	12
44	PULLBOXES	EA	36
45	PANELBOARDS	EA	2
46	BRANCH CIRCUITING	LS	1
47	LANDSCAPE AND IRRIGATION	SF	26,100
48	24" BOX TREES	EA	100
49	15 GALLON TREES	EA	25
50	15 GALLON SHRUBS	EA	36
51	5 GALLON SHRUBS	EA	368
52	ROOT BARRIERS- BOTH SIDES	EA	262
53	SOIL TESTING – SEVEN (7) AREAS	EA	7
54	SOIL FERTILIZERS/TABS AND HERIBICIDES	SF	26,100
55	3" DEPTH MULCH COVER	SF	26,100
56	PLANT ESTABLISHMENT AND MAINTENANCE (100 DAYS)	SF	26,100
57	TURF REPAIR	SF	6,640

CITY OF IRVINE

WILLIAM WOOLETT JR. AQUATICS CENTER EXPANSION (PART A) AND
HERITAGE PARK PARKINGS LOTS (PART B)
CIP 362604 AND 362605
BID NO. PK-26-0047

BID ITEM NO.	LOT 2 BID ITEM DESCRIPTION	UNIT	EST. QTY.
58	PROVIDE AS-BUILT PLANS	LS	1
59	66-INCH DETENTION PIPE	Cu. FT	3,780
60	6'X4' BIOFILTRATION INTERNAL BYPASS SYSTEM	EA	2
61	JUNCTION STRUCTURE (W/O MANHOLE)	EA	1
62	CONSTRUCTION SCHEDULE	LS	1
63	TRAFFIC CONTROL	LS	1

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CITY OF IRVINE

WILLIAM WOOLETT JR. AQUATICS CENTER EXPANSION (PART A) AND HERITAGE PARK PARKINGS LOTS (PART B)

CIP 362604 AND 362605

BID NO. PK-26-0047

SCHEDULE OF WORK (PART B) – ADDITIVE BID

All applicable sales taxes, State and/or Federal taxes, and any other special taxes, patent rights or royalties are included in the prices quoted in this Proposal.

ADD. BID ITEM NO.	LOT 1 ADDITIVE BID ITEM DESCRIPTION	UNIT	EST. QTY.
1	MOBILIZATION	LS	1
2	DEMOBILIZATION AND CLEANUP	LS	1
3	SWPPP PREPARATION, IMPLEMENTATION AND MONITORING	LS	1
4	CLEARING AND GRUBBING	LS	1
5	EARTHWORK-CUT	CY	7,900
6	EARTHWORK-FILL	CY	2,850
7	18-INCH IMPORTED SUBGRADE	CY	8,200
8	DEMOLITION	LS	1
9	4-INCH THICK ASPHALT CONCRETE	TON	1,300
10	5-INCH THICK ASPHALT CONCRETE	TON	2,200
11	5-INCH THICK AGGREGATE BASE	TON	1,520
12	5.5-INCH THICK AGGREGATE BASE	TON	2,100
13	"TYPE D" CURB AND GUTTER	LF	1,125
14	"TYPE B-6" CURB	LF	2,000
15	"TYPE C-6" CURB	LF	115
16	"TYPE B-6" TO "TYPE C-6" CURB TRANSITION	LF	20
17	3-FT PCC VALLEY GUTTER	SF	1,000
18	4-INCH THICK PCC SIDEWALK	SF	2,250
19	CONCRETE SLOUGH WALL	LF	300
20	CATCH BASINS TYPE I (INCLUDE LOCAL DEPRESSION)	EA	1
21	CATCH BASINS TYPE II, W=21' (INCLUDE LOCAL DEPRESSION)	EA	2
22	8-INCH HDPE STORM DRAIN LINE	LF	40
23	12-INCH HDPE STORM DRAIN LINE	LF	500
24	8'X12.5' BIOFILTRATION PEAK DIVERSION SYSTEM	EA	2

CITY OF IRVINE

WILLIAM WOOLETT JR. AQUATICS CENTER EXPANSION (PART A) AND
HERITAGE PARK PARKINGS LOTS (PART B)

CIP 362604 AND 362605

BID NO. PK-26-0047

ADD. BID ITEM NO.	LOT 1 ADDITIVE BID ITEM DESCRIPTION	UNIT	EST. QTY.
25	FLOW GUARD FILTER	EA	3
26	STORM DRAIN CLEANOUT	EA	2
27	CURB RAMP	EA	3
28	CONTECH STORM GATE SYSTEM	EA	1
29	TRUNCATED DOMES	SF	360
30	WHEELSTOP	EA	202
31	U-CHANNEL	EA	1
32	SIGNING AND THERMO STRIPING	LS	1
33	ELECTRICAL UTILITY SERVICE	LS	1
34	PARKING LOT LIGHTS	EA	29
35	MAIN SWITCHBOARD	LS	1
36	PEDESTAL	EA	1
37	CONNECT LIGHTING SYSTEM TO EXISTING CIRCUITING	LS	1
38	PULLBOXES	EA	36
39	PANELBOARDS	EA	2
40	BRANCH CIRCUITING	LS	1
41	IRRIGATION CABINET/ CONTROLLER	EA	2
42	LANDSCAPE AND IRRIGATION	SF	17,865
43	24" BOX TREES	EA	100
44	15 GALLON TREES	EA	25
45	15 GALLON SHRUBS	EA	36
46	5 GALLON SHRUBS	EA	368
47	1 GALLON SHRUBS /G ROUND COVER	EA	7,680
48	2 TREE SUPPORTS AND 4 TIES	EA	262
49	ROOT BARRIERS- BOTH SIDES	EA	262
50	SOIL TESTING – SEVEN (7) AREAS	EA	7
51	SOIL FERTILIZERS/TABS AND HERIBICIDES	SF	17,865
52	3" DEPTH MULCH COVER	SF	17,865
53	PLANT ESTABLISHMENT AND MAINTENANCE (100 DAYS)	SF	17,865
54	TURF REPAIR	SF	9,800
55	PROVIDE AS-BUILT PLANS	LS	1
56	VARIABLE HEIGHT CURB	LF	395

CITY OF IRVINE

WILLIAM WOOLETT JR. AQUATICS CENTER EXPANSION (PART A) AND
HERITAGE PARK PARKINGS LOTS (PART B)
CIP 362604 AND 362605
BID NO. PK-26-0047

ADD. BID ITEM NO.	LOT 1 ADDITIVE BID ITEM DESCRIPTION	UNIT	EST. QTY.
57	SLURRY SEAL	SF	16,772
58	4-INCH STORM DRAIN LINE	LF	9
59	60-INCH DETENTION PIPE	Cu. FT	8,847
60	BASEBALL NETTING AND FOUNDATION (DEFERED SUBMITTAL)	LS	1
61	CONSTRUCITON SCHEDULE	LS	1
62	TRAFFIC CONTROL	LS	1

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CITY OF IRVINE

WILLIAM WOOLETT JR. AQUATICS CENTER EXPANSION (PART A) AND HERITAGE PARK PARKINGS LOTS (PART B) CIP 362604 AND 362605 BID NO. PK-26-0047

INSTRUCTIONS FOR ENTERING ELECTRONIC BIDS

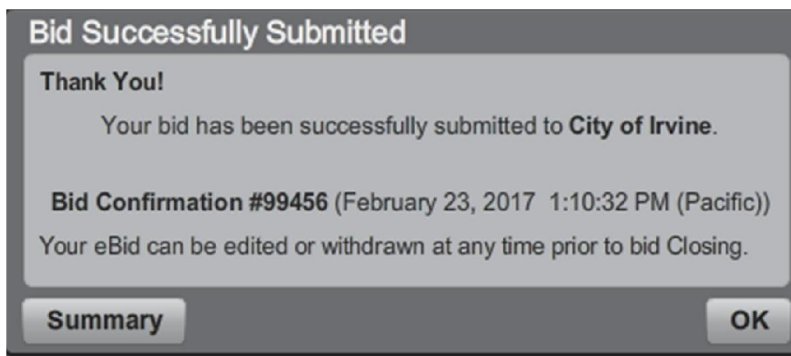
In order to access the BidsOnline system and ensure successful online submission of your bid prices, follow these steps:

- a) Go to <https://www.planetbids.com/portal/portal.cfm?CompanyID=15927#>
- b) On the Vendor Portal page, log into the system (lower right-hand corner of screen) with your assigned username and password. (You must be registered in order to download documents and submit a bid.)
- c) Click on "Bid Opportunities" and then on the Bid # and Description that you wish to bid on. The selected bid will open to allow you to access all tabs, documents, and the pricing sheet.
- d) Click on the "Documents & Attachment" tab to be sure you have downloaded all documents that are part of this bid.
 - *If you have not already downloaded all bid documents, you must download them now, in order to submit your bid. The screen will indicate which documents you've already downloaded.*
- e) Click on the tab "Addenda & Emails" to be sure you have read and acknowledged all addenda that have been issued for this bid.
 - *The screen will display "yes" or "no" next to each addendum to indicate whether you have viewed and acknowledged it. If you have not previously acknowledged an addendum, do so now by clicking on the addendum to open and read it, then click on the "Acknowledge" button on the lower left-hand corner of screen.*
- f) To begin entering your bid, click on "Place eBid" on the lower right corner of the screen. The bid "Terms and Conditions" will pop up with a button for you to click "Accept" to acknowledge your agreement to the terms of the bid.
- g) Enter the Respondee information on the "Detail" tab.
- h) Click the "Attach" button on the "Attachments" tab, browse to your scanned Bid Submittal Documents, and upload all Bid Submittal Documents as a single PDF file.

CITY OF IRVINE

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- i) Go to the "Line Items" tab and enter your unit prices on each line. The system will calculate the extended costs and grand total for you.
- j) When you have finished entering all pricing and attachments, click on the "Save" button. This saves your bid as a draft for you to review or revise as needed anytime up to the bid submittal deadline. When you are ready to submit your bid, click the "Submit" button. You will receive a confirming message that looks like this:



Note: E-Bids are sealed and cannot be viewed by the City until the closing date and time. As noted in the screen print above, if you need to withdraw your bid, you may do so any time before the bid deadline, by going back into the system and selecting "withdraw".

Please begin entering your bid in sufficient time to complete and submit it prior to the stated deadline. The official closing time for the bid is determined, and controlled, by the electronic clock in the bid management system. Once the deadline is reached, the system will not allow any bids to be submitted, and any in process that are not completed will be rejected. The amount of time required to enter and submit your bid depends on the complexity of the bid and the processing speed of your server and internet connections.

Technical Support

In the event you encounter technical difficulties during the uploading process, please contact the Planet Bids, BidsOnline system team as shown below (M-F from 8 a.m. to 5 p.m.):

support@planetbids.com or call 818-992-1771, ext. 0

Bid prices must be entered and the bid proposal packet must be uploaded to the BidsOnline system no later than the date and time indicated in the Notice Inviting Bids. No late bids will be accepted. No other method of bid submittal will be accepted.

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CIP 362604 AND 362605
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INFORMATION REQUIRED OF BIDDERS

In determining the lowest “responsible” bidder, consideration will be given to the general competency of the bidder in regard to the work covered by the Bid Proposal. To this end, each proposal shall be supported by a statement of the Bidder’s experience on this form. **Failure of the Bidder to provide requested information in a complete and accurate manner shall render the bid non-responsive.** Additionally, the City reserves the right to disqualify or refuse to consider a proposal if a Bidder is determined to be non-responsible in accordance with Irvine Municipal Code § 2-12-103 “Determination of Contractor Non-Responsibility.”

The Bidder shall supply the following information. Use additional sheets as necessary.

1. Contact person name: _____ Email: _____
Address: _____
Telephone: (____) _____ Fax: (____) _____
2. Type of firm (Individual, Partnership, or Corporation): _____
3. State Contractor’s License Number and Classification: _____
4. DIR Registration Number: _____ Expiration Date _____
5. Number of years your firm has operated as a contractor: _____
6. Number of years your firm operated under its present business name: _____
7. List the **names and addresses** of all principals or officers authorized to bind your firm.

Name:	Address:

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8. List any project(s) your firm has **failed to complete** within the last five years due to a termination of contract. For each project, list the type of project, client's name, contact person, current telephone number, email address, and provide a brief description of the grounds for the termination.

Check appropriate box: None ☐ See list below ☐

Type of Project	Client Name	Contact Person	Contact Phone No. and email address
Description:			

Type of Project	Client Name	Contact Person	Contact Phone No. and email address
Description:			

Type of Project	Client Name	Contact Person	Contact Phone No. and email address
Description:			

9. List projects of similar nature to the WILLIAM WOOLETT JR. AQUATICS CENTER EXPANSION (PART A) AND HERITAGE PARK PARKING LOTS (PART B) your firm is **currently** constructing. For each project, list the type of project, contract amount, client's name, contact person, current telephone number, email address, and a brief description.

Check appropriate box: None ☐ See list below ☐

Type of Project	Contract Amount	Client Name	Contact Person	Contact Phone No. and email address
Description:				

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Type of Project	Contract Amount	Client Name	Contact Person	Contact Phone No. and email address
Description:				
Description:				

10. List projects of a similar nature to the WILLIAM WOOLETT JR. AQUATICS CENTER EXPANSION (PART A) AND HERITAGE PARK PARKING LOTS (PART B) your firm has **completed** within the last five years. For each project, list the type of project, contract amount, date of completion, client's name, contact person, current telephone number, email address, and a brief description.

Check appropriate box: None ☐ See list below ☐

Type of Project	Contract Amount	Date of Completion	Client Name	Contact Person	Contact Phone No. and email address
Description:					

Type of Project	Contract Amount	Date of Completion	Client Name	Contact Person	Contact Phone No. and email address
Description:					

CITY OF IRVINE

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Type of Project	Contract Amount	Date of Completion	Client Name	Contact Person	Contact Phone No. and email address
Description:					

11. List the name of the person(s) (**A MINIMUM OF ONE**) who inspected the site of the proposed work for your firm.

Name:	Date of Inspection:

12. Complete the following in conformance with Labor Code Section 1725.5:

Name of Subcontractor	Registered with DIR?	DIR Registration No.
	Yes ___ No ___	
	Yes ___ No ___	
	Yes ___ No ___	
	Yes ___ No ___	
	Yes ___ No ___	
	Yes ___ No ___	
	Yes ___ No ___	
	Yes ___ No ___	
	Yes ___ No ___	
	Yes ___ No ___	
	Yes ___ No ___	

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13. If requested by the City, the Bidder shall furnish a notarized financial statement, financial data, or other information and references sufficiently comprehensive to permit an appraisal of its current financial condition or ability to perform the work.

Failure to furnish information upon request will render the bid nonresponsive.

All of the above statements regarding Contractor's experience and financial qualifications are submitted in conjunction with the Bid Proposal, as a part thereof, and the truthfulness and accuracy of the information is guaranteed by the Bidder.

CITY OF IRVINE

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THE CITY OF IRVINE RESERVES THE RIGHT TO REJECT ALL BIDS

The undersigned understands the contract time limit allotted for the completion of the work required by the Contract is **Four Hundred Twenty (420) Working Days** (excluding plant establishment) and **Five Hundred Twenty (520) Working Days** (including plant establishment.)

The undersigned agrees, if awarded the Contract, to sign the Contract and furnish the necessary insurance certificates and bonds within ten (10) days of the date specified in the Notice of Award of Contract, not including Saturdays, Sundays, and legal holidays, and to begin work within ten (10) Working Days from the date specified in the City's Notice to Proceed. Contract time accounting shall begin on the date shown in the Notice to Proceed.

Accompanying this Bid Proposal is **(check appropriate box)**:

☐ **Cashier's Check** ☐ **Certified Check** ☐ **Bid Bond**

Sign Here if Individual:

Signature: _____

Print Name: _____

Address: _____

Affix notary's acknowledgement

(Signature blocks continue on the following page)

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Sign Here if Co-Partnership or LLC:

Co-Partnership/LLC Name of Firm: _____

Address: _____

Members Signing:

Signature: _____ Print Name: _____

Address: _____

Signature: _____ Print Name: _____

Address: _____

Affix notary's acknowledgement

Sign Here if Corporation:

Name of Corporation: _____

Address: _____

Officers of Corporation Signing:

Signature: _____ Print Name: _____

Address: _____

Signature: _____ Print Name: _____

Address: _____

If executed by other than President and Secretary of the Corporation, attach a certified copy of resolution authorizing signature on behalf of the Corporation.

Affix notary's acknowledgement

CITY OF IRVINE

WILLIAM WOOLETT JR. AQUATICS CENTER EXPANSION (PART A) AND HERITAGE PARK PARKINGS LOTS (PART B)

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BID NO. PK-26-0047

LIST OF SUBCONTRACTORS

The Bidder shall list each subcontractor performing work in an amount in excess of one-half of one percent (1/2%) of the prime contractor's total bid, or, in the case of bids for the construction of streets or highways, including bridges, in excess of one-half of one percent (1/2%) of the prime contractor's total bid or ten thousand dollars (\$10,000), whichever is greater. Complete columns (1) and (2) and submit with the bid. Complete columns (3) and (4) and submit with the bid or email to Purchasing@cityofirvine.org within 24 hours after the bid opening. Failure to provide complete information in columns (1) through (4) within the time specified shall render the bid non-responsive.

Subcontractors listed must not be debarred from performing the designated work.

Information must be typed or clearly printed.

BUSINESS NAME AND LOCATION (1)	CONTRACTOR LICENSE NUMBER (2)	BID ITEM NUMBER (SUBCONTRACTORS PROVIDING WORK TO MULTIPLE BID ITEMS OF WORK SHOULD BE LISTED FOR EACH BID ITEM SEPARATELY) (3)	PERCENTAGE OF BID ITEM PRICE SUBCONTRACTED AND DESCRIPTION OF THE PORTION OF BID ITEM WORK TO BE PERFORMED BY SUBCONTRACTOR (4)*
<u>Sample: XYZ Contractors</u>	<u>XXXXXX</u>	2	<u>50% of Bid Item #2; Excess soil export</u>
<u>Sample: XYZ Contractors</u>	<u>XXXXXX</u>	3	<u>20% of Bid Item #3; Topsoil import</u>

*** If you are subcontracting a whole bid item, insert one hundred percent (100%); if less, insert actual percentage.**

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NON-COLLUSION DECLARATION-CONTRACTOR

To be Executed by Bidder and Submitted with Bid

The undersigned declares:

I am the _____ [title] of _____ [company
name], 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].

Signature

Print Name

CITY OF IRVINE

WILLIAM WOOLETT JR. AQUATICS CENTER EXPANSION (PART A) AND
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CIP 362604 AND 362605

BID NO. PK-26-0047

FORM OF BID BOND

(10% of the Proposal Amount)

KNOW ALL PERSONS BY THESE PRESENTS that we _____
_____ as Principal, and _____
_____ as Surety, are held and firmly bound unto City of Irvine, hereinafter called the City
in the sum of _____ Dollars (\$____
_____), for the payment of which sum well and truly to be made, we bind ourselves, our
heirs, executors, administrators and successors, jointly and severally, firmly by these
presents.

The conditions of this obligation are such that whereas the Principal submitted to the City a
certain Bid Proposal, attached hereto and hereby made a part hereof, to enter into a
contract in writing for the **WILLIAM WOOLETT JR. AQUATICS CENTER EXPANSION
(PART A), CIP 362604 AND HERITAGE PARK PARKING LOTS (PART B), CIP 362605**
and will furnish all required certificates of insurance and bonds as required by the
Contract.

NOW THEREFORE, if said Bid Proposal shall be rejected; or in the alternate, if said Bid
Proposal shall be accepted, and the Principal shall execute and deliver a contract in the
prescribed Form of Contract, shall deliver certificates evidencing that the required
insurance is in effect and shall execute and deliver Performance and Payment Bonds in
the forms prescribed, and shall in all other respects perform the Contract created by the
acceptance of said Bid Proposal, then this obligation shall be void; otherwise this
obligation shall remain in force and effect, it being expressly understood and agreed that
the liability of the Surety for any and all default of the Principal hereunder shall be the
amount of this obligation as herein stated. In the event suit is brought upon this bond by
City and judgment is recovered, Surety shall pay all costs incurred by City in said suit,
including a reasonable attorney's fee to be fixed by the court.

The Surety, for the value received, hereby stipulates and agrees that the obligations of
said Surety and its bond shall in no way be impaired or affected by an extension of the
time within which the City may accept such a Bid Proposal; and said Surety does hereby
waive notice of any such extension.

IN WITNESS WHEREOF, the above-bounded parties have executed this instrument this
____ day of _____, 20____, the name of each party being hereto written below
and these presents duly signed by each party's undersigned representative, pursuant to
authority of its governing body. This bond shall be authenticated by way of notarized
acknowledgment, including a copy of the power of attorney, for the Surety.

ATTEST:

(Principal) _____

(Address) _____

(By) _____

(Title) _____

ATTEST:

(Surety) _____

(Address) _____

(By) _____

(Title) _____

CITY OF IRVINE

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BID NO. PK-26-0047

FALSE CLAIMS

Bidder shall complete the False Claims Act Certification below or in the alternative, provide the information requested under False Claims Act Violations below. Failure to certify or provide the requested information shall render the bid non-responsive.

"False Claims Act" as used herein is defined as either or both the Federal False Claims Act, 31 U.S.C. § 3729, *et seq.*, and the California False Claims Act, Government Code § 12650, *et seq.*

FALSE CLAIMS ACT CERTIFICATION

I _____ hereby certify that neither
Print name

Contractor name

nor _____
Name of qualifying person licensed by Contractors State License Board

has been determined by a court or tribunal of competent jurisdiction to have violated the False Claims Act as defined above.

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

Executed this _____ day of _____ at _____
(Month and year) (City and State)

By _____
(Signature of owner, officer, manager or licensee responsible for submission of Bid Proposal)

FALSE CLAIMS ACT VIOLATIONS

With regard to any determinations by a tribunal or court of competent jurisdiction that the False Claims Act, as defined above, has been violated by (1) the Contractor submitting this Bid Proposal or (2) the qualifying person licensed by the State Contractors License Board to perform the work described in this Bid Proposal, shall provide on a separate sheet the following information: (1) the date of the determination of the violation, (2) the identity of the tribunal or court, (3) the identity of the government contract or project involved, (4) the identity of the government department involved, (5) the amount of fine imposed, and (6) any exculpatory information of which the Agency should be aware.

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CIVIL LITIGATION AND ARBITRATION HISTORY

Bidder shall provide the certification or information requested below. Failure to certify or provide such certification or information shall render the bid non-responsive.

For five (5) years preceding the submittal date of this Bid Proposal, identify civil litigation and arbitration arising out of the performance of a construction contract within the State of California in which the (1) Contractor submitting this bid proposal or (2) the qualifying person licensed by the State Contractors Licensing Board to perform the work described in this Bid Proposal was a named as a party in a lawsuit brought by or against the project owner or any action to confirm, vacate or modify an arbitration award involving an owner.

CIVIL LITIGATION AND ARBITRATION CERTIFICATION

If the Bidder has no civil litigation and arbitration history to report as described above, complete the following:

I _____ certify that neither
Print name

Contractor name

nor _____
Name of qualifying person licensed by Contractors State License Board

has been involved in civil litigation and arbitration as described above.

I declare under penalty of perjury that the foregoing is true and correct.

Executed this _____ day of _____ at _____
(Month and year) (City and State)

By _____
(Signature of owner, officer, manager or licensee responsible for submission of Bid Proposal)

Do not include litigation and arbitration which are limited solely to enforcement of mechanics' liens or stop notices. Provide on a separate sheet (1) the name and court case identification number of each case, (2) the jurisdiction in which it was filed, and (3) the outcome of the litigation, e.g. whether the case is pending, a judgment was entered, a settlement was reached, or the case was dismissed.

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CRIMINAL CONVICTIONS

Bidder shall provide the certification or information requested below. Failure to certify or provide such certification or information shall render the bid non-responsive.

CRIMINAL CONVICTION CERTIFICATION

If the Bidder has no criminal convictions to report as described above, complete the following:

I _____ hereby certify that neither
Print name

Contractor name

nor _____
Name of qualifying person licensed by Contractors State License Board

has been convicted of a criminal violation as described above.

I declare under penalty of perjury that the foregoing is true and correct.

Executed this _____ day of _____ at _____
(Month and year) (City and State)

By _____
(Signature of owner, officer, manager or licensee responsible for submission of Bid Proposal)

For the five (5) years preceding the date of this Bid Proposal is due, identify on a separate sheet any criminal conviction in any jurisdiction in the United States for a violation of law arising out of the performance of a construction contract (1) by the Contractor submitting this Bid Proposal or (2) by the qualifying person licensed by the State Contractors License Board to perform the work described in the Bid Proposal.

Provide on the following page labeled "Criminal Convictions Information." (1) the date of conviction, (2) the name and court case identification number, (3) the identity of the law violated, (4) the identity of the prosecuting agency, (5) the contract or project involved, (6) the punishment imposed, and (7) any exculpatory information of which the Agency should be aware.

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VIOLATION OF LAW OR A SAFETY REGULATION

Has the Bidder, any officer of the Bidder, or any employee who has proprietary interest in the Bidder, ever been disqualified, removed, or otherwise prevented from bidding on, or completing a federal, state, or local government project because of a violation of a law or a safety regulation?

☐ Yes ☐ No

If the answer is yes, explain the circumstances in the following space.

Name of bidder (print)

Signature

Address

State Contractors' License No. &
Classification

City

Zip Code

Telephone

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CERTIFICATION BY CONTRACTOR

CRIMINAL RECORDS CHECK

AB 1610, 1612 and 2102

To the Governing Board of **Irvine Unified School District:**

I, _____ certify that:

Name of Contractor

1. I have carefully read and understand the Notice to Contractors Regarding Criminal Record Checks (Education Code Section 45125.1) required by the passage of AB 1610, 1612 and 2102.
2. Due to the nature of the work I will be performing for the District, my employees may have contact with students of the District.
3. None of the employees who will be performing the work have been convicted of a violent or serious felony as defined in the Notice and in Penal Code Section 1192.7 and this determination was made by a fingerprint check through the Department of Justice.

I declare under penalty of perjury that the foregoing is true and correct.

Executed at _____, California on _____.

Date

Signature

Typed or printed name

Title

Address

Telephone

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NOTICE TO CONTRACTORS REGARDING CRIMINAL RECORDS CHECK **(EDUCATION CODE SECTION 45125.1)**

Education Code Section 45125.1 provides that if the employees of any entity that has a contract with a school district may have any contact with pupils, those employees shall submit or have submitted their fingerprints in a manner authorized by the Department of Justice together with a fee determined by the Department of Justice to be sufficient to reimburse the Department for its costs incurred in processing the application.

The Department of Justice shall ascertain whether the individual whose fingerprints were submitted to it has been arrested or convicted of any crime insofar as that fact can be ascertained from information available to the Department. When the Department of Justice ascertains that an individual whose fingerprints were submitted to it has a pending criminal proceeding for a violent felony listed in Penal Code Section 1192.7(c), or has been convicted of such a felony, the Department shall notify the employer designated by the individual of the criminal information pertaining to the individual. The notification shall be delivered by telephone and shall be confirmed in writing and delivered to the employer by first-class mail.

The contractor shall not permit an employee to come in contact with pupils until the Department of Justice has ascertained that the employee has not been convicted of a violent or serious felony. The contractor shall certify in writing to the governing board of the school district that none of its employees who may come in contact with pupils have been convicted of a violent or serious felony.

Penal Code Section 667.5(c) lists the following “violent” felonies: murder; voluntary manslaughter; mayhem; rape; sodomy by force; oral copulation by force; lewd acts on a child under the age of 14 years; any felony punishable by death or imprisonment in the state prison for life; any felony in which the defendant inflicts great bodily injury on another; any robbery perpetrated in an inhabited dwelling; arson; penetration of a person’s genital or anal openings by foreign or unknown objects against the victim’s will; attempted murder; explosion or attempt to explode or ignite a destructive device or explosive with the intent to commit murder; kidnapping; continuous sexual abuse of a child; and carjacking.

Penal Code Section 1192.7 lists the following “serious” felonies: murder; voluntary manslaughter; mayhem; rape; sodomy by force; oral copulation by force; a lewd or lascivious act on a child under the age of 14 years; any felony punishable by death or imprisonment in the state prison for life; any felony in which the defendant personally inflicts great bodily injury on another, or in which the defendant personally uses a firearm; attempted murder; assault with intent to commit rape or robbery; assault with a deadly weapon on a peace officer; assault by a life prisoner on a noninmate; assault with a deadly weapon by an inmate; arson; exploding a destructive device with intent to injure or to murder, or explosion causing great bodily injury or mayhem; burglary of an inhabited dwelling; robbery or bank robbery; kidnapping; holding of a hostage by a person confined in a state prison; attempt to commit a felony punishable by death or imprisonment in the state prison for life; any felony in which the defendant personally uses a dangerous or deadly weapon; selling or furnishing specified controlled substances to a minor;

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penetration of genital or anal openings by foreign objects against the victim's will; grand theft involving a firearm; carjacking; and a conspiracy to commit specified controlled substances offenses.

This space is intentionally left blank

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DESIGNATION OF SUBCONTRACTORS

In compliance with the Subletting and Subcontracting Fair Practices Act (Public Contract Code Section 4100 et. seq.) and any amendments thereof, each bidder shall set forth below: (a) the name and the location of the place of business of each subcontractor who will perform work or labor or render service to the bidder (prime contractor) in or about the construction of the work or improvement to be performed under this contract or a subcontractor licensed by the State of California who, under subcontract to the bidder (prime contractor), specially fabricates and installs a portion of the work or improvement according to detailed drawings contained in the plans and specifications in an amount in excess of one-half of one percent of the bidder's (prime contractor's) total bid and (b) the portion of the work which will be done by each subcontractor. The bidder (prime contractor) shall list only one subcontractor for each such portion as is defined by the bidder (prime contractor) in this bid.

Since this Project includes work that will be performed by mechanical, electrical or plumbing contractors (defined as contractors holding C-4, C-7, C-10, C-16, C-20, C-34, C-36, C-38, C-42, C-43 or C-46 licenses, collectively "MEP Subcontractors"), such MEP Subcontractors must also be prequalified in accordance with Public Contract Code section 20111.6. A list of prequalified prime contractors and MEP Subcontractors will be made available by the District to all bidders at least five business days prior to the bid opening date.

If a bidder (prime contractor) fails to specify a subcontractor or if a bidder (prime contractor) specifies more than one subcontractor for the same portion of work to be performed under the contract in excess of one-half of one percent of the bidder's (prime contractor's) total bid, bidder shall be deemed to have agreed that bidder is fully qualified to perform that portion, and that bidder alone shall perform that portion. Violation of this requirement (including the procurement of a subcontractor for the Project if no subcontractor is specified) can result in the DISTRICT invoking the remedies of Public Contract Code Sections 4110 and 4111.

No bidder (prime contractor) whose bid is accepted shall (a) substitute any subcontractor, (b) permit any subcontractor to be voluntarily assigned or transferred or allow it to be performed by any one other than the original subcontractor listed in the original bid, or (c) sublet or subcontract any portion of the work in excess of one-half of one percent of the bidder's (prime contractor's) total bid as to which the original bid did not designate a subcontractor, except as authorized in the Subletting and Subcontracting Fair Practices Act. Subletting or subcontracting of any portion of the work in excess of one-half of one percent of the bidder's (prime contractor's) total bid as to which no subcontractor was designated in the original bid shall only be permitted in cases of public emergency or necessity, only after a finding reduced to writing as a public record of the DISTRICT awarding this contract setting forth the facts constituting the emergency or necessity.

WILLIAM WOOLETT JR. AQUATICS CENTER EXPANSION (PART A) AND
HERITAGE PARK PARKINGS LOTS (PART B)
CIP 362604 AND 362605
BID NO. PK-26-0047

[illegible]

CITY OF IRVINE

WILLIAM WOOLETT JR. AQUATICS CENTER EXPANSION (PART A) AND
HERITAGE PARK PARKINGS LOTS (PART B)
CIP 362604 AND 362605
BID NO. PK-26-0047

Type of trade, labor, or service	Name & License # of Subcontractor License Expiration Date (Indicate if a Disabled Veteran Business Enterprise)	Complete Address (Name of City Not Sufficient) and Telephone No.
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

Bidder agrees that within twenty-four (24) hours of the bid opening, Bidder shall provide the DISTRICT with the license number (if applicable), expiration date of license, complete address and telephone numbers of each listed subcontractor if such information is not available at the time of the bid opening.

Dated: _____

Name of Bidder

By: _____
(Signature of Bidder)

Print Name: _____

Address: _____

Telephone: _____

CITY OF IRVINE

WILLIAM WOOLETT JR. AQUATICS CENTER EXPANSION (PART A) AND
HERITAGE PARK PARKINGS LOTS (PART B)

CIP 362604 AND 362605

BID NO. PK-26-0047

**NON-COLLUSION DECLARATION TO BE EXECUTED BY BIDDER AND
SUBMITTED WITH BID**

(Public Contract Code section 7106)

The undersigned declares:

I am the _____ of _____, the party making the foregoing
(Print Title) (Company Name)
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].

Signature

Print Name

CITY OF IRVINE

WILLIAM WOOLETT JR. AQUATICS CENTER EXPANSION (PART A) AND HERITAGE PARK PARKINGS LOTS (PART B)

CIP 362604 AND 362605

BID NO. PK-26-0047

IRAN CONTRACTING ACT

(Public Contract Code sections 2202-2208)

Prior to bidding on, submitting a proposal or executing a contract or renewal for a State of California contract for goods or services of \$1,000,000 or more, a vendor must either: a) certify it is **not** on the current list of persons engaged in investment activities in Iran created by the California Department of General Services ("DGS") pursuant to Public Contract Code section 2203(b) and is not a financial institution extending twenty million dollars (\$20,000,000) or more in credit to another person, for 45 days or more, if that other person will use the credit to provide goods or services in the energy sector in Iran and is identified on the current list of persons engaged in investment activities in Iran created by DGS; or b) demonstrate it has been exempted from the certification requirement for that solicitation or contract pursuant to Public Contract Code section 2203(c) or (d).

To comply with this requirement, please insert your vendor or financial institution name and Federal ID Number (if available) and complete **one** of the options below. Please note: California law establishes penalties for providing false certifications, including civil penalties equal to the greater of \$250,000 or twice the amount of the contract for which the false certification was made; contract termination; and three-year ineligibility to bid on contracts. (Public Contract Code section 2205.)

OPTION #1 - CERTIFICATION

I, the official named below, certify I am duly authorized to execute this certification on behalf of the vendor/financial institution identified below, and the vendor/financial institution identified below is **not** on the current list of persons engaged in investment activities in Iran created by DGS and is not a financial institution extending twenty million dollars (\$20,000,000) or more in credit to another person/vendor, for 45 days or more, if that other person/vendor will use the credit to provide goods or services in the energy sector in Iran and is identified on the current list of persons engaged in investment activities in Iran created by DGS.

<i>Vendor Name/Financial Institution (Printed)</i>		<i>Federal ID Number (or n/a)</i>
<i>By (Authorized Signature)</i>		
<i>Printed Name and Title of Person Signing</i>		
<i>Date Executed</i>	<i>Executed in</i>	

OPTION #2 – EXEMPTION

Pursuant to Public Contract Code sections 2203(c) and (d), a public entity may permit a vendor/financial institution engaged in investment activities in Iran, on a case-by-case basis, to be eligible for, or to bid on, submit a proposal for, or enters into or renews, a contract for goods and services.

If you have obtained an exemption from the certification requirement under the Iran Contracting Act, please fill out the information below, and attach documentation demonstrating the exemption approval.

<i>Vendor Name/Financial Institution (Printed)</i>		<i>Federal ID Number (or n/a)</i>
<i>By (Authorized Signature)</i>		
<i>Printed Name and Title of Person Signing</i>		<i>Date Executed</i>

CITY OF IRVINE

WILLIAM WOOLETT JR. AQUATICS CENTER EXPANSION (PART A) AND HERITAGE PARK PARKINGS LOTS (PART B)

CIP 362604 AND 362605

BID NO. PK-26-0047

DRUG-FREE WORKPLACE CERTIFICATION

This Drug-Free Workplace Certification is required pursuant to Government Code Sections 8350, et seq., the Drug-Free Workplace Act of 1990. The Drug-Free Workplace Act of 1990 requires that every person or organization awarded a contract for the procurement of any property or services from any State agency must certify that it will provide a drug-free workplace by doing certain specified acts. In addition, the Act provides that each contract awarded by a State agency may be subject to suspension of payments or termination of the contract, and the contractor may be subject to debarment from future contracting, if the state agency determines that specified acts have occurred.

Pursuant to Government Code Section 8355, every person or organization awarded a contract from a State agency shall certify that it will provide a drug-free workplace by doing all of the following:

- a) publishing a statement notifying employees that the unlawful manufacture, distribution, dispensation, possession or use of a controlled substance is prohibited in the person's or organization's workplace and specifying actions which will be taken against employees for violations of the prohibition;
- b) establishing a drug-free awareness program to inform employees about all of the following:
 - 1) the dangers of drug abuse in the workplace;
 - 2) the person's or organization's policy of maintaining a drug-free workplace;
 - 3) the availability of drug counseling, rehabilitation and employee-assistance programs;
 - 4) the penalties that may be imposed upon employees for drug abuse violations;
- c) Requiring that each employee engaged in the performance of the contract be given a copy of the statement required by subdivision (a) and that, as a condition of employment on the contract, the employee agrees to abide by the terms of the statement.

I, the undersigned, agree to fulfill the terms and requirements of Government Code Section 8355 listed above and will publish a statement notifying employees concerning (a) the prohibition of controlled substance at the workplace, (b) establishing a drug-free awareness program, and (c) requiring that each employee engaged in the performance of the contract be given a copy of the statement required by Section 8355(a) and requiring that the employee agree to abide by the terms of that statement.

CITY OF IRVINE

WILLIAM WOOLETT JR. AQUATICS CENTER EXPANSION (PART A) AND
HERITAGE PARK PARKINGS LOTS (PART B)
CIP 362604 AND 362605
BID NO. PK-26-0047

I also understand that if the DISTRICT determines that I have either (a) made a false certification herein, or (b) violated this certification by failing to carry out the requirements of Section 8355, that the contract awarded herein is subject to suspension of payments, termination, or both. I further understand that, should I violate the terms of the Drug-Free Workplace Act of 1990, I may be subject to debarment in accordance with the requirements of Section 8350, et seq.

I acknowledge that I am aware of the provisions of Government Code Section 8350, et seq. and hereby certify that I will adhere to the requirements of the Drug-Free Workplace Act of 1990.

NAME OF CONTRACTOR

Signature

Print Name

Title

Date

CITY OF IRVINE

WILLIAM WOOLETT JR. AQUATICS CENTER EXPANSION (PART A) AND
HERITAGE PARK PARKINGS LOTS (PART B)
CIP 362604 AND 362605
BID NO. PK-26-0047

**CONTRACTOR'S CERTIFICATE REGARDING
NON-ASBESTOS CONTAINING MATERIALS**

Per Article 69 of the General Conditions.

Certification for _____. We hereby certify that no Asbestos, or Asbestos Containing Materials shall be used in this Project or in any tools, devices, clothing, or equipment used to affect the _____ which we have installed in the **Irvine Unified School District** under WILLIAM WOOLLETT JR. AQUATIC CENTER EXPANSION (PART A) AND HERITAGE PARK PARKING LOTS (PART B) HERITAGE PARK, IRVINE, CALIFORNIA, CIP 362604 AND 362605 | BID NO. PK-26-0047.

- (a) The Contractor further certifies that he/she has instructed his/her employees with respect to the above mentioned standards, hazards, risks and liabilities.
- (b) Asbestos and/or asbestos containing material shall be defined as all items containing but not limited to chrysotile, corcidolite, amosite, anthophyllite, tremolite and actinolite.
- (c) Any or all material containing greater than one-tenth of one percent (.1%) asbestos shall be defined as asbestos containing material.
- (d) Any disputes involving the question of whether or not material contains asbestos shall be settled by electron microscopy. The costs of any such tests shall be paid by the Contractor if the material is found to contain asbestos.
- (e) All work or materials found to contain asbestos or work or material installed with asbestos containing equipment will be immediately rejected and this work will be removed at no additional cost to the District.

Date

Name of Contractor

By: _____
Signature

Print Name

Title

CITY OF IRVINE

WILLIAM WOOLETT JR. AQUATICS CENTER EXPANSION (PART A) AND
HERITAGE PARK PARKINGS LOTS (PART B)
CIP 362604 AND 362605
BID NO. PK-26-0047

**CERTIFICATION – PARTICIPATION OF
DISABLED VETERAN BUSINESS ENTERPRISES
IN ACCORDANCE WITH EDUCATION CODE 17076.11**

In accordance with Education Code Section 17076.11, the **Irvine Unified School District** has a participation goal for Disabled Veteran Business Enterprises of at least three percent (3%) per year of the overall dollar amount of funds allocated by the District by the State Allocation Board pursuant to the Leroy F. Greene School Facilities Act of 1998 for construction or modernization of school buildings and expended each year by the District. At the time of execution of the contract, the Contractor will provide a statement to the District of anticipated participation of Disabled Veteran Business Enterprises in the contract. Prior to, and as a condition precedent for final payment under the contract, the Contractor will provide appropriate documentation to the District identifying the amount paid to Disabled Veteran Business Enterprises pursuant to the contract, so that the District can assess its success at meeting this goal.

The Contractor may provide the anticipated participation of Disabled Veteran Business Enterprises in terms of percentage of its total contract or the dollar amount anticipated to be paid to Disabled Veteran Business Enterprises or by providing the names of the Disabled Veteran Business Enterprises that will participate in the contract. If there is a discrepancy between the anticipated goals and the actual goals at completion of the contract or a failure to meet the anticipated goal or dollar amounts, the District will require the Contractor to provide, at the completion of the contract, a detailed statement of the reason(s) for the discrepancy or failure to meet the anticipated goals or dollar amounts.

I certify that I have read the above and will comply with the anticipated participation of Disabled Veteran Business Enterprises in this contract.

Signature

Typed or Printed Name

Title

Company

Address

City, State, Zip

Telephone

Fax

E-mail

CITY OF IRVINE

WILLIAM WOOLLETT JR. AQUATICS CENTER EXPANSION AND
HERITAGE PARK PARKING LOTS

CIP 362604 and 362605

BID NO. PK-26-0047

CONSTRUCTION CONTRACT (SAMPLE)
FOR CAPITAL IMPROVEMENTS

This Contract is made and entered into _____, 2026 by and between the CITY OF IRVINE, a municipal corporation of the State of California, hereinafter referred to as "CITY" and _____, a (insert state of entity type) (insert legal entity type) hereinafter referred to as "CONTRACTOR."

WITNESSETH:

That the CITY and the CONTRACTOR, for the consideration hereinafter named, mutually agree as follows:

1. The complete Contract includes all of the Contract Documents, which are incorporated herein by this reference, to wit:

- a. Permits and Agreements
- b. Contract
- c. Addenda
- d. Instructions to Bidders, Proposal Requirements and Conditions
- e. Special Provisions
- f. Contract Plans
- g. Standard Plans
- h. Standard Specifications
- i. Reference Specifications

The Contract Documents are complementary, and that which is required by one shall be as binding as if required by all.

2. CONTRACTOR shall provide and furnish all labor, materials, necessary tools, expendable equipment, and all utility and transportation services required for the following work of improvement:

- a) William Woollett Jr. Aquatics Center Expansion, CIP 362604 (Part A): Construction of the following: pool, splash pad, training and locker room building, pool equipment building, bleachers, Ninja Cross obstacle course system, Musco sports lighting, and associated structural, mechanical, electrical, plumbing, and fire alarm work. Scope of work also includes

associated site work, ground improvements, soil export and import, demolition, utilities, and other items not mentioned here, but are required by the plans, specifications, and the Special Provisions. The Engineer's construction cost estimate for Part A of the project is above \$30,990,000 (rounded to the nearest ten thousand).

- b) Heritage Park Parking Lots, CIP 362605 (Part B): Construction of two parking lots consisting of: Grading including excavation and cut/fill operations; constructing asphalt, base and finish course pavement; removing and replacing concrete curb, gutter, and sidewalk; constructing new concrete curb, gutter, sidewalk, curb ramps, and local depressions; constructing concrete drainage inlets, constructing HDPE and RCP drainage lines, construction drainage junction structures; relocating and/or constructing new irrigation mainlines and associated electrical, relocating and/or constructing new electrical conduit; Asphalt concrete pavement surface course overlay; install signing, striping, markers, and pavement markings; modify and/or install new landscape and irrigation, modify and/or install new electrical and lighting , and other items not mentioned here, but are required by the plans and the Special Provisions. The Engineer's construction cost estimate for Part B of the project is above \$6,500,000 (rounded to the nearest ten thousand).

3. CONTRACTOR agrees to perform all the said work and furnish all the said materials at his own cost and expense that are necessary to construct and complete in strict conformance with Contract Documents and to the satisfaction of the Engineer, the work hereinafter set forth in accordance with the Contract therefore adopted by the City Council and as prepared by TBD, TBD.

Contractor Information

Address for Notices and Payments:

Attn:

Telephone:

Email:

4. CITY agrees to pay and CONTRACTOR agrees to accept in full payment for performance of this work of improvement as described, the stipulated sum of \$_____ the "Contract Price".

CITY agrees to make progress payments and final payment in accordance with the method set forth in the Special Provisions.

5. CONTRACTOR agrees to commence construction of the work provided for herein within ten (10) Calendar Days after the date specified in the Notice to Proceed, and to

continue diligently in strict conformance with Contract Documents and without interruption, and to complete the construction thereof within 420 Working Days after the date specified in the Notice to Proceed.

6. Time is of the essence of this Contract, and it is agreed that it would be impracticable or extremely difficult to ascertain the extent of actual loss or damage which the CITY will sustain by reason of any delay in the performance of this Contract. It is, therefore, agreed that CONTRACTOR will pay as liquidated damages to the CITY no more than the following sum: \$12,500 per Working Day, for each and every Working Days delay in finishing the Work in excess of the number of Working Days prescribed in accordance with the table below. If liquidated damages are not paid, as assessed by the CITY, the CITY may deduct the amount thereof from any money due or that may become due the CONTRACTOR under this Contract in addition to any other remedy available to CITY. By executing this Contract, CONTRACTOR agrees that the amount of liquidated damages is reasonable and shall not constitute a penalty.

Milestone	Scope	Working Days	LD Rate
Milestone 1	Phase 1 – Ground Improvements (Geopiers)	40 Working Days from NTP	\$5,000 per Working Day
Milestone 2	Phases 2 & 3 – Over-Ex, Grade Pads, Underground Utilities	50 Working Days from Completion of Milestone 1	\$5,000 per Working Day
Milestone 3	Phase 4A – Pool and Bleachers	180 Working Days from Completion of Milestone 2	\$7,500 per Working Day
Milestone 4	Phase 4B – Buildings and Splash Pads	105 Working Days from Completion of Milestone 3	\$7,500 per Working Day
Milestone 5	Phase 5 & 6 – Substantial Completion (Walnut Parking Lot & Project)	45 Woking Days from Completion of Milestone 4	\$12,500 per Working Day

7. CONTRACTOR will maintain and will require all subcontractors to maintain valid and current Department of Industrial Relations (DIR) Public Works Contractor registration during the term of this project. CONTRACTOR shall notify the CITY in writing immediately, and in no case more than twenty-four (24) hours, after receiving any information that CONTRACTOR'S or any of its subcontractor's DIR registration status has been suspended, revoked, expired, or otherwise changed.

8. CONTRACTOR will pay, and will require all subcontractors to pay, all employees on said Contract a salary or wage at least equal to the prevailing salary or wage established for such work as set forth in the wage determinations and wage standards applicable to this work, a copy of which is on file in the office of the City Clerk of the City of Irvine. Federal prevailing wage rates apply for federally funded projects. Travel and subsistence pay shall be paid in accordance with Labor Code § 1773.1.

9. CONTRACTOR shall be subject to the penalties in accordance with Labor Code of § 1775 for each worker paid (either by him or by any subcontractors under him) less than the prevailing rate described above on the work provided for in this Contract.

10. CONTRACTOR and subcontractors shall comply with Labor Code § 1810 and § 1811 which stipulates that eight hours labor constitutes a legal day's work, and § 1812 which stipulates that the CONTRACTOR and subcontractors shall keep an accurate record showing the name of and actual hours worked each calendar day and each calendar week by each worker employed by him in connection with the work performed under the terms of the Contract. Failure to comply with these sections of the Labor Code will subject the CONTRACTOR to penalty and forfeiture provisions of the Labor Code § 1813.

11. CONTRACTOR will comply with the provisions of Labor Code § 1777.5 and CWA Article 14 pertaining to the employment of apprentices to the extent applicable to this Contract. The Contractor shall ensure that all apprentices performing work on the project work under the direct supervision of a journeyworker from the trade in which the apprentice is indentured.

12. The City of Irvine will be using the eComply Solutions software for managing certified payrolls on this project. Accordingly, Contractor shall register in, attend training for, and use the eComply Solutions software for submitting certified payrolls and related tasks as deemed appropriate by the City of Irvine. When the project commences, you will be contacted by an eComply Solutions representative regarding this process. Further information will be provided via a separate communication at that time.

13. CONTRACTOR, by executing this Contract, hereby certifies:

“I am aware of, and will comply with the Labor Code § 3700 by securing payment for, and maintaining in full force and effect for the duration of the contract, complete Workers’ Compensation Insurance, and shall furnish a Certificate of Insurance to the Agency before execution of the Contract. The CITY, its officers, or employees, will not be responsible for any claims in law or equity occasioned by failure of the CONTRACTOR to comply with this paragraph.”

CONTRACTOR further agrees to require all subcontractors to carry Workers’ Compensation Insurance as required by the Labor Code of the State of California.

CONTRACTOR acknowledges that this project is subject to the City’s CWA. Contractor agrees that it and all of its subcontractors will abide by the terms and conditions of the CWA, including submittal of a Letter of Assent prior to the start of work.

14. CONTRACTOR shall, concurrent with the execution of this Contract, furnish two bonds approved by the CITY, one in the amount of One Hundred Percent (100%) of the Contract Price, to guarantee the faithful performance of the work “Performance Bond”, and one in the amount of One Hundred Percent (100%) of the Contract Price to guarantee payment of all claims for labor and materials furnished “Payment Bond.” This Contract shall not become effective until such bonds are supplied to and approved by the CITY.

CONTRACTOR will comply with CWA Section 3.8, which requires contractors that are not signatory with one of the unions that are signatory to the CWA to register each of their own workers (Core Employees) with the appropriate union hall prior to them performing work on the project. The contractor must provide a listing of their Core Employees to the CWA administrator and the union prior to start of work. To qualify as a Core Employee, each employee must have been on the contractor's active payroll for sixty (60) of the one hundred (100) working days prior to project award and have worked at least two thousand (2,000) hours in the craft that they are employed within the previous four (4) years. Core Employees are to be used in a one-to-one ratio with referred workers from the union hall.

15. CONTRACTOR shall, prior to commencing work, furnish certificates evidencing compliance with all requirements of the Contract Documents pertaining to insurance.

CONTRACTOR will pay all craft employee fringe benefits to the appropriate Union Trust Fund in the amounts designated in the Union MLA as required by CWA Section 5.2. Employee fringe benefit contributions paid to other funds or direct to the employee do not count towards this requirement.

16. Any amendments to any of the Contract Documents must be in writing executed by the CONTRACTOR and the CITY. Any time an approval, time extension, or consent of the CITY is required under the Contract Documents, such approval, extension, or consent must be in writing in order to be effective.

17. This Contract contains all of the agreements and understandings of the parties and all previous understandings, negotiations, and contracts are integrated into and superseded by this Contract.

18. In the event that any one or more of the phrases, sentences, clauses, paragraphs, or sections contained in this Contract shall be declared invalid or unenforceable by a valid judgment or decree of a court of competent jurisdiction, such invalidity or unenforceability shall not affect any of the remaining phrases, sentences, clauses, paragraphs, or sections of this Contract which are hereby declared as severable and shall be interpreted to carry out the intent of the parties hereunder.

19. The persons executing this Contract on behalf of the parties hereto warrant that they are duly authorized to execute this Contract on behalf of said parties and that, by so executing this Contract, the parties hereto are formally bound to the provisions of this Contract.

20. This Contract shall be binding upon and shall inure to the benefit of the parties hereto and their respective heirs, personal representatives, successors, and assigns.

21. In performing its obligations and duties under this Contract, each party shall comply with all applicable local, state, and federal laws, regulations, rules, standards, and ordinances.

22. In the event any action is brought between the parties hereto relating to this Contract or the breach thereof, the prevailing party in such action shall be entitled to recover from the other party reasonable expenses, attorneys' fees, and costs in connection with such action or proceeding.

23. This Contract may be executed by the parties in counterparts, which counterparts shall be construed together and have the same effect as if all of the parties had executed the same instrument.

24. This Contract is to be governed by the laws of the State of California.

(Signatures on following page)

IN WITNESS WHEREOF, the parties have executed and entered into this Agreement as of the date first set forth above.

CITY OF IRVINE

By:

Luis Estevez

Its: Director of Public Works & Sustainability

By:

Its:

By:

Sean Crumby

Its: City Manager

By:

Its:

By:

Larry Agran

Its: Mayor of the City of Irvine

Attest:

By:

Carl Petersen

Its: City Clerk

APPROVED AS TO FORM:
RUTAN & TUCKER, LLP

By:

Jeffrey Melching

PERFORMANCE BOND (SAMPLE)

WILLIAM WOOLETT JR. AQUATICS CENTER EXPANSION (PART A) AND HERITAGE PARK PARKINGS LOTS (PART B)

CIP 362604 AND 362605

BID NO. PK-26-0047

KNOW ALL PERSONS BY THESE PRESENTS that we _____
_____, as Principal, and _____ as Surety, are held and
firmly bound unto City of Irvine, hereinafter called the City in the sum of _____
_____ (\$ _____
_____) (this amount being not less than one hundred percent (100%) of the total bid price
of the contract awarded by the owner to the Principal), for the payment of which sum well
and truly to be made, we bind ourselves, our heirs, executors, administrators and
successors, jointly and severally, firmly by these presents.

The conditions of this obligation are such that whereas the Principal entered into a contract
attached hereto, with the City of Irvine.

NOW THEREFORE, if the Principal shall well and truly perform and fulfill all the
undertakings, covenants, terms, conditions and agreements of said Contract during the
original terms thereof, and any extensions thereof that may be granted by the Owner with
or without notice of the Surety, and during the life of any guarantee required under the
Contract, and shall also well and truly perform and fulfill all the undertakings, covenants,
terms, conditions and agreements of any and all duly authorized modifications of said
Contract that may hereafter be made, then this obligation shall be void otherwise this
obligation shall remain in full force and effect.

Further, the said Surety, for value received, hereby stipulates and agrees that no change,
extension of time, alteration or modifications of the Contract Documents and/or of the
Work to be performed thereunder shall in any way affect its obligations on this bond; and it
hereby waives notice of any and all such changes, extensions of time, and alterations or
modifications of the contract documents and/or of the work to be performed thereunder.

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 attorneys' fees, incurred by the City in successfully enforcing such obligation,
and all to be taxed as costs and included in any judgment rendered by a court of law.

IN WITNESS WHEREOF, the above-bounded parties have executed this instrument this
_____ day of _____, 20____, the name of each party being hereto written below,
and these presents duly signed by each party's undersigned representative, pursuant to
authority of its governing body. This bond shall be authenticated by way of notarized
acknowledgment, including a copy of the power of attorney, for the Surety.

ATTEST:

(Principal) _____

(Address) _____

(By) _____

(Title) _____

ATTEST:

(Surety) _____

(Address) _____

(By) _____

(Title) _____

PAYMENT BOND (SAMPLE)

WILLIAM WOOLETT JR. AQUATICS CENTER EXPANSION (PART A) AND HERITAGE PARK PARKINGS LOTS (PART B)

CIP 362604 AND 362605

BID NO. PK-26-0047

KNOW ALL PERSONS BY THESE PRESENTS that we _____
_____, as Principal, and _____ as Surety, are held and
firmly bound unto City of Irvine, hereinafter called the City in the sum of _____
_____ (\$_____) (this
amount being not less than one hundred percent (100%) of the total bid price of the
contract awarded by the owner to the Principal), for the payment of which sum well and
truly to be made, we bind ourselves, our heirs, executors, administrators and successors,
jointly and severally, firmly by these presents.

The conditions of this obligation are such that whereas the Principal entered into a
contract, attached hereto, with the City of Irvine.

NOW THEREFORE, if the Principal shall promptly make payment to all persons supplying
labor and material in the prosecution of the work provided for in said contract, and any and
all duly authorized modifications of each contract that may hereafter be made, then this
obligation shall be void, otherwise this obligation shall remain in full force and effect.

The condition of this obligation is such that, if said Principal or his subcontractors, or heirs,
executors, administrators, successors, or assigns thereof, shall fail to pay any of the
persons named in the Civil Code § 9100 for any material 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 shall fail to pay any amount due under the Unemployment Insurance Code with
respect to work or labor performed by any such claimant or any amount required to be
deducted, withheld, and paid over to the Franchise Tax Board from the wages of
employees of the Contractor and his subcontractors with respect to such work and labor,
then said Surety will pay and, also, in case suit is brought upon the bond, will pay a
reasonable attorney's fee to be fixed by the court. This bond shall inure to the benefit of all
persons named in the aforesaid Civil Code § 9100 to give a right of action to them or their
assigns in any suit brought upon the bond.

Further, the said Surety, for value received, hereby stipulates and agrees that no change,
extension of time, alteration or modification of the Contract Documents or of the Work to
be performed thereunder shall in any way affect its obligations on this bond; and it hereby
waives notice of any and all such changes, extensions of time, and alterations or
modifications of the Contract Documents and/or of the work to be performed thereunder.

IN WITNESS WHEREOF, the above-bounded parties have executed this instrument this
_____ day of _____, 20____, the name of each party being hereto written below
and these presents duly signed by each party's undersigned representative, pursuant to
authority of its governing body. This bond shall be authenticated by way of notarized
acknowledgment, including a copy of the power of attorney, for the Surety.

ATTEST:

(Principal) _____

(Address) _____

(By) _____

(Title) _____

ATTEST:

(Surety) _____

(Address) _____

(By) _____

(Title) _____

SPECIAL PROVISIONS

- A. THESE ADDITIONS, DELETIONS, AND AMENDMENTS MODIFY THE SPECIFICATIONS IN THE “STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION”, 2024 EDITION AND CURRENT SUPPLEMENT.
- B. THESE ADDITIONS, DELETIONS, AND AMENDMENTS SHALL TAKE PRECEDENCE IN THE EVENT OF A CONFLICT WITH ANY STANDARD SPECIFICATIONS.
- C. AS A CONVENIENCE, THESE ADDITIONS, DELETIONS, AND AMENDMENTS HAVE BEEN ARRANGED IN A FORMAT THAT PARALLELS THE “STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION”, 2024 EDITION AND CURRENT SUPPLEMENT.
- D. ALSO SEE PROJECT MANUAL (APPENDIX C) FOR WILLIAM WOOLLETT JR. AQUATICS CENTER EXPANSION (PART A). APPENDIX C COVERS THE WORK FOR PART A ONLY.

PART 1 – GENERAL PROVISIONS

SECTION 1 – TERMS, DEFINITIONS, ABBREVIATIONS, UNITS OF MEASURE AND SYMBOLS

REVISE as follows:

1-1 GENERAL. *ADD the following term:*

The word *provide* shall mean furnish and install.

1-2 TERMS AND DEFINITIONS. *MODIFY to ADD the following:*

Acceptance, Final Acceptance – Formal action by the Agency acknowledging the Work is complete.

Agency/Board/City – The City of Irvine, a municipal corporation.

Agency Representative – The person or engineering/architectural firm Agency authorizes to represent it during the performance of the Work by the Contractor and until Final Acceptance. The Agency Representative means the Agency Representative or his assistants.

Calendar Day – The 24-hour day denoted on the calendar.

Calendar Month – The period including the first through the last day of a month.

City – See Agency.

Clarification – Verbal or written interpretation of Contract Documents by the Agency Representative to clarify intent, procedures, materials or processes with no change in contract sum or time.

REPLACE the definition for “Engineer” with the following:

Engineer – The City Engineer acting either directly or through the Agency Representative.

Field Order – Authorization by Agency Representative to proceed with Change Order work after completion of negotiations, but before the issuance of the Change Order.

Invitation for Bids – Comprised of the NOTICE INVITING BIDS, and all CONTRACT DOCUMENTS, referenced or provided in the project bid package, detailed in paragraph 1 of the INSTRUCTIONS TO BIDDERS, PROPOSAL REQUIREMENTS AND CONDITIONS, included herein.

Laboratory – The laboratory authorized by the Agency or the Agency Representative to test material and work involved in the project.

Major Bid Item – A single Contract item constituting ten percent (10%) or more of the original Contract Price.

Request for Quotation – Contemplated revision of Contract Documents by the Agency requesting detailed information from the Contractor on impacts to contract sum or contract time.

State Standard Specifications – Standard Specifications issued by the State of California, Department of Transportation, 2024.

Traffic Control Devices – All signs, signals, markings, and other devices used to regulate, warn, or guide traffic, placed on, over, or adjacent to a street, highway, pedestrian facility, or bikeway, by authority of the Engineer.

1-3 ABBREVIATIONS.

1-3.2 Common Usage. *MODIFY to ADD the following:*

Abbreviation	Word or Words
CSMP	Construction Site Monitoring Program
DBE	Disadvantaged Business Enterprise
ESA	Environmentally Sensitive Area
HMA	Hot Mix Asphalt
NOI	Notice of Intent
SWMP	Storm Water Management Plan
SWRCB	State Water Resources Control Board
WPCP	Water Pollution Control Program
WDID	Waste Discharge Identification Number

DELETE the abbreviation of MUTCD and SUBSTITUTE with the following:

MUTCD	California Manual on Uniform Traffic Control Devices
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1-3.3 Institutions. *MODIFY to ADD the following:*

Abbreviation	Word or Words
AI	The Asphalt Institute
AIA	American Institute of Architects
APWA	American Public Works Association
AREMA	American Railway Engineering and Maintenance of Way Association
ASHRAE	American Society of Heating, Refrigerating, and Air Conditioning Engineers
CRSI	Concrete Reinforcing Steel Institute
NFPA	National Fire Protection Association
PCA	Portland Cement Association
UBC	Uniform Building Code, Pacific Coast Building Officials Conference of the International Conference of Building Officials

DELETE the institution of SSPC and SUBSTITUTE with the following:

SSPC

Steel Structures Painting Council

1-6 BIDDING AND SUBMISSION OF THE BID.

1-6.2 Subcontractor Listing

ADD the following:

If the Contractor subcontracts any part of this Contract, the Contractor shall be as fully responsible to the Agency for the acts and omissions of his subcontractor as he is for the acts and omissions of persons directly employed by him. Nothing contained in the Contract Documents shall create any contractual relationship between any subcontractor and the Agency. The Contractor shall bind every subcontractor to be bound by the terms of the Contract Documents as applicable to his work.

Debarred contractors shall not be employed on the Work pursuant to the provisions of Labor Code § 1777.1 and the City of Irvine Council Ordinance No. 08-10. The Labor Commissioner publishes and distributes a list of contractors ineligible to perform work as a subcontractor on a public works project. This list of debarred contractors is available from the Department of Industrial Relations website: <https://www.dir.ca.gov/dlse/debar.html>

The City will not conduct business with an individual, firm or organization, and the Contractor shall not employ or otherwise use any subcontractor, supplier, or equipment vendor at any tier that is on the City's debarment list, the Department of Industrial Relations debarment list, or on the US General Services Administration "List of Parties Excluded from Federal Procurement and Non Procurement Programs."

A list of individuals, firms and organizations debarred, suspended or who have voluntarily excluded themselves from Federal Procurement and Non-Procurement Programs is maintained by the US General Services Administration. This excluded parties list is available from the website: <https://sam.gov/content/home>

The Contractor and each of its subcontractors shall maintain a valid and current Department of Industrial Relations (DIR) Public Works Contractor registration during the term of this project.

Prior to including a subcontractor's name on the bid, the Contractor shall be responsible for verifying that each of its subcontractors are properly licensed and not debarred from performing the designated work.

This requirement shall be enforced as follows: Noncompliance shall be corrected. Payment for subcontracted work involved will be withheld from progress payments due, or to become due, until correction is made. Failure to comply may result in termination of the Contract.

If any subcontractor or person employed by the Contractor is deemed by the Engineer to be incompetent or to act in an improper manner, at the request of the Engineer, they shall be dismissed immediately from the job and shall not be employed again on the Work.

A copy of each subcontract is required to be filed with the Agency before the subcontractor begins work. Each subcontract shall contain a reference to the Contract between the Agency and the Contractor, and the terms of that Contract, and all parts thereof shall be made a part of such subcontract insofar as applicable to the work covered thereby. Each subcontract shall provide for its annulment by the Contractor at the order of the Agency if in the Agency's opinion the subcontractor fails to comply with the requirements of the Contract.

SECTION 2 – SCOPE OF THE WORK

REVISE as follows:

2-1 WORK TO BE DONE.

ADD the following after the 1st paragraph:

The Contractor shall leave the Work area in a neat condition. Any work not shown in the Plans or Specifications but necessary to complete the Work according to law and governmental codes and regulations shall be performed by the Contractor as if in the Plans and Specifications.

The Contractor shall remove and dispose of all structures, debris, or other obstructions of any character necessary to accommodate the Work. Where such obstructions consist of improvements not required by law to be removed by the Agency thereof, all such improvements shall be removed, maintained, and permanently replaced by the Contractor at his expense.

2-2 PERMITS.

DELETE in its entirety and SUBSTITUTE with the following:

2-2 PERMITS AND LICENSES. Except as otherwise specified in the Special Provisions, the Contractor shall procure all permits and licenses, pay all charges and fees, and give all notices necessary, and incidental to the due and lawful prosecution of the Work. These permits and licenses shall be obtained in sufficient time to prevent delays to the Work. The Contractor shall maintain a copy of all permits on the site. The Contractor shall furnish the Agency with copies of permits and licenses within one (1) Working Day of obtaining them. The Contractor shall comply with all rules and regulations included in permits. Should the Contractor fail to conform to said rules and regulations, the Agency reserves the right to perform the work necessary to conform to the rules and regulations and the cost of such work will be deducted from any monies due or to become due to the Contractor.

The Contractor and all subcontractors shall obtain within five (5) Calendar Days of executing the Contract, a current City of Irvine Business License and maintain such license(s) throughout the term of the Contract.

In the event that the Agency has obtained permits, licenses or other authorizations applicable to the Work, the Contractor shall obtain a rider, pay all fees and comply with the provisions of said permits, licenses, and other authorizations.

2-3 RIGHT OF WAY.

DELETE the 1st sentence and SUBSTITUTE with the following:

Rights of way, easements, agreements, licenses, or rights of entry (all referred to as right of way) for the Work have been provided by the Agency. Temporary right-of-way to construct one or more portions of the Work may also have been acquired by the Agency. If temporary right of way was acquired, the documents or their contractual terms and obligations are included in the Contract Documents. The Contractor shall comply with all the terms and obligations related to the physical use of the temporary right of way and its eventual return of the property to the owner. The Contractor shall schedule the Work that may include landscape establishment, maintenance periods, and final acceptance within the temporary right of way to start and finish within the time

allotted in each temporary right of way agreement. Should the Work be delayed through no fault of the Agency, the Contractor shall be responsible for all costs incurred by the Agency to extend use of the temporary right of way.

MODIFY to ADD the following:

Work in the public right of way shall be done in accordance with the requirements of the permit issued by the public agency in whose right of way the Work is located in addition to conforming to the Contract Documents. If a permit or traffic control plan is not required, the Work shall conform to the standards set forth in the MUTCD.

The Contractor shall not allow his employees to use private property for any reason or to use water or electricity from such property without providing the City written permission from the owner. The Contractor shall comply with all applicable federal, state and local laws, ordinances, codes, and regulations in performing any work or doing any activity on lands outside the public rights of way.

The Contractor shall hold harmless, indemnify, and defend the Agency, the Agency Representative and each of their officers, employees, and agents from all claims or suits for damages occasioned by such work or activity, whether done according to this section and with permission from the Agency or in violation of this section without permission from the Agency. To the maximum extent permitted by law, all obligations of the Contractor stated in 5-4.2 shall apply in the case of any such claims or suits.

The Contractor shall comply with City of Irvine Municipal Code § 5-9-521 Construction Site and Vacant Property Security, and be fully responsible for locating and obtaining permission to use equipment yards or material storage site(s). The Contractor shall assume full responsibility and costs for property rental, site preparation, maintenance and cleanup in a manner satisfactory to the City and the property owner.

If, through the failure of the Agency to acquire or clear right of way, the Contractor sustains loss which could not have been avoided by the judicious handling of forces, equipment and plant, the Contractor will be paid an amount as the Engineer may find to be a fair and reasonable compensation for such part of the Contractor's actual loss as, in the opinion of the Engineer, was unavoidable, determined as follows:

Compensation for idle time of equipment will be determined in the same manner as determinations are made for equipment used in the performance of extra work paid for as provided in 2-8 with the following exceptions:

- a) The right of way delay factor for each classification of equipment shown in the State of California, Department of Transportation publication entitled "Equipment Rental Rates and Labor Surcharge," current edition at the time of bid opening will be applied to such equipment rental rate.
- b) The time for which such compensation will be paid will be the actual normal working time during which such delay condition exists, but in no case will exceed eight (8) hours in any day.
- c) The days for which compensation will be paid will be the Calendar Days, excluding Saturdays, Sundays, and legal holidays, during the existence of such delay.

Actual loss shall be understood to include no items of expense other than idle time of equipment and necessary payments for idle time of men, cost of extra moving of equipment, and cost of longer hauls. Compensation for idle time of equipment will be determined, as provided herein, and compensation for idle time of men will be determined as provided in 2-8.

If the performance of the Contractor's work is delayed as a result of the failure of the City to acquire or clear right of way, an extension of time determined pursuant to the provisions in 6-4 will be granted.

2-4 COOPERATION AND COLLATERAL WORK.

DELETE in its entirety 4th paragraph and SUBSTITUTE with the following:

Nothing in the Contract shall be interpreted as granting to the Contractor exclusive occupancy of the site of the project. The Contractor must ascertain to his own satisfaction the scope of the project and the nature of any other contracts that have been or may be awarded by the Agency in the construction of the project, to the end that the Contractor may perform this Contract in the light of such other constraints, if any.

The Contractor shall not cause any unnecessary hindrance or delay to any other contractor working on or adjacent to the project. If the performance of any Contract for the project is likely to be interfered with by the simultaneous performance of some other contract or contracts, the Engineer will decide which contractor shall cease work temporarily and which contractor shall continue or whether the work under the contracts can be coordinated so that the Contractors may proceed simultaneously. On all questions concerning conflicting interest of Contractors performing related work, the decision of the Engineer shall be binding upon Contractors concerned. The Agency, the Engineer, the Agency Representative, and each of their officers, employees, and agents shall not be responsible for any damages suffered or extra costs incurred by the Contractor resulting directly or indirectly from the award of performance or attempted performance of any other contract or contracts on the project or caused by a decision or omission of the Engineer respecting the order of precedence in the performance of the contracts.

If, through acts of neglect on the part of the Contractor, any other contractor or any subcontractor shall suffer loss or damage on the Work, the Contractor agrees to settle with such other contractor or subcontractor by agreement or arbitration, if such other contractor or subcontractor will so settle. If such other contractor or subcontractor shall assert any claim against the Agency, the Engineer, the Agency Representative, or their consultants on account of any damage alleged to have been so sustained, the Agency will notify the Contractor. To the maximum extent permitted by law, all obligations of the Contractor stated in 5-4.2 shall apply in the case of the assertion of any such claims or liabilities against the Agency, the Engineer, the Agency Representative and each of their officers, employees, and agents against any such claim.

ADD:

2-4.1 Coordination. The Contractor shall coordinate his operations with the operations of other contractors, utility companies, and City of Irvine forces, during stage construction, traffic shifts, opening of new lanes, closing of lanes, roads or ramps, detours, traffic signal facilities, shared irrigation facilities for landscaped areas and during any other operation that may affect or have influence on adjacent projects.

2-5 THE CONTRACTOR'S EQUIPMENT AND FACILITIES.

2-5.1 General. *MODIFY to ADD the following:*

The Contractor shall render its machinery and equipment inoperable at all times except during actual construction. The Contractor shall be responsible for construction means, controls, techniques, sequences, procedures, and construction safety.

ADD:

2-5.1.1 Equipment. Contractor shall stencil or stamp at a clearly visible location on each piece of equipment, except hand tools, an identifying number and:

- a) On compacting equipment, its make, model number, and empty gross weight that is either the manufacturer's rated weight or the scale weight.
- b) On meters and on the load-receiving element and indicators of each scale, the make, model, serial number, and manufacturer's rated capacity.

The Contractor shall submit a list describing each piece of equipment and its identifying number before commencement of the Work.

Upon request, the Contractor shall submit manufacturer's information that designates portable vehicle scale capacities.

The Contractor's measuring devices shall be tested and approved under California Test 109 in the Agency's presence or by any of the following:

- a) County Sealer of Weights and Measures
- b) Certified Scale Service Agency
- c) Division of Measurement Standards Official

2-5.2 Temporary Utility Services. *DELETE in its entirety and SUBSTITUTE with the following:*

The Contractor shall, at its own expense, make all arrangements to furnish, install and maintain temporary water, electricity, telephone, and sanitary facilities for construction needs throughout construction period. Materials may be new or used, but must be adequate for the purposes intended, and must not violate requirements of applicable codes, specifications or standards.

The Contractor shall maintain systems to provide continuous services, modify, and extend services, as work progress requires. The Contractor shall completely remove temporary materials and equipment when construction needs can be met by use of permanent utility facilities.

The Contractor shall clean and repair damage caused by installation or use of temporary facilities, restore existing facilities used for temporary services to original or better condition, and restore permanent facilities used for temporary services to original condition.

For water, the Contractor shall:

- a) Provide adequate supply of water suitable for construction usage and needs.

Water Source: Irvine Ranch Water District (IRWD)

- a) Obtain meter, inspections, and approvals prior to use of existing system.
- b) Comply with IRWD requirements.

Conservation:

- a) Minimize water use whenever possible.
- b) Maintain watering equipment in good working order.
- c) Repair leaks promptly.

When necessary to maintain pressure, provide temporary pumps, tanks, and compressors.

For electricity, the Contractor shall:

- a) Provide portable power plants and/or connection to existing system for construction needs.
- b) Source of existing power: Southern California Edison Company (SCE). Prior to connecting to existing system:
 - 1) Obtain permit from City of Irvine, Community Development Department for installation of temporary power pole and/or system.
 - 2) Arrange for required inspections and coordinate temporary meter installation with City and SCE.

For sanitary facilities, the Contractor shall:

- a) Furnish and maintain portable toilet units in a clean, operable, and sanitary condition for use by construction personnel.
- b) Place units in conformance with applicable laws, codes, and regulations.

Pay all fees and charges for applications, non-City permits and inspections, installations, temporary meters, utility usage, service charges, maintenance, removals, and restoration.

Contractor shall use standard products of service companies. At Contractor's option with prior approval by the Agency, patented specialty devices may be used, when in compliance with applicable codes and service company requirements.

2-6 CHANGES REQUESTED BY THE CONTRACTOR.

ADD the following:

The Contractor may initiate changes by submitting a written Change Order Request to the Engineer containing:

- a) Description of the proposed changes.
- b) Statement of the reason for making the changes.
- c) Reference applicable specifications sections and specific plans in support of the request.

- d) Statement of the effect on the Contract Price and Contract time.
- e) Statement of the effect on the work of separate subcontractors.
- f) Documentation supporting any change in Contract Price or Contract time as appropriate.

2-7 CHANGES INITIATED BY THE AGENCY.

2-7.1 General. *DELETE in its entirety and SUBSTITUTE with the following:*

The Agency may issue a Change Order for modifications of Work including, but not limited to, the Plans, Specifications, character, quantity or time of Work. Change Orders shall be in writing, on a form substantially conforming to the sample Contract Change Order Form provided in section 2-7.2 below, and state the dollar value of the change or establish the method of payment, and any adjustment in the Contract time of completion.

The Engineer may order minor changes in the Work not involving an increase or decrease in the contract amount, nor involving a change in the time for completion, but consistent with the purposes for which the works are being constructed. If the Contractor believes that any order for minor changes in the work involves changes in the Contract Price or time of completion, the Contractor shall not proceed with the minor changes so ordered and shall immediately, upon the receipt of such order, notify the Engineer in writing of his estimate of the changes in the Contract Price and time of completion he believes to be appropriate.

No payment for changes in the Work will be made and no change in the time of completion by reasons of changes in the Work will be made, unless the changes are covered by a written Change Order approved by the Agency in advance of the Contractor's proceeding with the changed work.

Once a Change Order is finalized and executed by both parties, the Contractor waives its right to seek any additional compensation for the work covered by the Change Order or any project impacts. The Contractor agrees that all Change Orders constitutes full payment for the work covered by the Change Orders, including all direct and indirect overhead expenses.

Notwithstanding any other provision in the Contract Documents, the Agency's issuance of a Change Order shall not constitute a waiver by the Agency of, or preclude the Agency in any way from, asserting any claim with respect to the same, including but not limited to, a claim of breach of contract or claim that the issued Change Order covers work included in the Scope of Work set forth in the Contract Documents for which the Contractor was not entitled to any additional funds.

A Change Order is approved when the Agency signs the Change Order.

A Contract Change Order approved by the Engineer may be issued to the Contractor at any time. Should the Contractor disagree with any terms or conditions set forth in an approved Contract Change Order not executed by the Contractor, the Contractor shall proceed with the Change Order work in accordance with 2-10 of the Standard Specifications and submit a written protest to the Engineer within fifteen (15) days after the receipt of the approved Contract Change Order. The protest shall state the points of disagreement citing the Specification references, quantities, and costs involved. If a written protest is not submitted, payment will be made as set forth in the approved Contract Change Order, and that payment shall constitute full compensation for all work included therein or required thereby. Unprotested approved Contract Change Orders will be considered as executed Contract Change Orders.

The Engineer may initiate changes by submitting a Request for Quotation to Contractor. Such request will include detailed description of the change, products, and location of the change in the Work, supplementary or revised Plans and Specifications. Such request is for information only and is not an instruction to execute the changes, or to stop work in progress.

The Contractor shall support each quotation for a lump-sum proposal, and for each unit price that has not previously been established, with sufficient substantiating data to allow Engineer to evaluate the quotation.

On request, the Contractor shall provide additional data to support time and cost computations, labor required, equipment required, products required, recommended source of purchase and unit cost, and quantities required, taxes, insurance and credit for work deleted from Contract, similarly documented, justification for any change in Contract time.

The Contractor shall support each claim for additional costs, and for work done on a time-and-material/force account basis, with documentation as required for a lump-sum proposal, plus additional information as follows:

- a) Name of the Agency Representative who ordered the work, and date of the order.
- b) Dates and times work was performed, and by whom.
- c) Time record, summary of hours worked, and hourly rates paid.
- d) Receipts and invoices for equipment used, listing dates and times of use, products used, listing of quantities, and subcontracts.

In lieu of a Request for Quotation, the Engineer may issue a written Field Order for the Contractor to proceed with a change for subsequent inclusion in a Contract Change Order. Authorization will describe changes in the Work, both additions and deletions, with attachments of revised Contract Documents to define details of the change and will designate the method of determining any change in the Contract Price and any change in Contract time. Agency Representative will sign and date the Field Order as authorization for the Contractor to proceed with the changes. Contractor may sign and date the Field Order to indicate agreement with the terms therein. Contractor shall proceed with the work so ordered prior to actual receipt of an approved Contract Change Order.

ADD:

2-7.2 Contract Change Order Form

CITY OF IRVINE

Sheet 1 of X

Contract Change Order

Change Requested by: Engineer ☐ Contractor ☒

CCO No.	CIP No.	Description	Federal Number(s)
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To _____ Contractor

*You are directed to make the following changes from the plans and specifications or do the following described work not included in the plans and specifications for this contract. **NOTE: This change order is not effective until approved by the Engineer.***

Description of work to be done, estimate of quantities and prices to be paid. (Segregate between additional work at contract price, agreed price and force account.) Unless otherwise stated, rates for rental of equipment cover only such time as equipment is actually used and no allowance will be made for idle time.

Body of Contract Change Order

Total Cost: \$ _____

Estimated Cost: Decrease ☐ Increase ☐

Revised Contract Amount: \$ _____

By reason of this order, the time of completion will be adjusted as follows: Working Days

The revised completion date is:

Submitted by		
Signature	(Print name & title) Insert Name - SENIOR PROJECT MANAGER	Date
Reviewed by		
Signature	(Print name & title) Insert Name – MANAGER OF PROJECT DELIVERY	Date
Approval by		
Signature	(Print name & title) Insert Name – DEPUTY DIRECTOR/CITY ENGINEER	Date

We, the undersigned Contractor, have given careful consideration to the change proposed and agree, if this proposal is approved, that we will provide all equipment, furnish the materials, except as may otherwise be noted above, and perform all services necessary for the work above specified, and will accept as full payment therefore the prices shown above, including, but not limited to, direct and indirect overhead expenses.

Notwithstanding any other provision in the Contract Documents, the City's issuance of a change order shall not constitute a waiver by the City of, or preclude the City in any way from, asserting any claim with respect to the same, including but not limited to, a claim of breach of contract or claim that the issued change order covers work included in the Scope of Work set forth in the Contract Documents for which the Contractor was not entitled to any additional funds.

Contractor Acceptance by: Contractor's name

Signature	(Print name & title)	Date
-----------	----------------------	------

cc: Contractor, Finance, Inspection, File

2-8 EXTRA WORK.

DELETE in its entirety and SUBSTITUTE with the following:

When the price for the extra work cannot be agreed upon prior to the commencement of the work, the Agency will pay for the extra work based on the accumulation of costs as provided herein.

SECTION 3 – CONTROL OF THE WORK

REVISE as follows:

3-1 ASSIGNMENT.

Modify to add the following:

The performance of the Contract may not be assigned, except upon the written consent of the Agency. Consent will not be given to any proposed assignment that would relieve the original Contractor or its Surety of their responsibilities under the Contract, nor will the Agency consent to any assignment of any part of the Work under the Contract.

Assignment of this Contract shall contain a provision that the funds to be paid to the assignee under the assignment are subject to a prior lien for services rendered or materials supplied for performance of the work called for under the Contract in favor of all persons, firms, or corporations rendering such services or supplying such materials.

3-2 SELF PERFORMANCE.

DELETE in its entirety and SUBSTITUTE with the following:

When an item of work is designated as (S) or (S-F) in the “Schedule of Work,” that item of work shall be the considered a “Specialty Item.”

The Contractor shall perform, with its own organization, Contract work amounting to at least 15 percent of the Contract Price on building/facility contracts of the Contract Price on all other Public Works contracts except that any designated “Specialty Items” may be performed by subcontract and the amount of any such “Specialty Items” so performed may be deducted from the Contract Price before computing the amount required to be performed by the Contractor with its own organization. “Specialty Items” will be identified by the Agency in the Bid or Proposal. Where an entire item is subcontracted, the value of work subcontracted will be based on the Contract Unit Price. When a portion of an item is subcontracted, the value of work subcontracted will be based on the estimated percentage of the Contract Unit Price. This will be determined from information submitted by the Contractor, and subject to approval by the Engineer.

The provisions in 3-2 of these Special Provisions require that the Contractor shall perform with the Contractor’s own organization contract work amounting to not less than 15 percent of the original Contract Price is not changed by the Federal Aid requirement specified under “Required Contract Provisions Federal Aid Construction Contracts” of these Special Provisions that the Contractor perform not less than 30 percent of the original contract work with the Contractor’s own organization.

3-4 AUTHORITY OF THE BOARD AND THE ENGINEER.

MODIFY TO ADD THE FOLLOWING:

The Contractor is subject to the provisions of Government Code § 8546.7, which provides that this Contract and related documents are subject to the examination and audit of the State Auditor, at the request of the Agency or as part of any audit of the Agency, for a period of three (3) years after final payment under the Contract.

The Agency reserves the right to audit the Contractor's books, records, and documents related to the Contractor's performance and the Contractor's compliance with all of the terms and conditions of this Contract at any time. Upon request by Agency, Contractor shall prepare and submit to Agency any reports concerning Contractor's performance of the services rendered under this Contract. With 72 hours advance written notice delivered to Contractor, Agency shall have access to the books, records, and documents of Contractor related to Contractor's performance of this Contract in the event any audit is requested.

All drawings, documents, and other materials prepared by Contractor in the performance of this Contract:

- a) Shall be the property of Agency and shall be delivered at no cost to Agency upon request of Agency or upon the termination of this Contract, and
- b) Are confidential and shall not be made available to any individual or entity without prior written approval of the Agency.

3-5 INSPECTION.

DELETE in its entirety and SUBSTITUTE with the following:

Inspection of the Work will be conducted by an Agency Representative and will include monitoring and enforcing compliance of materials, equipment, installations, workmanship, methods, and requirements of the Contract Documents.

The Agency Representative shall, at all times, have safe access to the Work during construction and shall be furnished with every reasonable facility for ascertaining full knowledge respecting the progress, workmanship, and character of materials and equipment used and employed in the Work.

Whenever the Contractor varies the work hours in which inspection is required, the Contractor shall give at least two (2) Working Days written notice to the Agency Representative so that inspection may be made.

All installations which are to be backfilled or otherwise covered will be inspected by the Agency Representative prior to backfilling or covering. The Contractor shall give the Agency Representative a minimum of two (2) days advance notice prior to backfilling or covering any part of the Work.

Work or materials concealed or performed without the prior notice specified above, will be subject to such tests or exposure as may be necessary to prove to the satisfaction of the Engineer, that all materials used and the work done are in strict conformity with the Contract Documents. All labor and equipment necessary for exposing and testing shall be furnished and paid for by the Contractor. The Contractor shall replace, without additional cost to the Agency, any materials or work damaged by exposure or testing.

Defective work shall be made good at the Contractor's expense including any unsuitable materials and equipment that may have been previously inspected by the Agency Representative, and/or that payment therefore has been included in an estimate for payment.

Inspection of the Work shall not relieve the Contractor of the obligation to fulfill all requirements of the Contract.

All submittals and correspondence between the Agency and the Contractor, related to inspection of the Work of this Contract, shall be directed to the Engineer.

ADD:

3-5.1 Inspection Requirements. The Contractor shall notify the Agency Representative a minimum of 48 hours before inspection is required.

- a) Unless specified elsewhere in the Special Provisions, inspection of the Work will be provided by the Agency between the hours of 7:00 a.m. and 3:30 p.m., Monday through Friday, exclusive of Agency holidays. Any inspections 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 wage rate, plus 21% for overhead costs.

The Contractor shall submit a request to the Engineer for approval, a minimum five (5) Calendar Days, in advance of inspections requested by or made necessary as a result of the actions of the Contractor on Saturdays, Sundays or Agency and/or Federal holidays. The Contractor shall pay for these inspections at the prevailing rate of 1-1/2 times for Saturdays and 2 times the regular hourly wage rate for Sundays or Agency and/or Federal holidays plus associated overhead costs.

For purposes of this section, the following holidays are observed by the Agency:

- New Year's Day
- Martin Luther King Jr. Day
- Presidents' Day
- Memorial Day
- Juneteenth
- Independence Day
- Labor Day
- Veterans Day
- Thanksgiving Day
- Day after Thanksgiving
- Christmas Eve
- Christmas Day

A construction calendar showing the days that each of the above holidays will be observed is available upon request from the Engineer.

- b) The Contractor shall telephone the designated Agency Representative at least two (2) Working Days prior to starting construction or resuming construction following suspension of the Work for any reason.

Prior to commencing any work on the Contract, the Contractor shall submit a completed Inspection Overtime Permit form provided by the City of Irvine.

- c) In addition to any inspection required by Codes and/or Ordinances or Contract Documents, Contractor shall notify the Engineer a minimum of 2 days prior to the permanent concealment of any materials or work. The following list is typical, but not all inclusive of such required inspections:

- 1) Foundation/subgrade material, footing, and slab beds

- 2) Reinforcing for concrete, masonry, and plaster
- 3) Contact surface of concrete forms
- 4) Concrete and masonry surfaces
- 5) Piping and conduit
- 6) Finish grade prior to paving, seeding or planting
- 7) All soil mixes prior to installation
- 8) All chemicals and amendments prior to installation or application

3-6 THE CONTRACTOR'S REPRESENTATIVE.

DELETE the 3rd sentence in the 1st paragraph and SUBSTITUTE with the following:

Said authorized representative shall be present at the site of the Work at all times while Work is actually in progress on the Contract. When Work is not in progress and during periods when Work is suspended, arrangements acceptable to the Agency Representative shall be made for any emergency work, which may be required.

ADD the following after the last sentence of the 1st paragraph:

Whenever the Contractor or his authorized representative is not present on any particular part of the Work where it may be desired to give direction, orders will be given by the Agency Representative, which shall be received and obeyed by the superintendent or supervisor who may have charge of the particular work in reference to which the orders are given.

The Agency reserves the right to approve the Contractor's Superintendent. Once approved, the Superintendent shall remain on the project for the duration of the project so long as he is in the employment of the Contractor.

3-7 CONTRACT DOCUMENTS.

3-7.1 General. ADD the following after the 2nd paragraph:

All work of the Contract including, but not limited to, the general nature and character of the work area and conducting of Contractors' operations shall be performed in accordance with the Standard Specifications for Public Works Construction, 2024 edition, and all supplements thereto, except as modified in these Special Provisions and as follows:

Work to be performed which is directly related to the construction and/or modification of traffic, striping, signing, markings or signals; work within State right of way; and, work which is directly related to the construction of bridges and bridge appurtenances shall be performed in accordance with the State Standard Specifications, current edition as of bid date.

As applicable, unless modified elsewhere in these Special Provisions, Work of the Contract shall conform to current editions of: Uniform Building, Plumbing, Mechanical Codes; Uniform Fire Code; National Electrical Code; and, City of Irvine amendments thereto.

All work shall be performed in accordance to the Standard Specification for Public Works Construction "Greenbook" (2024 Edition, with all current supplements), the California Building Code (2022 Edition) with City Amendments, the California Electrical Code (2022 Edition) with City Amendments, the California Plumbing Code (2022 Edition) with key amendments, California Green Building Standards Code (2022 Edition), Building Energy Efficiency Standards (2022 Edition), California Playground Safety Regulations; All City of Irvine Codes & Ordinances, City of Irvine's Grading Manual, City of Irvine's Standards and Design Manual; City of Irvine's Park/Public Facility Standards; City of Irvine's Construction Site Security Requirements, Americans with Disabilities Act (ADA), Chapter 11B Title 24 of the California Code of Regulations; California Public Contract Laws; these Specifications, Attachments, and the Construction Drawings, and all applicable requirements.

DELETE last paragraph in its entirety and SUBSTITUTE with the following:

If the Contractor, either before commencing work or in the course of the work, finds any discrepancy between the Specifications and the Plans or between either of them and the physical conditions at the site of the work or finds any error or omission in any of the Plans or in any survey, the Contractor shall promptly notify the Agency of such discrepancy, error, or omission. If the Contractor observes that any plans or specifications are at variance with any applicable law, ordinance, regulation, order, or decree, he shall promptly notify the Agency in writing of such conflict.

The Agency, on receipt of any such notice, will investigate the circumstances and give appropriate instructions to the Contractor. Until such instructions are given, any work done by the Contractor after its discovery of such an error, discrepancy, or conflict that is directly or indirectly affected by such error, discrepancy, or conflict, will be at its own risk and it shall bear all cost arising therefrom.

The Agency will provide, free of charge, three (3) copies of Plans and Special Provisions for the Contractor and one (1) copy of Plans and Special Provisions for each subcontractor listed in the Bidder's Proposal. Any Plans or Special Provisions required by the Contractor/subcontractor in addition to the above can be provided by Agency at Contractor's expense. The Contractor shall keep one set of Plans and Special Provisions in good order and available to the Agency Representative at the site of the Work.

3-7.2 Precedence of Contract Documents. *DELETE the order of precedence and SUBSTITUTE with the following:*

- a) Permits and Agreements
- b) Change Orders and/or Supplemental Agreements; whichever occurs last
- c) Contract
- d) Addenda
- e) Instructions to Bidders, Proposal Requirements and Conditions
- f) Bid/Proposal
- g) Special Provisions
- h) Appendices

- i) Contract Plans
- j) Standard Plans
- k) Standard Specifications
- l) Reference Specifications

ADD:

3-7.2.1 Interpretation of Plans and Specifications. Figured dimensions on Plans shall govern but work not dimensioned shall be as directed. Work not particularly shown or specified shall be the same as similar parts that are shown or specified. Specifications shall govern as to materials, workmanship, and installation procedures. Plans and Specifications requiring higher quality material or workmanship shall prevail. In the event of any discrepancy between any drawings and the figures thereon, the figures shall be taken as correct. In the event of any doubt or question arising respecting the true meaning of the Specifications, reference shall be made to Engineer whose decision thereon shall be final.

3-8 SUBMITTALS.

3-8.1 General. *MODIFY to ADD the following:*

The review period begins anew upon each submittal or resubmittal.

In providing specified submittals, the Contractor certifies that they are complete in all respects and all materials, equipment, and other work shown thereon conforms to the Contract Documents.

Where a manufactured item is designed or engineered by the manufacturer, fabricator, subcontractor, consultant or designee, the drawings, and supporting calculations shall be stamped and signed by an engineer registered by the State of California executing the design within the scope of his registration. Unless otherwise accepted by the Engineer, data shall be submitted only by the prime Contractor. Data that, in the opinion of the Engineer, are incomplete or have not been checked by the prime Contractor or are illegible will be considered as not complying with the Contract requirements and will be returned to the Contractor for resubmittal in the proper form. The City may make this determination at any time during the review period.

Data shall be submitted in a format similar to the arrangement of the applicable section(s) of the Specifications unless otherwise specified. Any submittal not following the format specified, and not conforming to the requirements listed below, will be returned for resubmittal without review.

- a) Data shall include drawings and descriptive information in sufficient detail to show the kind, size, arrangement, and operation of component materials and devices, the external connections, anchorages, and supports required, performance characteristics, dimensions needed for installation and correlation with other materials and equipment, and all additional information as required in the detailed section(s) of the Contract Documents. Identify field dimensions; show relation to adjacent or critical features, work or products.
- b) Calculations to support the adequacy of the design in meeting specified performance ratings or requirements shall be submitted when required by the Specifications.

- c) Each drawing or data sheet shall be clearly marked with the name of the project, the Contractor's name, and references to applicable Specification paragraphs and Plan sheets. Submittals containing multiple drawings or data sheets shall be collated prior to submittal for review.
- d) Data sheets, catalog cuts or drawings showing more than the particular item under consideration shall be marked to cross out all but the applicable information. Submit only pertinent pages; mark each copy of standard printed data to identify pertinent products, referenced to Specification Section and Article number. Show reference standards, performance characteristics, and capacities; wiring and piping diagrams and controls; component parts; finishes; dimensions; and required clearances.
- e) Data submitted shall include drawings showing wiring and/or pipe layouts. Any changes proposed by the Contractor shall be stated in a cover letter and essential details of such changes shall be clearly shown in the data submitted.
- f) Present in a clear and thorough manner. Title each drawing with project name and number; identify each element of drawings by reference to sheet number and detail, schedule, or room number of Contract Documents.
- g) Provide manufacturer's preparation, assembly, and installation instructions.
- h) Submit full range of manufacturer's standard finishes except when more restrictive requirements are specified, indicating colors, textures, and patterns, for Engineer's selection.
- i) Submit samples to illustrate functional characteristics of products, including parts and attachments. Label each sample with identification required for transmittal letter. Approved samples which may be used in the Work are indicated in the Specification section.
- j) Provide field samples of finishes for the Work, at location acceptable to Agency Representative, as required by individual Specifications section. Install each sample complete and finished. Finishes in place that have been accepted by the Agency Representative may be retained in completed work.

Submittals shall be accompanied by a letter of transmittal listing the contents of the submittal. Drawings shall show the name of the project, the name of the Contractor, and, if any, the names of suppliers, manufacturers, and subcontractors. Shop drawings shall be submitted with sufficient time for Agency's review and in orderly sequence in accordance with the progress schedule to cause no delay in prosecution of the Work. Drawings shall be submitted on 11"x17" or 24"x36" sheet sizes only. Any submittal not accompanied by such a transmittal, or where all applicable items on the form are not complete, will be returned for resubmittal.

A separate letter of transmittal shall be used for each specific item or class of materials or equipment for which a submittal is required. Transmittal of shop drawings on various items using a single letter of transmittal will be permitted only when the items taken together constitute a manufacturer's "package" or are so functionally related that expediency indicates review of the group or package as a whole. Submittals transmitted by facsimile will not be accepted.

The Agency will return any submittal sent (1) without a transmittal letter, (2) with an incomplete form, or (3) by facsimile.

The Contractor shall assign a unique sequential number to each submittal package, which shall be clearly written in the space provided on the transmittal letter. This number shall be used in all correspondence to the Agency when referencing to a particular submittal. The Contractor shall be responsible for ensuring the same submittal number is not assigned to different submittal packages.

Resubmittals shall incorporate the original submittal number followed by the revision number (i.e., the first resubmittal of submittal #1 is numbered 1R1, the second 1R2, etc.). The Agency will return improperly numbered submittals without review. The Contractor shall indicate on the transmittal letter that either no exceptions to the Contract Documents are taken or deviations are submitted. All deviations indicated shall be listed on the transmittal letter and the Contractor shall be solely responsible for any omitted deviations. If any deviations are omitted, the Agency will return the submittal and the engineering data without review for resubmittal. Any consequences from the resulting delay shall be fully borne by the Contractor.

The Engineer's review of the Contractor's submittals will cover only general conformity to the Contract Documents. The Engineer's acceptance of drawings returned marked NO EXCEPTION TAKEN or RESUBMITTAL NOT REQUIRED (CORRECTIONS ARE NOTED) shall not constitute a blanket approval of dimensions, qualities, and details of the materials, equipment, device, or item shown, and does not relieve the Contractor from any responsibility for errors, omission or deviations from conforming to the Contract Documents. The Agency reserves the right to subsequently reject any previously accepted equipment, material, and/or construction method that deviates from the Contract Documents. When the drawings and data are returned marked CORRECT AND RESUBMIT, the corrections shall be made as noted thereon and as instructed by the Engineer, resubmittal shall be made in the same manner as the original submittal.

If the Engineer rejects the submittals, the Contractor is responsible for any subsequent time delays at no additional compensation from the Agency. Subject to these requirements, drawings and data, after final processing by the Engineer, shall become a part of the Contract Documents, and the work shown or described thereby shall be performed in conformity therewith unless otherwise required by the Engineer. In the event of conflict between accepted submittals and the other Contract Documents, the most stringent requirements shall apply unless the Agency has agreed in writing to less stringent requirements in response to a deviation listed on a submittal letter of transmittal.

No portion of the work requiring a submittal shall be commenced until the submittal has been reviewed by the Engineer and returned to the Contractor with a notation indicating that resubmittal is not required.

The review by the Engineer is only of general conformance with the design concept of the project, and general compliance with the Contract Documents and shall not be construed as relieving the Contractor of these full responsibilities for providing materials, equipment, and work required by the Contract; the proper fitting and construction of the Work; the accuracy and completeness of the submittals; selecting fabrication processes and techniques of construction; and performing the Work in a safe manner.

3-10 SURVEYING.

3-10.1 General. *DELETE the 1st sentence in the 1st paragraph and SUBSTITUTE with the following:*

Any and all surveying necessary to complete this project shall be in accordance with Section 3-10 of the Greenbook Specification and shall be provided by the Contractor and be performed by a registered Civil Engineer licensed prior to January 1, 1982 or licensed Land Surveyor in the State of California at the Contractor's expense. Any and all costs, including adjustment of well monuments and restoration of corner records prescribed by the Greenbook Specifications and these Special Provisions relative to Surveying shall be included in the various items of work requiring construction staking/surveying and no additional compensation will be allowed therefor.

The Agency will engage a licensed land surveyor or civil engineer registered in the State of California to perform surveying and calculations required for quality assurance surveying only.

DELETE the last sentence in the 1st paragraph and SUBSTITUTE with the following:

Staking will be in accordance with Chapter 12 "Construction Surveys" of the State of California, Department of Transportation "Survey Manual." A copy of the Manual is available at http://www.dot.ca.gov/hq/row/landsurveys/SurveysManual/12_Surveys.pdf.

Any construction stakes required in addition to those listed in the "Survey Manual", or any re-staking required by loss of stakes, or additional costs encountered by significant delays or conditions which cause the use of more difficult survey methods during field operations and which are, in the judgment of the Agency, caused by interference of Contractor's operations, equipment or materials, are also the Contractor's responsibility.

The Contractor shall submit to the Agency Representative a construction staking form 48 hours in advance of staking operations, with an assigned sequential number, description of specific items, locations, and date to be staked, together with supplemental drawings and/or data as necessary to facilitate the Agency's quality assurance surveying as required.

If additional quality assurance surveying by the Agency's surveyor is necessary due to re-staking attributed to the loss of stakes caused by the Contractor's operations, the Agency shall be compensated by the Contractor at the hourly rate schedule of the Agency's surveyor. Costs shall be deducted from any monies due or to become due the Contractor and any delays due to the replacement or restoration of stakes shall be the responsibility of the Contractor.

ADD:

3-10.3 Conformity with Contract Documents. The Work shall conform to the lines, grades, dimensions, tolerances, and material and equipment requirements shown on the Contract Documents. Although measurement, sampling, and testing may be considered evidence as to such conformity, the Engineer shall be the sole judge as to whether the work or materials deviate from the Contract Documents and his decision as to any allowable deviations therefrom shall be final.

If specific lines, grades, and dimensions are not shown on the Plans, those furnished by the Engineer shall govern.

3-12 WORK SITE MAINTENANCE.

MODIFY to ADD the Following:

Section 3-12 includes specifications for performing work site maintenance, including spill prevention and control, material management, waste management, water pollution control, and nonstormwater management.

Projects are required to comply with the City of Irvine Ordinance No. 07-18, which establishes requirements for recycling and diversion of construction and demolition waste.

The Contractor shall implement effective handling, storage, usage, and disposal practices to control material pollution and manage waste and nonstormwater at the job site before they come in contact with storm drain systems and receiving waters.

Linear sediment barriers must comply with 3-12.6.2 of the Standard Specifications and the Contract Special Provisions.

ADD:

3-12.1.1 Construction Cleaning. The Contractor shall:

- a) Initiate and maintain a daily program to prevent accumulation of debris on-site and along access roads and haul routes. Maintain areas under Contractor's control free of waste materials, debris, weeds 6" high, and rubbish. Maintain site in a clean and orderly condition.
- b) Provide suitable covered containers for deposit of debris and rubbish. Dispose of accumulation of extraneous materials, prohibit overloading of trucks to prevent spillages on access and haul routes and provide daily inspection of haul routes to enforce requirements.
- c) The Contractor shall supply self-loading motorized street sweepers equipped with a functional water spray system as part of his daily program.
- d) Schedule at a minimum, weekly collection and disposal of debris. Provide additional collections and disposals of debris whenever the weekly schedule is inadequate to prevent accumulation.

The Contractor shall remove debris from closed or remote spaces prior to closing the space, control cleaning operations to minimize dust and other particulates and immediately remove clay and earth which adhere to the paved surface of the roadway. Remove by hand scraping, washing, sweeping, and/or other method(s) which will leave a clean non-skid surface without impairing, injuring or loosening the surface.

The Contractor shall remove waste materials, debris, vegetation, other rubbish, and non-recyclable materials as required by the Contract Documents, and dispose of off-site in an approved disposal site or recycling center.

Unless otherwise specified in the Special Provisions, all concrete, asphalt, aggregate or sand base material, cement block, trees, shrubs, bushes, and all other recyclable material generated during cleaning, demolition, clearing, and grubbing or other phases of the work is to be disposed of at appropriate recycling centers. The Contractor shall be responsible for removing reinforcing steel, wood, or other deleterious materials as required by the recycling center for acceptance of recycled materials. The Contractor shall supply proof of disposal at a recycling center. The proof of disposal shall include verification of tonnage by certified weigh masters tickets. If weigh

masters tickets are not feasible, the Contractor and Agency Representative shall estimate the tonnage prior to disposal at the recycling centers.

Known recycling centers:

Ewles Materials
16081 Construction Circle West
Irvine

The Contractor is required to control dust throughout the life of the Contract. The control may be required by job conditions or Agency Representative. In any case, the Contractor shall use water or other means to control the dust. No chemical agents may be used without written authorization from the Agency. The Contractor shall be solely responsible for safety problems, accidents or any other complications or claims arising from inadequate dust control.

No separate payment will be made for any work performed or material used to control dust resulting from the Contractor's performance of the Work, or by public traffic, either inside or outside the right of way. Full compensation for such dust control will be considered as included in the price paid for the various items of work involved.

No separate payment will be made for any work performed or material used in cleaning the project. Full compensation for such cleaning shall be considered as included in the price paid for the various items of work involved and no additional compensation will be allowed therefor.

ADD:

3-12.1.2 Final Cleaning. The Contractor shall execute cleaning prior to inspection for completion of the Work. The Contractor shall use materials which will not create hazards to health or property, and which will not damage surfaces, remove debris from and otherwise clean exposed-to-view surfaces, remove temporary protection and labels not required to remain, clean finishes free of foreign substances, remove waste, debris, and surplus materials from site. Clean grounds; remove stains, spills, and foreign substances from paved areas and sweep clean, clean other exterior surfaces, and where applicable:

- a) Clean transparent and glossy materials to a polished condition; remove foreign substances. Polish reflective surfaces to a clear shine.
- b) Vacuum clean carpeted and similar soft surfaces.
- c) Clean resilient and hard surface floors.
- d) Clean surfaces of equipment; remove excess lubrication.
- e) Clean plumbing fixtures to a sanitary condition.
- f) Clean permanent filters of ventilating equipment and replace disposable filters when units have been operated during construction; in addition, clean ducts, blowers, and coils when units have been operated without filters during construction.
- g) Clean light fixtures and lamps.
- h) Remove waste, foreign matter, and debris from roofs, gutters, areaways, and drainage systems.

ADD:

3-12.4.3 Material Management.

3-12.4.3.1 General. The Contractor shall minimize or eliminate discharge of material into the air, storm drain systems, and receiving waters while taking delivery of, using, or storing the following materials:

- a) Hazardous chemicals, including acids, lime, glues, adhesives, paints, solvents, and curing compounds
- b) Soil stabilizers and binders
- c) Fertilizers
- d) Detergents
- e) Plaster
- f) Petroleum materials, including fuel, oil, and grease
- g) Asphalt and concrete components
- h) Pesticides and herbicides

The Contractor's employees trained in emergency spill cleanup procedures must be present during the unloading of hazardous materials or chemicals.

The Contractor shall use less hazardous materials if practicable.

The following activities must be performed at least 100 feet from concentrated flows of stormwater, drainage courses, and inlets if within the floodplain and at least 50 feet if outside the floodplain, unless otherwise authorized:

- a) Stockpiling materials
- b) Storing pile-driving equipment and liquid waste containers
- c) Washing vehicles and equipment in outside areas
- d) Fueling and maintaining vehicles and equipment

3-12.4.3.2 Material Storage. If materials are stored by the Contractor, he shall:

- a) Store liquids, petroleum materials, and substances listed in 40 CFR 110, 117, and 302 and place them in secondary containment facilities as specified by USDOT for storage of hazardous materials.
- b) Ensure that secondary containment facilities are impervious to the materials stored there for a minimum contact time of 72 hours.
- c) Cover secondary containment facilities during nonworking days and whenever precipitation is forecasted. Secondary containment facilities must be adequately ventilated.

- d) Keep secondary containment facilities free of accumulated rainwater or spills. After precipitation, or in the event of spills or leaks, collect accumulated liquid and place it into drums within 24 hours. Handle the liquid as hazardous waste in accordance with subsection 3-12 of the Standard Specifications and these Special Provisions.
- e) Not store incompatible materials, such as chlorine and ammonia, in the same secondary containment facility.
- f) Store materials in their original containers with the original material labels maintained in legible condition. Immediately replace damaged or illegible labels.
- g) Ensure that secondary containment facilities have the capacity to contain precipitation from a 24-hour-long, 25-year storm, plus 10 percent of the aggregate volume of all containers or the entire volume of the largest container within the facility, whichever is greater.
- h) Store bagged or boxed material on pallets. Protect bagged or boxed material from wind and rain during nonworking days and whenever precipitation is forecasted.
- i) Provide sufficient separation between stored containers to allow for spill cleanup or emergency response access. Storage areas must be kept clean, well-organized, and equipped with cleanup supplies appropriate for the materials being stored.
- j) Repair or replace perimeter controls, containment structures, covers, and liners as necessary. Inspect storage areas before and after precipitation, and at least weekly during other times.

3-12.4.3.3 Stockpile Management. The Contractor shall minimize stockpiling of materials at the job site.

The Contractor shall implement water pollution control practices within 72 hours of stockpiling material or before a forecasted storm event, whichever occurs first. If stockpiles are being used, do not allow soil, sediment, or other debris to enter storm drains, open drainages, and watercourses.

Active and inactive soil stockpiles must be:

- a) Covered with soil stabilization material or a temporary cover
- b) Surrounded with a linear sediment barrier

Stockpiles of asphalt concrete and PCC rubble, HMA, aggregate base, or aggregate subbase must be:

- a) Covered with a temporary cover
- b) Surrounded with a linear sediment barrier

Stockpiles of pressure-treated wood must be:

- a) Placed on pallets
- b) Covered with impermeable material

Stockpiles of cold mix asphalt concrete must be:

- a) Placed on an impervious surface
- b) Covered with an impermeable material
- c) Protected from stormwater run-on and runoff

The Contractor shall control wind erosion year-round.

The Contractor shall repair or replace linear sediment barriers and covers as needed to keep them functioning properly. Whenever sediment accumulates to 1/3 of the linear sediment barrier height, remove the accumulated sediment.

3-12.5.3 Spill Prevention and Emergency Response Plan.

ADD:

3-12.5.3.1 Spill Prevention and Control. The Contractor shall keep material or waste storage areas clean, well-organized, and equipped with enough cleanup supplies for the material being stored.

The Contractor shall implement spill and leak prevention procedures for chemicals and hazardous substances stored on the job site. Whenever the Contractor spills or leaks chemicals or hazardous substances at the job site, he is responsible for all associated cleanup costs and related liability.

The Contractor shall report minor, semi significant, and significant or hazardous spills to the WPC manager and the WPC manager must notify the Engineer immediately.

As soon as it is safe, the Contractor shall contain and clean up spills of petroleum materials and sanitary and septic waste substances listed under 40 CFR, parts 110, 117, and 302.

ADD:

3-12.5.3.2 Minor Spills. Minor spills consist of quantities of oil, gasoline, paint, or other materials that are small enough to be controlled by a first responder upon discovery of the spill.

The Contractor shall clean up a minor spill using the following procedures:

- a) Contain the spread of the spill
- b) Recover the spilled material using absorption
- c) Clean the contaminated area
- d) Dispose of the contaminated material and absorbents promptly and properly

ADD:

3-12.5.3.3 Semi Significant Spills. Semi significant spills consist of spills that can be controlled by a first responder with help from other personnel.

The Contractor shall clean up a semi significant spill immediately using the following procedures:

- a) Contain the spread of the spill.

- b) On paved or impervious surfaces, encircle and recover the spilled material with absorbent materials. Do not allow the spill to spread widely.
- c) If the spill occurs on soil, contain the spill by constructing an earthen dike and dig up the contaminated soil for disposal.
- d) If the spill occurs during precipitation, cover the spill with 10-mil plastic sheeting or other material to prevent contamination of runoff.
- e) Dispose of the contaminated material promptly and properly.

ADD:

3-12.5.3.4 Significant or Hazardous Spills. Significant or hazardous spills consist of spills that cannot be controlled by job site personnel.

The Contractor shall immediately notify qualified personnel of a significant or hazardous spill and take the following steps:

- a) Do not attempt to clean up the spill until qualified personnel have arrived.
- b) Notify the Engineer and follow up with a report.
- c) Obtain the immediate services of a spill contractor or hazardous material team.
- d) Notify local emergency response teams by dialing 911 and county officials by using the emergency phone numbers retained at the job site.
- e) Notify the California Emergency Management Agency State Warning Center at 916-845-8911.
- f) Notify the National Response Center at (800) 424-8802 regarding spills of Federal reportable quantities under 40 CFR 110, 119, and 302.
- g) Notify other agencies as appropriate, including:
 - 1) Fire Department
 - 2) Department of Public Works and Sustainability
 - 3) Coast Guard
 - 4) Highway Patrol
 - 5) City Police or County Sheriff's Department
 - 6) Department of Toxic Substances
 - 7) California Division of Oil and Gas
 - 8) Cal/OSHA
 - 9) Regional Water Resources Control Board

The Contractor shall prevent a spill from entering stormwater runoff before and during cleanup activities and shall not bury or wash the spill with water.

ADD:

3-12.5.4 Waste Management.

3-12.5.4.1 Paint Waste. The Contractor shall clean water-based and oil-based paint from brushes or equipment within a contained area in a way that does not contaminate soil, receiving waters, or storm drain systems. Handle and dispose of the following as hazardous waste: paints, thinners, solvents, residues, and sludges that cannot be recycled or reused. When thoroughly dry, dispose of the following as solid waste under: dry latex paint, paint cans, used brushes, rags, absorbent materials, and drop cloths.

3-12.5.4.2 Concrete Waste. The Contractor shall use practices to prevent the discharge of asphalt concrete, PCC, and HMA waste into storm drain systems and receiving waters.

The Contractor shall collect and dispose of asphalt concrete, PCC, and HMA waste at locations where:

- a) Concrete material, including grout, is used.
- b) Concrete dust and debris result from demolition.
- c) Saw cutting, coring, grinding, grooving, or hydro-concrete demolition creates a residue or slurry.
- d) Concrete trucks or other concrete-coated equipment is cleaned at the job site.

3-12.5.4.3 Sanitary and Septic Waste. The Contractor shall not bury or discharge wastewater from a sanitary or septic system anywhere at the site of Work. A sanitary facility discharging into a sanitary sewer system must be properly connected and free from leaks. The Contractor shall place a portable sanitary facility at least 50 feet away from storm drains, receiving waters, and flow lines.

The Contractor shall comply with local health agency provisions if using an on-site disposal system.

3-12.5.4.4 Liquid Waste. The Contractor shall use practices that will prevent job-site liquid waste from entering storm drain systems and receiving waters. Liquid wastes include the following:

- a) Drilling slurries or fluids
- b) Grease-free and oil-free wastewater and rinse water
- c) Dredgings, including liquid waste from cleaning drainage systems
- d) Liquid waste running off a surface, including wash or rinse water
- e) Other nonstormwater liquids not covered by separate permits

The Contractor shall hold liquid waste in structurally sound, leak-proof containers, such as roll-off bins or portable tanks.

Liquid waste containers must be of sufficient quantity and volume to prevent overflow, spills, and leaks.

The Contractor shall store containers at least 50 feet from moving vehicles and equipment.

The Contractor shall remove and dispose of deposited solids from sediment traps in accordance with 3-12 of the Standard Specifications and these Special Provisions. Liquid waste may require testing to determine hazardous material content before disposal.

The Contractor shall dispose of drilling fluids and residue.

If an authorized location is available within the job site, fluids and residue exempt under 23 CA Code of Regs § 2511(g) may be dried by evaporation in a leak-proof container. The Contractor shall dispose of the remaining solid waste in accordance with 3-12 of the Standard Specifications and these Special Provisions.

ADD:

3-12.5.5 Nonstormwater Management.

3-12.5.5.1 Water Control and Conservation. The Contractor shall manage water used for work activities in a way that will prevent erosion and the discharge of pollutants into storm drain systems and receiving waters. Obtain authorization before washing anything at the job site with water that could discharge into a storm drain system or receiving waters. Report discharges immediately.

The Contractor shall implement water conservation practices if water is used at the job site. Inspect irrigation areas. Adjust watering schedules to prevent erosion, excess watering, or runoff. Shut off the water source to broken lines, sprinklers, or valves and repair breaks within 24 hours. Reuse water from waterline flushing for landscape irrigation if practicable. Sweep and vacuum paved areas. Do not wash paved areas with water.

The Contractor shall direct runoff water, including water from water line repair, from the job site to areas where it can infiltrate into the ground. Do not allow runoff water to enter storm drain systems and receiving waters. Do not allow spilled water to escape filling areas for water trucks. Direct water from off-site sources around the job site if practicable. Minimize the contact of off-site water with job site water.

3-12.5.5.2 Illicit Connection and Illegal Discharge Detection and Reporting. Before starting work, the Contractor shall inspect the job site and the job site's perimeter for evidence of illicit connections, illegal discharges, and dumping. After starting work, inspect the job site and perimeter on a daily schedule for illicit connections and illegal dumping and discharges.

Whenever illegal connections, discharges, or dumping are discovered, The Contractor shall notify the Engineer immediately, should take no further action unless ordered and assume that unlabeled or unidentifiable material is hazardous.

The Contractor shall look for the following evidence of illicit connections, illegal discharges, and dumping:

- a) Debris or trash piles
- b) Staining or discoloration on pavement or soils
- c) Pungent odors coming from drainage systems
- d) Discoloration or oily sheen on water

- e) Stains and residue in ditches, channels, or drain boxes
- f) Abnormal water flow during dry weather
- g) Excessive sediment deposits
- h) Nonstandard drainage junction structures
- i) Broken concrete or other disturbances at or near junction structures

3-12.5.5.3 Vehicle and Equipment Cleaning. The Contractor shall limit vehicle and equipment cleaning or washing at the job site except for what is necessary to control vehicle tracking or hazardous waste. The Contractor shall notify the Engineer before cleaning vehicles and equipment at the job site with soap, solvents, or steam, and contain and recycle or dispose of resulting waste under 5-7.4. The Contractor shall not use diesel to clean vehicles or equipment and minimize the use of solvents.

The Contractor shall clean or wash vehicles and equipment in a structure equipped with disposal facilities. The Contractor may wash vehicles in an outside area if the area is:

- a) Paved with asphalt concrete, HMA, or PCC
- b) Surrounded by a containment berm
- c) Equipped with a sump to collect and dispose of wash water

The Contractor shall use as little water as practicable whenever washing vehicles and equipment with water and hoses used must be equipped with a positive shutoff valve.

The Contractor shall discharge liquid from wash racks to a recycling system or to another authorized system. Remove liquids and sediment as necessary.

3-12.5.5.4 Vehicle and Equipment Fueling and Maintenance. If practicable, the Contractor shall perform maintenance on vehicles and equipment off-site.

If fueling or maintenance must be done at the job site, the Contractor shall assign a site or sites, and obtain authorization before using them. The Contractor shall minimize mobile fueling and maintenance activities. The Contractor's fueling and maintenance activities must be performed on level ground in areas protected from stormwater run-on and runoff.

The Contractor shall use containment berms or dikes around fueling and maintenance areas. Keep adequate quantities of absorbent spill-cleanup material and spill kits in the fueling or maintenance area and on fueling trucks. The Contractor shall dispose of spill-cleanup material and kits immediately after use and use drip pans or absorbent pads during fueling or maintenance.

The Contractor shall not leave fueling or maintenance areas unattended during fueling and maintenance activities. The Contractor's fueling nozzles must be equipped with an automatic shutoff control. The Contractor shall use equipment with vapor-recovery fueling nozzles where required by the Air Quality Management District, secure nozzles in an upright position when not in use and shall not top off fuel tanks.

The Contractor shall recycle or properly dispose of used batteries and tires.

If leaks cannot be repaired immediately, the Contractor shall remove the vehicle or equipment from the job site.

3-12.5.5.5 Material and Equipment Used Over Water. The Contractor shall place drip pans and absorbent pads under vehicles and equipment used over water, keep an adequate supply of spill-cleanup material with vehicles and equipment, place drip pans or plastic sheeting under vehicles and equipment on docks, barges, or other surfaces over water whenever vehicles or equipment will be idle for more than one (1) hour.

The Contractor shall furnish watertight curbs or toe boards on barges, platforms, docks, or other surfaces over water to contain material, debris, and tools and shall secure material to prevent spills or discharge into the water due to wind.

The Contractor shall report discharges to receiving waters immediately upon discovery and shall submit a discharge notification.

3-12.5.5.6 Structure Removal Over or Adjacent to Water. The Contractor shall not allow demolished material to enter storm drain systems and receiving waters, use authorized covers and platforms to collect debris, use attachments on equipment to catch debris during small demolition activities and empty debris-catching devices daily and dispose of debris in accordance with 3-12 of the Standard Specifications and these Special Provisions.

3-12.5.5.7 Paving, Sealing, Saw Cutting, Grooving, and Grinding Activities. The Contractor shall prevent material from entering storm drain systems and receiving waters including:

- a) Cementitious material
- b) Asphaltic material
- c) Aggregate or screenings
- d) Saw cutting, grooving, and grinding residue
- e) Pavement chunks
- f) Shoulder backing
- g) Methacrylate
- h) Sandblasting residue

The Contractor shall cover drainage inlets and use linear sediment barriers to protect downhill receiving waters until paving, sealing, saw cutting, grooving, and grinding activities are completed and excess material has been removed and cover drainage inlets and manholes during the application of seal coat, tack coat, slurry seal, or fog seal.

Whenever precipitation is forecasted, the Contractor shall limit paving, saw cutting, and grinding to places where runoff can be captured.

The Contractor shall not start seal coat, tack coat, slurry seal, or fog seal activities whenever precipitation is forecasted during the application and curing period and shall not excavate material from existing roadways during precipitation.

The Contractor shall use a vacuum to remove slurry immediately after slurry is produced and shall not allow the slurry to run onto lanes open to traffic or off the pavement.

The Contractor shall collect the residue from PCC grooving and grinding activities with a vacuum attachment on the grinding machine. The Contractor shall not leave the residue on the pavement or allow the residue to flow across pavement.

The Contractor shall not coat asphalt trucks and equipment with substances that contain soap, foaming agents, or toxic chemicals.

The Contractor shall park paving equipment over drip pans or plastic sheeting with absorbent material to catch drips if the paving equipment is not in use.

3-12.5.5.8 Thermoplastic Striping and Pavement Markers. The Contractor shall not preheat, transfer, or load thermoplastic within 50 feet of drainage inlets and receiving waters.

The Contractor shall not unload, transfer, or load bituminous material for pavement markers within 50 feet of drainage inlets and receiving waters.

The Contractor shall collect and dispose of bituminous material from the roadway after removing markers.

3-12.5.5.9 Pile Driving. The Contractor shall keep spill kits and cleanup materials at pile driving locations; park pile driving equipment over drip pans, absorbent pads, or plastic sheeting with absorbent material; protect pile driving equipment by parking on plywood and covering with plastic whenever precipitation is forecasted.

The Contractor shall store pile driving equipment on level ground and protect it from stormwater run-on when not in use. Use vegetable oil instead of hydraulic fluid if practicable.

3-12.5.5.10 Concrete Curing. The Contractor shall not overspray chemical curing compounds and shall not allow runoff of curing compounds.

The Contractor shall minimize the drift by spraying as close to the concrete as practicable, cover drainage inlets before applying the curing compound, and minimize the use and discharge of water by using wet blankets or similar methods to maintain moisture when concrete is curing.

3-12.5.5.11 Concrete Finishing. The Contractor shall collect and dispose of water and solid waste from high-pressure water blasting, collect and dispose of sand and solid waste from sandblasting. Before sandblasting, the Contractor shall cover drainage inlets within 50 feet of sandblasting, and shall minimize the drift of dust and blast material by keeping the nozzle close to the surface of the concrete. If the character of the blast residue is unknown, the Contractor shall test it for hazardous materials and dispose of it properly.

The Contractor shall inspect containment structures for concrete finishing for damage before each day of use and before forecasted precipitation and remove liquid and solid waste from containment structures after each work shift.

3-12.5.5.12 Sweeping. The Contractor shall sweep by hand or mechanical methods, such as vacuuming, and shall not use methods that use only mechanical kick brooms.

The Contractor shall sweep paved roads at construction entrance and exit locations and paved areas within the job site:

- a) During clearing and grubbing activities
- b) During earthwork activities
- c) During trenching activities
- d) During pavement structure activities
- e) When vehicles are entering and leaving the job site
- f) After soil-disturbing activities
- g) After observing off-site tracking of material
- h) As deemed necessary by the Engineer

The Contractor shall monitor paved areas and roadways within the project and sweep within:

- a) 1 hour whenever sediment or debris is observed during activities that require sweeping.
- b) 24 hours whenever sediment or debris is observed during activities that do not require sweeping.

The Contractor shall remove collected material, including sediment, from paved shoulders, drain inlets, curbs and dikes, and other drainage areas, may stockpile collected material at the job site, and shall dispose of collected material at least once per week if stockpiled.

The Contractor shall keep dust to a minimum during street sweeping activities and use water or a vacuum whenever dust generation is excessive or sediment pickup is ineffective.

The Contractor shall remove and dispose of trash collected during sweeping.

3-12.5.5.13 Dewatering. Dewatering consists of discharging accumulated stormwater, groundwater, or surface water from excavations or temporary containment facilities.

The Contractor shall perform dewatering work as specified for the work items involved, such as temporary active treatment system or dewatering and discharge.

If dewatering and discharging activities are not specified under a work item and the Contractor performs dewatering activities, he shall:

- a) Conduct dewatering activities under the Caltrans' *Field Guide for Construction Site Dewatering*.
- b) Ensure that any dewatering discharge does not cause erosion, scour, or sedimentary deposits that could impact natural bedding materials.
- c) Discharge the water within the project limits if approved by the Engineer. Dispose of the water if it cannot be discharged within project limits due to site constraints or contamination.

- d) Not discharge stormwater or nonstormwater that has an odor, discoloration other than sediment, an oily sheen, or foam on the surface.
- e) Notify the Engineer immediately upon discovering any such condition.

3-12.6 Water Pollution Control.

3-12.6.1 General. *ADD the following after the last paragraph:*

This project is anticipated to be Risk Level 2.

ADD:

3-12.6.1.1 Definitions and Abbreviations.

Active and inactive areas: (1) Active areas have soil disturbing work activities occurring at least once within 15 days, and (2) Inactive areas are areas that have not been disturbed for at least 15 days.

BMPs: Best Management Practices are water pollution control practices.

Construction phase: Construction phases are (1) Highway Construction including work activities for building roads and structures, (2) Plant Establishment including maintenance on vegetation installed for final stabilization, and (3) Suspension where work activities are suspended and areas are inactive.

NAL: Numeric Action Level.

NEL: Numeric Effluent Limit.

Normal working hours: The hours the Contractor normally works on this project.

Preparation Manual: The Caltrans' "Storm Water Pollution Prevention Plan and Water Pollution Control Program Preparation Manual."

QSD: Qualified SWPPP Developer.

QSP: Qualified SWPPP Practitioner.

Qualified rain event: A qualified rain event is a storm that produces at least 0.5 inch of precipitation with a 48 hour or greater period between storms.

REAP: Rain Event Action Plan.

SAP: Sampling and Analysis Plan.

SSC: Suspended Sediment Concentration.

SWRCB: State Water Resources Control Board.

WPC: Water Pollution Control.

WPC Manager: The Contractor's Water Pollution Control Manager. The WPC Manager implements water pollution control work described in the SWPPP and oversees revisions and amendments to the SWPPP.

ADD:

3-12.6.1.2 Summary. Section 3-12.6 includes general specifications for preventing, controlling, and abating water pollution in streams, waterways, and other bodies of water.

Information on forms, reports, and other documents can be found in the following Caltrans manuals:

- a) Field Guide for Construction Site Dewatering
- b) Storm Water Pollution Prevention Plan (SWPPP) and Water Pollution Control Program (WPCP) Preparation Manual
- c) Construction Site Best Management Practices (BMP) Manual
- d) Construction Site Monitoring Program (CSMP) Guidance Manual

For the above-referenced manuals, go to the Caltrans' website for the Division of Construction, Storm Water and Water Pollution Control at (<https://dot.ca.gov/programs/construction/storm-water-and-water-pollution-control/manuals-and-handbooks>) or the Caltrans' publication distribution unit.

The Contractor shall not start job site activities until:

- a) The WPCP or SWPPP, in accordance with 3-12.6.3 of the Special Provisions, is authorized.
- b) The waste discharge identification number is issued if the project requires a SWPPP.
- c) WPCP or SWPPP review requirements have been fulfilled. If the RWQCB requires time for review, allow 30 days for the review.

If the Contractor operates a Contractor-support facility, the Contractor shall protect stormwater systems or receiving waters from the discharge of potential pollutants by using water pollution control practices.

Contractor-support facilities include:

- a) Staging areas
- b) Storage yards for equipment and materials
- c) Mobile operations
- d) Batch plants for PCC and HMA
- e) Crushing plants for rock and aggregate
- f) Other facilities installed by the Contractor for his, such as haul roads

Discharges from manufacturing facilities, such as batch plants and crushing plants, must comply with the general waste discharge requirements for *Order No. 97-03-DWQ, NPDES General Permit No. CAS000001*, issued by the State Water Resources Control Board for “*Discharge of Storm Water Associated with Industrial Activities Excluding Construction Activities*” and referred to herein as “General Industrial Permit.” For the General Industrial Permit, go to the website for the State Water Resources Control Board.

If the Contractor operates a batch plant to manufacture PCC, HMA, or other material or a crushing plant to produce rock or aggregate, the Contractor shall obtain coverage under the General Industrial Permit. The Contractor must be covered under the General Industrial Permit for batch plants and crushing plants located:

- a) Outside of the job site
- b) Within the job site that serve 1 or more contracts

If the Contractor obtains or disposes of material at a noncommercially operated borrow or disposal site, the Contractor shall prevent water pollution due to erosion at the site during and after completion of his activities. Upon completion of his work, the Contractor shall leave the site in a condition such that water will not collect or stand therein.

The Agency does not pay for water pollution control practices at Contractor-support facilities and noncommercially operated borrow or disposal sites.

3-12.6.1.3 Submittals. Within 48 hours after the conclusion of a storm event resulting in a discharge, after a nonstormwater discharge, or after receiving a written notice or an order from the RWQCB or another regulatory agency, the Contractor’s WPC manager must submit the following information:

- a) Date, time, location and nature of the activity and the cause of the notice or order
- b) Type and quantity of discharge
- c) Water pollution control practices in use before the discharge or before receiving the notice or order
- d) Description of water pollution control practices and corrective actions taken to manage the discharge or cause of the notice

The Contractor shall submit water pollution control training records for all employees and subcontractors who will be working at the job site as an informational submittal that includes the training subjects, training dates, ongoing training, and tailgate meetings with the submittal. The Contractor shall submit records for:

- a) Existing employees within 5 business days of obtaining SWPPP or WPCP authorization
- b) New employees within 5 business days of receiving the training
- c) Subcontractor's employees at least 5 business days before a subcontractor starts work

At least Five (5) business days before operating any Contractor-support facility, the Contractor shall submit:

- a) A plan showing the location and quantity of water pollution control practices associated with the Contractor-support facility
- b) A copy of the notice of intent approved by the RWQCB and the WPCP or SWPPP approved by the RWQCB if the Contractor will be operating a batch plant or a crushing plant under the General Industrial Permit

3-12.6.1.4 Quality Control and Assurance.

Training

The Contractor's employees must receive water pollution control training before starting work at the job site.

For the Contractor's project managers, supervisory personnel, subcontractors, and employees involved in water pollution control work:

- a) The Contractor shall provide stormwater training in the following subjects:
 - 1) Water pollution control rules and regulations
 - 2) Implementation and maintenance for:
 - i. Temporary soil stabilization
 - ii. Temporary sediment control
 - iii. Tracking control
 - iv. Wind erosion control
 - v. Material pollution prevention and control
 - vi. Waste management
 - vii. Nonstormwater management
- b) The Contractor shall conduct weekly training meetings covering:
 - 1) Deficiencies and corrective actions for water pollution control practices
 - 2) Water pollution control practices required for work activities during the week
 - 3) Spill prevention and control
 - 4) Material delivery, storage, usage, and disposal
 - 5) Waste management
 - 6) Nonstormwater management procedures

Training for personnel who collect water quality samples must include:

- a) CSMP review
- b) Health and safety review
- c) Sampling simulations

3-12.6.1.5 Water Pollution Control Manager.

General

The Contractor's WPC manager must be a QSP if the project requires a WPCP. The Contractor's WPC manager must be a QSD if the project requires a SWPPP.

The Contractor shall assign one (1) WPC manager to implement the WPCP or SWPPP, whichever is applicable for the project.

Qualifications

The Contractor's QSD must:

- a) Have completed the stormwater management training described in the Caltrans' website for the Division of Construction, Storm Water and Water Pollution Control Information
- b) Be registered or certified for at least one of the following:
 - 1) California registered civil engineer
 - 2) California registered professional geologist or engineering geologist
 - 3) California licensed landscape architect
 - 4) Professional hydrologist registered through the American Institute of Hydrology
 - 5) Certified Professional in Erosion and Sediment Control (CPESC)[™] registered through Enviro Cert International, Inc.
 - 6) Certified Professional in Storm Water Quality (CPSWQ)[™] registered through Enviro Cert International, Inc.
 - 7) Professional in erosion and sediment control registered through the National Institute for Certification in Engineering Technologies (NICET)

The Contractor's QSP must comply with the qualifications for a QSD or must:

- a) Have completed the storm water management training described in the Caltrans' website for the Division of Construction, Storm Water and Water Pollution Control Information
- b) Be certified for at least one of the following:
 - 1) Certified Erosion, Sediment and Storm Water Inspector (CESSWI)[™] registered through Enviro Cert International, Inc.
 - 2) Certified Inspector of Sediment and Erosion Control (CISEC) registered through CISEC, Inc.

Responsibilities

The Contractor's WPC manager must:

- a) Be responsible for water pollution control work

- b) Be the primary contact for water pollution control work
- c) Oversee:
 - 1) Maintenance of water pollution control practices
 - 2) Inspections of water pollution control practices identified in the SWPPP or WPCP
 - 3) Inspections and reports for visual monitoring
 - 4) Preparation and implementation of REAPs
 - 5) Sampling and analysis
 - 6) Preparation and submittal of:
 - i. NAL exceedance reports
 - ii. NEL violation reports
 - iii. SWPPP annual certification
 - iv. Annual reports
 - v. BMP status reports
- d) Oversee and enforce hazardous waste management practices, including spill prevention and control measures
- e) Have authority to mobilize crews to make immediate repairs to water pollution control practices
- f) Ensure that all employees have current water pollution control training
- g) Implement the authorized SWPPP or WPCP
- h) Amend the SWPPP or WPCP if required
- i) Be at the job site within 2 hours of being contacted
- j) Have the authority to stop construction activities damaging water pollution control practices or causing water pollution

3-12.6.1.6 Construction.

General

The Contractor shall install facilities and devices used for water pollution control practices before performing work activities. The Contractor shall install soil stabilization materials for water pollution control practices in all work areas that are inactive and before storm events.

The Contractor shall repair or replace water pollution control practices within 24 hours of discovering any damage, unless a longer period is authorized.

The Agency will not pay for the cleanup, repair, removal, disposal, or replacement of water pollution control practices due to improper installation or the Contractor's negligence.

The Contractor shall retain a printed copy of the authorized WPCP or SWPPP at the job site at all times.

Monitoring

The Contractor shall monitor the National Weather Service's forecast on a daily basis. For the National Weather Service's forecast, go to the website for the National Weather Service.

Inspections

The Contractor shall use the *Stormwater Site Inspection Report* form for documenting site inspections.

The Contractor's WPC manager must oversee:

- a) Inspections of water pollution control practices identified in SWPPP or WPCP:
 - 1) Before a forecasted storm event
 - 2) After a qualifying rain event that produces site runoff
 - 3) At 24-hour intervals during extended storm events
 - 4) On a predetermined schedule of at least once a week
- b) Daily inspections of:
 - 1) Storage areas for hazardous materials and waste
 - 2) Hazardous waste disposal and transporting activities
 - 3) Hazardous material delivery and storage activities
- c) Inspections of:
 - 1) Vehicle and equipment cleaning facilities:
 - i. Daily if vehicle and equipment cleaning occurs daily
 - ii. Weekly if vehicle and equipment cleaning does not occur daily
 - 2) Vehicle and equipment maintenance and fueling areas:
 - i. Daily if vehicle and equipment maintenance and fueling occurs daily
 - ii. Weekly if vehicle and equipment maintenance and fueling does not occur daily
 - 3) Vehicles and equipment at the job site for leaks and spills on a daily schedule. Verify that operators are inspecting vehicles and equipment each day of use.
 - 4) Demolition sites within 50 feet of storm drain systems and receiving waters daily.
 - 5) Pile driving areas for leaks and spills:
 - i. Daily if pile driving occurs daily
 - ii. Weekly if pile driving does not occur daily

- 6) Temporary concrete washouts:
 - i. Daily if concrete work occurs daily
 - ii. Weekly if concrete work does not occur daily
- 7) Paved roads at job site access points for street sweeping:
 - i. Daily if earthwork and other sediment or debris-generating activities occur daily
 - ii. Weekly if earthwork and other sediment or debris-generating activities do not occur daily
 - iii. Within 24 hours of precipitation forecasted by the National Weather Service
- 8) Dewatering work:
 - i. Daily if dewatering work occurs daily
 - ii. Weekly if dewatering work does not occur daily
- 9) Temporary active treatment system:
 - i. Daily if temporary active treatment system activities occur daily
 - ii. Weekly if temporary active treatment system activities do not occur daily
- 10) Work over water:
 - i. Daily if work over water occurs daily
 - ii. Weekly if work over water does not occur daily

Deficiencies

Whenever the Contractor or the Engineer identify a deficiency in the implementation of the authorized WPCP or SWPPP, The Contractor shall correct the deficiency:

- a) Immediately, unless a later date is authorized
- b) Before precipitation occurs

The Agency may correct the deficiency and deduct the cost of correcting the deficiency from payment if the Contractor fails to correct the deficiency by the agreed date or before the onset of precipitation.

3-12.6.2 Best Management Practices (BMPs). *MODIFY to ADD the following:*

BMPs shall be maintained and/or added based on any exceedances of Numeric Action Levels (NALs) and Numeric Effluent Limitations (NELs). The Contractor shall make any necessary changes to the SWPPP and implement additional BMPs that will result in effluent levels below that of NALs.

3-12.6.3 Storm Water Pollution Prevention Plan (SWPPP). *DELETE in its entirety and SUBSTITUTE with the following:*

3-12-6.3 Storm Water Pollution Prevention Plan (SWPPP)

3-12.6.3.1 General.

Summary

The Contractor shall prepare two separate Storm Water Pollution Prevention Plans (SWPPP) for William Woollett Jr. Aquatic Center Expansion (Part A) and Heritage Park Parking Lots (Part B), that includes developing and implementing the SWPPP, providing a Water Pollution Control (WPC) manager, conducting water pollution control training, and monitoring, inspecting, and correcting water pollution control practices. No additional compensation will be allowed.

The Contractor shall provide all documents to the SMARTS System for each project separately for Agency review and acceptance.

The Contractor may assign a Qualified SWPPP Developer (QSD) other than the WPC manager to develop the SWPPP.

Construction activities will be conducted in a manner to protect channels, storm drains, and bodies of water from pollution. Water pollution control work shall consist of activities necessary to meet the requirements of the Orange County MS4 permit, Order No. R8-2009-0030, NPDES Permit No. CAS618030 a copy of which can be found at https://www.waterboards.ca.gov/rwqcb8/board_decisions/adopted_orders/orders/2009/09_030_oc_ms4_as_amended_by_10_062.pdf; the County's Drainage Area Management Plan (DAMP) at <https://ocerws.ocpublicworks.com/service-areas/oc-environmental-resources/oc-watersheds/documents/drainage-area-management-plan-7>; The State's General Construction Activities Permit (Order No. 2022-0057-DWQ, NPDES No CAS000002, at https://www.waterboards.ca.gov/board_decisions/adopted_orders/water_quality/2022/wqo_2022-0057-dwq.pdf; and as required by the Engineer. The Contractor shall coordinate water pollution control work with all other work done on the Contract.

The Contractor shall comply with all requirements of the above-mentioned permits, including visual monitoring, sample collection and analysis, training qualifications and certification requirements, risk determination, preparation and implementation of a Storm Water Pollution Prevention Plan (SWPPP), including updates and Changes of Information (COI).

The Contractor shall make the accepted SWPPP available at the construction site during working hours while construction is occurring and shall be made available upon request by a State or Agency Representative. 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.

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.

Implementation of the SWPPP shall not reduce effectiveness of existing storm drain system or interfere with traffic on public streets. The Contractor shall implement the SWPPP, make changes both to the SWPPP, and in the field as conditions warrant it. The Contractor shall be solely responsible for preventing any pollutants from leaving the project site.

In lieu of the Notice of Intent, the Contractor is required to notify the Engineer prior to the beginning of construction and upon project completion.

The Contractor shall notify the Agency Representative immediately upon request from any regulatory agency to enter, inspect, sample, monitor, or otherwise access the project site or the Contractor's records pertaining to storm water pollution control work. The Contractor shall provide copies of correspondence, notices of violation, enforcement actions, or fines proposed by regulatory agencies to the Engineer.

During each estimate period the Contractor fails to conform to the provisions in this section, "Water Pollution Control," or fails to implement the water pollution control practices shown on the accepted SWPPP and specified elsewhere in these special provisions, the City will withhold 25 percent of the progress payment.

Withholds for failure to perform water pollution control work will be in addition to all other withholds provided for in the contract. The City will return performance-failure withholds in the progress payment following the correction for noncompliance.

Contractor will also be responsible for any enforcement actions and penalties enacted on the Agency by the State Water Resources Control Board, Regional Water Quality Control Board, and/or any other agency due to Contractor's non-compliance with applicable water pollution regulations. Progress payments and/or final payments may be withheld to cover enforcement liabilities that include, but are not limited to, maximum financial penalties, legal costs, staff costs, and economic savings from violations and/or costs associated with corrective actions as required by enforcing agency.

Whenever a Qualifying Precipitation Event produces active discharge within site operating hours for a risk level 2 or risk level 3 project, sampling and analysis work must comply with the project's Construction Site Monitoring Program (CSMP).

A storm water annual report must cover the preceding period from July 1st to June 30th.

Submittals

Submittals shall conform to 2-5.3 of the Standard Specifications and the Special Provisions.

Within 20 days of Contract approval:

- a) The Contractor shall submit 3 printed copies of his SWPPP for review. Allow 20 days for the Agency's review. The Engineer provides comments and specifies the date when the review stopped if revisions are required.
- b) The Contractor shall change and resubmit a revised SWPPP within 15 days of receiving the Engineer's comments. The Agency's review resumes when a complete SWPPP has been resubmitted.
- c) When the Engineer authorizes the SWPPP, submit an electronic copy in Portable Document Format (PDF) or Microsoft Word (DOC) format and 4 printed copies of the authorized SWPPP.
- d) If the RWQCB requires review of the authorized SWPPP, the Engineer submits the authorized SWPPP to the RWQCB for its review and comment.

- e) If the Engineer requests changes to the SWPPP based on the RWQCB's comments, the Contractor shall amend the SWPPP within 10 days.

The SWPPP must comply with the Caltrans' *Storm Water Pollution Prevention Plan (SWPPP) and Water Pollution Control Plan (WPCP) Preparation Manual* and shall include the following:

- a) Description of the work involved in the installation, maintenance, repair, and removal of temporary and permanent water pollution control practices.
- b) Maps showing:
 - 1) Locations of disturbed soil areas
 - 2) Water bodies and conveyances
 - 3) Locations and types of water pollution control practices that will be used for each Contractor-support facility:
 - 4) Locations and types of temporary water pollution control practices that will be used in the work for each construction phase
 - 5) Locations and types of water pollution control practices that will be installed permanently under the Contract
 - 6) Pollutant sampling locations
 - 7) Locations planned for storage and use of potential nonvisible pollutants
 - 8) Receiving water sampling locations
- c) CSMP
- d) Copy of permits obtained by the Agency, including Fish & Game permits, US Army Corps of Engineers permits, RWQCB 401 certifications, aerially deposited lead variance from the Department of Toxic Substance Control, aerially deposited lead variance notification, and RWQCB waste discharge requirements for aerially deposited lead reuse.

The Contractor shall include the following items in the SWPPP:

- a) For all projects:
 - 1) Schedule
 - 2) CSMP
- b) For risk level 2 projects add:
 - 1) Adherence to effluent standards for NALs
- c) For risk level 3 projects add:
 - 1) Adherence to effluent standards for NALs and NELs
- d) For projects subject to Total Maximum Daily Loads (TMDLs)
 - 1) Adherence to requirements in Table H-2 in Attachment H of the State's General Construction Activities Permit

The SWPPP schedule must show when:

- a) Work activities will be performed that could cause the discharge of pollutants into stormwater
- b) Water pollution control practices associated with each construction phase will be implemented

- c) Soil stabilization and sediment control practices for disturbed soil areas will be implemented

The Contractor shall amend and resubmit the SWPPP:

- a) Annually before July 15th
- b) Whenever:
 - 1) Changes in work activities could affect the discharge of pollutants
 - 2) Water pollution control practices are added by Change Order work
 - 3) Water pollution control practices are added at the Contractor's discretion
 - 4) Changes in the quantity of disturbed soil are substantial
 - 5) Objectives for reducing or eliminating pollutants in stormwater discharges have not been achieved
 - 6) The Contractor receive a written notice of a permit violation for the project from the RWQCB or any other regulatory agency

The Contractor shall allow the same review time for amendments to the SWPPP as for the original SWPPP.

Construction Site Monitoring Program

A QSD must prepare the CSMP. The Contractor shall change the program to reflect current job site activities as needed. The CSMP must include the following:

- a) For all projects:
 - 1) Visual monitoring procedures
 - 2) Sample and Analysis Plan (SAP) for nonvisible pollutants, including applicable TMDL-specific pollutants listed in Table H-2 in Attachment H.
 - 3) SAP for nonstormwater discharges
 - 4) SAP for temporary active treatment systems
 - 5) SAP for monitoring required by RWQCB
- b) For risk level 2 &3 projects add:
 - 1) SAP for pH and turbidity

Sampling and Analysis Plan

The SAP must comply with the Caltrans' *Construction Site Monitoring Program (CSMP) Guidance Manual*.

The Contractor shall describe the following water quality sampling procedures in the SAP:

- a) Sampling equipment
- b) Sample preparation
- c) Collection
- d) Field measurement methods
- e) Analytical methods

- f) Quality assurance and quality control
- g) Sample preservation and labeling
- h) Collection documentation
- i) Sample shipping
- j) Chain of custody
- k) Data management and reporting
- l) Precautions from the construction site health and safety plan
- m) Laboratory selection and certifications

The SAP must identify the State-certified laboratory, sample containers, preservation requirements, holding times, and analytical method. For a list of State-certified laboratories go to the California Department of Public Health website.

The Contractor shall include procedures for sample collection during precipitation.

The Contractor shall list conditions when the Contractor's personnel will not be required to physically collect samples such as:

- 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.

The Contractor shall amend the SAP whenever discharges or sampling locations change because of changed work activities or knowledge of site conditions.

The Contractor shall include procedures for collecting and analyzing one sample from each discharge location per 24-hour period of each Qualifying Precipitation Event, during active discharge for a risk level 2 or risk level 3 project and shall describe the collection of effluent samples at each location where the stormwater is discharged off-site.

Run-on from surrounding areas may also be sampled if Contractor believes that the run-on may contribute to an exceedance of NALs and/or NELs.

Risk level 3 projects that discharge directly into receiving waters are required to monitor that receiving water if sampling results from the discharge monitoring location meets the conditions specified in Section III.D.2 of the State's General Construction Activities Permit.

Sampling and Analysis Plan for Nonvisible and TMDL-specific Pollutants

The SAP for nonvisible pollutants must describe the sampling and analysis strategy for monitoring pollutants that are not visually detectable in stormwater including nonvisible and TMDL-specific pollutants. Sampling and analysis are required for non-visible pollutants identified in the SWPPP's pollutant source assessment or otherwise known to be on site, when the materials or chemicals have the potential to cause or contribute to an exceedance of a water quality standard (e.g. when the non-visible pollutants may be discharged due to failure to implement BMPs, a container spill or leak, or a breach, failure, or malfunction of an existing BMP).

Sampling and analysis for TMDL-specific pollutants are required based on the project's watershed location and the associated requirements contained in Attachment H of the State's General Construction Activities Permit.

The SAP for nonvisible and TMDL-specific pollutants must provide sampling procedures and a schedule for:

- a) Collecting at least one sample, within 8 hours, from each discharge location hydraulically down-gradient from the observed triggering event or condition.
- b) Continuing to collect at least one sample per applicable discharge location for each 24-hour period that there is discharge, until corrective actions control further discharge of the pollutant are completed.
- c) Collecting samples during site operating hours
- d) Collecting an uncontaminated control sample

The SAP must identify locations for sampling downstream and control samples and the reasons for selecting those locations. The Contractor shall select locations for control samples where the sample does not come in contact with materials, wastes, or areas associated with potential nonvisible and/or TMDL-specific pollutants or disturbed soil areas.

Annual Certification

The Contractor shall submit an annual certification of compliance as described in the Caltrans' *Storm Water Pollution Prevention Plan (SWPPP) and Water Pollution Control Plan (WPCP) Preparation Manual* before July 15th of each year.

Site Inspection Reports

The WPC manager must submit the following informational submittals within 24 hours of completing an inspection:

- a) Completed *Stormwater Site Inspection Report* form.
- b) BMP status report. The WPC manager must oversee the preparation of the report. The report must include:
 - 1) Location and quantity of installed water pollution control practices
 - 2) Location and quantity of disturbed soil for active and inactive areas

Visual Monitoring Reports

The Contractor shall submit visual monitoring reports during scheduled site operating hours for:

- a) Each Qualifying Precipitation Event defined as a weather pattern forecast to have a 50 percent or greater chance of 0.5 inches or more in a 24-hour period, include:
 - 1) Date, time, and rain gauge reading
 - 2) Visual observations:
 - (a) Within 72 hours before the precipitation event for:
 - (1) Spills, leaks, or uncontrolled pollutants in drainage areas
 - (2) Proper implementation of water pollution control practices

- (3) Leaks and adequate available capacity in storage and containment areas
- (b) Every subsequent 24 hour period forecast to have at least 0.25 inches of precipitation. for:
 - (1) Effective operation of water pollution control practices
 - (2) Water pollution control practices needing maintenance and repair
- (c) Within 2 business days after the qualifying rain event for:
 - (1) Stormwater discharge locations
 - (2) Evaluation of design, implementation, effectiveness, and locations of water pollution control practices including locations where additional water pollution control practices may be needed

Use the *Stormwater Site Inspection Report* form to document visual monitoring. A visual monitoring report must include:

- 1) Name title, and certification (if any) of personnel performing the inspection, inspection date, type (weekly, pre-precipitation, daily precipitation, or post-precipitation event) and date and time the inspection report is completed
- 2) 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;
- 3) Site information including stage of construction, activities completed since last inspection, and the approximate area of the site that is exposed;
- 4) A description of any BMPs evaluated and any deficiencies noted, including those that may have resulted in the release of non-visible pollutants;
- 5) A list of BMPs inspected including erosion controls, sediment controls, chemical and waste controls, and non-stormwater controls
- 6) Report of any floating and suspended materials, odors, discolorations, visible sheens, and sources of pollutants in discharges and contained stormwater;
- 7) Corrective actions, changes to the SWPPP and associated implementation dates if appropriate;
- 8) Photographs and descriptions of areas of concern, if appropriate.

The Contractor shall retain visual monitoring reports at the job site as part of the SWPPP.

Sampling and Analysis Day

General

The Contractor shall submit a printed copy and electronic copy of water quality analysis results, and quality assurance and quality control reports within 48 hours of field sampling, and within 30 days of laboratory analysis. Electronic copies must be in one of the following formats: (1) xls, (2) doc. The Contractor shall include an evaluation of whether the downstream samples show levels of the tested parameter that are higher than the control sample. The evaluation must include:

- a) Sample identification number
- b) Contract number
- c) Constituent
- d) Reported value
- e) Analytical method
- f) Method detection limit
- g) Reported limit

Numeric Action Level Exceedance Reports

Whenever a NAL is exceeded, the Contractor shall notify the Engineer and submit a NAL exceedance report within 48 hours after conclusion of a storm event. The report must include:

- a) Field sampling results and inspections, including:
 - 1) Analytical methods, reporting units, and detection limits for reach parameter
 - 2) Date, location, time of sampling, visual observations, and measurements
 - 3) Quantity of precipitation from the storm event
- b) Assessment of BMPs associated with the exceedance and a description of each corrective action taken to manage the exceedance including photographs and date of implementation.

Numeric Effluent Limit Violation Reports

Whenever a NEL is exceeded, the Contractor shall notify the Engineer and submit a NEL violation report within 6 hours. The report must include:

- a) Field sampling results and inspections, including:
 - 1) Analytical methods, reporting units, and detection limits
 - 2) Date, location, time of sampling, visual observation, and measurements
 - 3) Quantity of precipitation from the storm event
- b) Description of BMPs and corrective actions taken to manage NEL exceedance

When applicable, exceedances of TMDL-related numeric effluent limitations must comply with the corrective action requirements in Section VI.Q of the State's General Construction Activities Permit.

Receiving Water Monitoring Reporting

Risk level 3 projects shall electronically submit all receiving water sample results to the Engineer within 48 hours.

Rain Event Action Plan

More action-based requirements have been implemented by the General Permit in lieu of the reporting-based strategy embodied by the REAP. REAPS are no longer required and have been replaced 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.

Storm Water Annual Report

The Contractor shall submit the storm water annual report before July 15th if construction occurs from July 1st through June 30th or within 15 days after Contract acceptance if construction ends before June 30th. Submit two (2) copies of the report. Allow 10 days for the Engineer's review. The Engineer provides comments and specifies the date when the review stopped if revisions are required.

The Contractor shall obtain authorization for the format of the storm water annual report. The report must include:

- a) Project information such as description and work locations
- b) Stormwater monitoring information, including:
 - 1) Summary of sampling and monitoring reports and supporting documents (e.g. laboratory reports);
 - 2) Summary of corrective actions taken
 - 3) Identification and explanation of compliance activities (e.g. missed sampling or visual inspections) or corrective actions not implemented
 - 4) Summary of violations
 - 5) Names of individuals performing stormwater inspections and sampling
 - 6) Logistical information for inspections and sampling, including location, date, time, and precipitation
 - 7) Visual inspection and sample collection exception records and reports

The Contractor shall submit a revised report within five (5) Working Days of receiving the Engineer's comments. The Engineer's review resumes when a complete report has been resubmitted.

When the storm water annual report is authorized, the Contractor shall submit one (1) electronic copy and two (2) printed copies of the report signed by the WPC manager.

Quality Control and Assurance

General

The Contractor shall assign trained personnel to collect water quality samples. Document the personnel and training in the SAP.

Samples taken by assigned field personnel must comply with the equipment manufacturer's instructions for collection, analytical methods, and equipment calibration.

Samples taken for laboratory analysis must comply with water quality sampling procedures and be analyzed by a State-certified laboratory under 40 CFR part 136, *Guidelines Establishing Test Procedures for the Analysis of Pollutants*.

Whenever downstream samples show increased levels of pollutants, the Contractor shall assess water pollution control practices, site conditions, and surrounding influences to determine the probable cause for the increase.

The Contractor shall obtain samples as shown in the following table:

Parameter	Risk level	Test method	Detection limit (min)	Unit
Turbidity	2 and 3	Field test with calibrated portable instrument	1	NTU
pH	2 and 3	Field test with calibrated portable instrument	0.2	pH units
Non-Visible Pollutant Parameter(s)	1, 2 and 3	U.S. EPA-approved test method for the specific pollutant parameter	Depends on method	mg/L

Numeric Action Levels

For a risk level 2 or risk level 3 project, NALs must comply with the values shown in the following table:

Numeric Action Levels

Parameter	Test method	Detection limit (min)	Unit	Value
pH	Field test with calibrated portable instrument	0.2	pH	Lower NAL = 6.5 Upper NAL = 8.5
Turbidity	Field test with calibrated portable instrument	1	NTU	250 NTU max

Numeric Effluent Limits

For a risk level 3 project, NELs must comply with the values shown in the following table:

Numeric Effluent Limits

Parameter	Test method	Detection limit (min)	Unit	Value
pH	Field test with calibrated portable instrument	0.2	pH	Not Applicable
Turbidity	Field test with calibrated portable instrument	1	NTU	Not Applicable

3-12.6.3.2 Construction.

General

The Contractor shall:

- Obtain, install, and maintain a rain gauge at the job site. Observe and record daily precipitation.
- Continue SWPPP implementation during any suspension of work activities.

Sampling and Analysis Day

The Contractor shall collect samples of discharges for non-visible and TMDL-specific pollutants 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. At least once sample shall be collected within 8 hours of each discharge location hydraulically downgradient from the triggering event or condition.

For risk level 2 or risk level 3 projects, the Contractor shall collect samples of discharges:

- a) During a Qualifying Precipitation Event for:
 - 1) Each nonvisible pollutant source and a corresponding uncontaminated control sample
 - 2) All locations identified on the *Storm Event Sampling and Analyses Plan* form
- b) During a Qualifying Precipitation Event for:
 - 1) Each nonvisible pollutant source and a corresponding uncontaminated control sample
 - 2) Turbidity, pH, and other constituents as required
 - 3) One sample from each active discharge location for each 24-hour period during active discharge of a Qualifying Precipitation Event.
 - 4) All locations identified on the *Qualifying Rain Event Sampling and Analyses Plan* form

The Contractor shall perform sample collection during:

- a) Site operating hours
- b) Each qualifying rain event

The Contractor shall collect receiving-water samples for a risk level 3 project whenever a direct discharge to receiving waters occurs and sampling results are outside of the range of 6.0 and 9.0 pH units or turbidity exceeds 500 NTU.

The Contractor shall not physically collect samples during dangerous weather conditions, such as flooding or electrical storms.

Whenever downstream samples show increased levels of turbidity, pH, and other constituents, the Contractor shall assess water pollution control practices, site conditions, and surrounding influences to determine the probable cause for the increase.

The Contractor shall document sample collection during precipitation.

The Contractor shall retain documentation of water quality sampling and analysis results with the SWPPP at the job site. The Contractor shall upload all required reports and documentation to the State Regional Water Quality Control Board SMARTS system for City review and certification.

Storm Water Annual Report

The Contractor shall document and summarize monitoring, sampling and analysis results, laboratory reports, and training.

3-12.6.3.3 Payment. Payment for **STORM WATER POLLUTION PREVENTION PLAN (SWPPP)** shall be per the **Lump Sum (LS)** price bid and shall include full compensation for furnishing all labor, materials, tools, equipment to perform all the work involved in 3-12, including preparing and modifying a SWPPP, permitting fees, Agency filing and processing, furnishing, installing, maintaining and removing BMPs, monitoring and reporting, uploading and filing required documentation to the State and all incidentals for doing all the work involved as

described herein or as otherwise required by the permit process, and shall be included in the contract lump sum price in the bid. No additional compensation shall be allowed therefor.

Payment will be issued by the Agency as follows:

- a) 25% - upon SWPPP approval
- b) 25% - upon installation of project BMPs
- c) 50% - to be paid monthly as a percentage of the total working days expended for monitoring, maintenance, testing, reporting, and all other requirements as outlined in these Special Provisions

3-12.6.4 Dewatering. *MODIFY to ADD the following:*

Submittals

Contractor shall submit a dewatering and discharge work plan to the Engineer before dewatering activities at least 5 days before dewatering begins. The dewatering and discharge work plan must include:

- a) Title sheet and table of contents
- b) Description of dewatering and discharge activities detailing locations, quantity and quality of water, proposed equipment, and discharge point(s)
- c) Estimated schedule for dewatering and discharge start and end dates of intermittent and continuous activities
- d) Discharge alternatives, such as dust control or percolation
- e) Visual monitoring procedures with inspection log
- f) Copy of written approval to discharge into a sanitary sewer system at least 5 business days before starting discharge activities, when appropriate

The Contractor shall submit the following informational submittals:

- a) Safety Data Sheet (SDS) at least 5 business days before material is used or stored
- b) Monthly inventory records for material used or stored

The Contractor shall submit written approval from the local health agency, city, county, and sewer district before discharging from a sanitary or septic system directly into a sanitary sewer system.

3-12.6.5 Payment. *DELETE in its entirety and SUBSTITUTE with the following:*

Payment for implementation and maintenance of BMPs and dewatering shall be included in the Contract Unit Price paid for STORM WATER POLLUTION PREVENTION PLAN (SWPPP).

ADD:

3-12.7 Drainage Control. The Contractor shall maintain drainage within and through the work areas. Earth dams will not be permitted in paved areas. Temporary dams of sandbags, asphaltic concrete, or other acceptable material will be permitted when necessary. Such dams shall be removed from the site as soon as their use is no longer necessary.

The Contractor shall ensure that storm and drainage water does not pond due to the temporary blockage of existing drainage facilities. To this end, the Contractor shall provide temporary works that allow for the passage of storm and drainage water in a manner equivalent to the existing drainage system.

No separate payment will be made for any work performed or material used in drainage control. Full compensation for such controls shall be considered as included in the price paid for the various items of work involved and no additional compensation will be allowed therefor.

ADD:

3-12.8 Graffiti Control. Throughout all phases of Work, including suspension of Work, and until final acceptance, the Contractor shall keep Work, all equipment, field offices, storage facilities, fences, signs, and other facilities free of graffiti. Within twenty-four (24) hours after notification by the Agency Representative, graffiti shall be water blasted and cleaned to original surface or repainted if previously painted.

No separate payment will be made for any work performed or material used in graffiti control. Full compensation for such cleaning shall be considered as included in the price paid for the various items of work involved and no additional compensation will be allowed therefor.

3-13.1 Completion. *DELETE in its entirety and SUBSTITUTE with the following:*

When the Contractor considers the Work, or a designated portion of Work, if specified in the Contract Documents, is complete, the Contractor shall submit a written request to the Engineer for inspection. By submittal of such request, Contractor certifies that:

- a) Contract Documents have been reviewed by the Contractor.
- b) Work has been completed in accordance with Contract Documents and is ready for inspection.
- c) Equipment and systems have been tested, adjusted/balanced and are fully operational.

The Contractor shall submit the request a minimum of five (5) Working Days in advance of requested inspection date. Contractor shall be responsible for allowing sufficient time during the Contract period to complete inspections and make any corrections. Each day beyond the time prescribed to complete the Contract will be subject to assessment of liquidated damages in accordance with 6-9.

Should Agency Representative's inspection find Work incomplete, Agency Representative will notify the Contractor in writing, listing observed deficiencies. The Contractor shall remedy listed deficiencies immediately and send a request for final inspection. Failure of the Contractor to remedy deficiencies may, at the Agency's option, result in reinspection(s) of the work to identify additional deficiencies, if any. Agency's costs associated with reinspection(s) are subject to provisions of 3-13.4.

When the Agency confirms Work is complete and, closeout submittals, as referred to in 3-13.5 have been provided, Agency Representative will notify Contractor of date of completion on the Weekly Statement of Working Days.

ADD:

3-13.4 Reinspections. Should status of completion of Work require reinspection(s) by Agency due to failure of the Contractor to make corrections on initial inspection, Agency may deduct the amount of compensation for reinspection services from final payment to Contractor. Observed deficiencies in excess of ten (10) will be reason for reinspection.

Inspections initiated at the request of the Agency will not be subject to provisions of this Subsection.

ADD:

3-13.5 Closeout Submittals.

Contractor shall submit:

- a) Project Record Documents clearly marked with all changes to Plans within thirty (30) Calendar Days of Final Acceptance
- b) Operation and Maintenance Data
- c) Warranties and Bonds
- d) Spare Parts and Maintenance Materials, as specified
- e) Evidence of Payment and Release of Stop Payment Notices
- f) Other data and materials as may be required in the Contract Documents

SECTION 4 – CONTROL OF MATERIALS

REVISE as follows:

4-1 GENERAL.

ADD the following before the 1st sentence in the 1st paragraph:

The Contractor shall furnish all materials required to complete the Work, except materials that are designated in the Special Provision to be furnished by the Agency.

ADD:

4-1.1 Contractor Equipment and Plants. Only equipment and plants suitable to produce the quality of work and materials required will be permitted to operate on the project. Such equipment and plants shall be maintained in a good state of repair during the process of the Work. No obsolete or badly worn equipment and plants shall be used. Manufacturer's ratings shall not be exceeded.

Plants shall be designed and constructed in accordance with general practice for such equipment and shall be of sufficient capacity to ensure a production rate of sufficient material to carry to completion within the time limit(s) specified in the Contract Documents, if any.

The Contractor, when ordered by the Engineer, shall remove unsuitable equipment from the work site and discontinue the operation of unsatisfactory plants and equipment.

ADD:

4-1.2 Adoption or Revision Date for Standards, Codes, and Tests. Whenever reference is made to a standard, code, specification, or test and the designation representing the date of adoption or latest revision thereof is omitted, it shall mean the latest revision of such standard, code; specification or test in effect on the day of the Notice Inviting Bids is dated.

In accordance with the Public Contract Code § 3400, the Contractor shall submit data substantiating requests for substitution of "equal" items within thirty-five (35) days of Contract award or before ten percent of the Contract Working Days have expired, whichever is less. This time is included in the number of Working Days allowed for the completion of the Work. The Engineer's decision regarding the acceptability of the substitution is final.

Materials, equipment, and supplies provided shall, without additional charge to Agency, fully conform with all applicable local, State and Federal safety laws, rules, and regulations, and orders, and it shall be the Contractor's responsibility to provide only such materials, equipment, and supplies notwithstanding any omission in the Contract Documents therefore on that particular material, equipment or supply as specified.

4-3 INSPECTION.

4-3.1 General. *ADD the following before the 1st paragraph:*

Materials to be used in the Work will be subject to inspection and tests by the Engineer. The Contractor shall furnish without charge such samples as may be required. The Contractor shall furnish the Engineer a list of his sources of materials and the locations at which such materials

will be available for inspection a minimum of twenty (20) Calendar Days in advance of their intended use. The Engineer may inspect, sample or test materials at the source of supply or other locations, but such inspection, sampling or testing will not be undertaken until the Engineer is assured by the Contractor of the cooperation and assistance of both the Contractor and the supplier of the material. The Contractor shall assure that the Engineer has free access at all times to the material to be inspected, sampled or tested. It is understood that such inspections and tests, if made at any point other than the point of incorporation in the Work, in no way shall be considered as a guarantee of acceptance of such material nor of continued acceptance of material presumed to be similar to that upon which inspections and tests have been made, and that inspection and testing performed by the Agency shall not relieve the Contractor or his suppliers of responsibility for quality control.

Manufacturers' warranties, guarantees, instruction sheets, and parts lists, which are furnished with certain articles or materials incorporated in the Work, shall be delivered to the Engineer before acceptance of the Contract Work.

Reports and records of inspections made and tests performed when available at the site of the Work, may be examined by the Contractor.

The Engineer may inspect the production of material, or the manufacture of products at the source of supply. Plant inspection, however, will not be undertaken until the Engineer is assured of the cooperation and assistance of both the Contractor and the material producer. The Engineer shall have free entry at all times to such parts of the plant as concerns the manufacture or production of the materials. Adequate facilities shall be furnished free of charge to make the necessary inspection. The Agency assumes no obligation to inspect materials at the source of supply.

4-4 TESTING. *ADD the following:*

The Contractor shall furnish the Agency Representative with a list of his sources of materials in sufficient time to permit proper inspection and testing of materials to be furnished for such listed sources in advance of their use. The Contractor shall furnish without charge such samples as may be required.

Inspection and tests will be made by the Agency Representative or his designated representative, but it is understood that such inspections and tests, if made at any point other than the point of incorporation in the work, in no way shall be considered as guarantee of acceptance of such materials nor of continued acceptance of materials, presumed to be similar to that upon which inspection and tests have been made.

Tests of materials will be made in accordance with commonly recognized procedures of technical organizations and such special procedures as prescribed in the Contract Documents. Materials will be sampled and tested at such times during the process of the Work as deemed desirable by the Engineer, the Contractor shall cooperate in obtaining the samples.

Add:

4-4.1 Testing Laboratory. The Contractor shall employ and pay for services of an independent testing laboratory, subject to approval by the Agency, to perform other testing and inspections services required by the Contract Documents.

Prior to start of Work, the Contractor shall submit his testing laboratory name, address, and telephone number, and names of full-time registered engineer and responsible officer.

Employment of testing laboratories will in no way relieve Contractor of its obligation to perform the Work in accordance with Contract Documents.

Laboratory field technicians employed by the Agency shall have no authority to release, revoke, alter, or enlarge on requirements of Contract Documents, or to approve, accept or stop any portion of the Work.

The Contractor shall:

- a) Cooperate with laboratory personnel, provide access to work, arrange access to manufacturer's operations.
- b) Provide the laboratory with preliminary representative samples of materials to be tested, in required quantities.
- c) Furnish copies of mill test reports.
- d) Provide casual labor and facilities for access to work being tested; obtain and handle samples at the site; facilitate inspections and tests; provide facilities for the laboratory's exclusive use for storage and curing of test samples.
- e) Coordinate requests for testing through the Agency Representative. Notify Agency Representative a minimum of three (3) Working Days in advance of operations to allow for assignment of personnel and scheduling of tests.
- f) Pay for additional laboratory inspections, sampling, and testing required for Contractor's convenience and when initial tests indicate that work does not comply with Contract Documents.
- g) When required by the Contract Documents, submit manufacturer's certificate, executed by responsible officer, certifying that the product(s) meet or exceed specified requirements. Provide certification in duplicate.

4-6 TRADE NAMES.

ADD the following:

The Contractor shall submit products list in accordance with the following:

- a) Within the time specified in 4-1.2 of the Standard Specifications and these Special Provisions, transmit number of copies Contractor needs plus four (4) of a list of major products which are proposed for installation, including name of manufacturer. Tabulate products by specification section number, title, and article number.
- b) For products specified only by reference standards, give manufacturer, trade name, model or catalog designation, and reference standards.
- c) The Engineer will reply in writing, stating whether there is reasonable objection to listed items. Failure to object to a listed item shall not constitute a waiver of requirements of Contract Documents.

The following limitations shall apply to substitutions:

- a) During the bidding period, Instructions to Bidders govern times for submitting requests for substitutions under requirements specified in this Subsection.
- b) Requests for substitutions of products will be considered only within the time period specified in the Contract Documents. Subsequent requests will be considered only in the case of product unavailability or other conditions beyond control of Contractor. Material delivery schedules will not be considered justification for substitution.
- c) Substitutions will not be considered when indicated on shop drawings or product data submittals without separate formal request or when requested directly by subcontractor or supplier, or when acceptance will require substantial revision of Contract Documents.
- d) Substitute products shall not be ordered or installed without written acceptance by the Engineer.
- e) Only one request for substitution for each product line will be considered. When substitution is not accepted, provide specified product.
- f) The Engineer will determine acceptability of substitutions.

Requests for substitutions shall conform to the following:

- a) Submit separate request for each substitution. Document each request with complete data substantiating compliance of proposed substitution with requirements of Contract Documents.
- b) Identify product by specifications section and article numbers. Provide manufacturer's name and address, trade name or product, and model or catalog number. List fabricators and suppliers, as appropriate.
- c) Give itemized comparison of proposed substitution with specified product, listing variations, and reference to specifications section and article numbers.
- d) Give cost data comparing proposed substitution with specified product, and amount of net change to Contract sum.
- e) List availability of maintenance services and replacement materials.
- f) State effect of substitution on construction schedule, and changes required in other work or products.

Request for substitution constitutes a representation that Contractor has investigated proposed product and has determined that it is equal to or superior in all respects to specified product. The Contractor shall provide the same warranty for the substitution as for the specified product, shall coordinate installation of accepted substitute, making such changes as may be requested for Work to be complete in all respects, certifies that cost data presented is complete and includes all related costs under this Contract and waives claims for additional costs related to substitution which may later become apparent. The Contractor shall submit the number of copies the Contractor needs plus four of request for substitution. For accepted products, submit shop drawings, product data, and samples, and tests conducted in accordance with 3-8.

ADD:

4-9. AGENCY-FURNISHED MATERIALS.

Materials which are listed as Agency-furnished materials in the Special Provisions will be available to the Contractor free of charge.

The Contractor shall submit a written request to the Engineer for the delivery of Agency-furnished material at least fifteen (15) Working Days in advance of the date of its intended use. The request shall state the quantity and the type of each material.

The locations at which Agency-furnished materials will be available to the Contractor free of charge will be designated in the Special Provisions. In those cases, the materials shall be hauled to the site of the Work by the Contractor at the Contractor's expense, including any necessary loading and unloading that may be involved. If the locations are not designated in the Special Provisions, the Agency-furnished materials will be furnished to the Contractor free of charge at the site of the Work. In either case, all costs of handling and placing Agency-furnished material shall be considered as included in the price paid for the contract item involving the Agency-furnished material.

The Contractor shall be responsible for Agency-furnished materials furnished to the Contractor, and shall pay all demurrage and storage charges. Agency-furnished materials, once furnished, delivered, or picked-up by the Contractor, that are lost or damaged from any cause whatsoever shall be replaced by the Contractor at the Contractor's expense. The Contractor shall be liable to the Agency for the cost of replacing Agency-furnished materials, and those costs may be deducted from any monies due or to become due the Contractor. All Agency-furnished material that is not used on the Work shall remain the property of the Agency, and the Contractor shall arrange with the Agency Representative for delivery back to the Agency at Contractor's expense.

SECTION 5 – LEGAL RELATIONS AND RESPONSIBILITIES

REVISE as follows:

5-1 LAWS AND REGULATIONS.

DELETE in its entirety and SUBSTITUTE with the following:

The Contractor shall keep itself fully informed of all existing and future State and National laws and County and Municipal ordinances and regulations which in any manner affect those engaged or employed in the Work or the materials used in the Work or which in any way affect the conduct of the Work and of all such order and decrees of bodies or tribunals having any jurisdiction or authority in the Plans, Specifications, or Contract for the Work in relation to any such law, ordinance, regulation, order or decree, he shall forthwith report the same to the Agency Representative in writing.

The Contractor shall at all times observe and comply with and shall cause all its agents, employees, and subcontractors to observe and comply with all such existing and future laws, ordinances, regulations, orders, and decrees even though such requirements may not be specifically mentioned in the specifications or shown on the Plans, and shall hold harmless, indemnify, and defend the Agency, the Engineer, the Agency Representative and each of their officers, employees, and agents against any claim or liability arising from or based on the violation of any such law, ordinance, regulation, order, or decree, whether by itself, its employees, its agents, or its subcontractors. To the maximum extent permitted by law, all obligations of the Contractor stated in 5-4.2 shall apply in the case of any such claim or liability.

As a material part of this Contract, Contractor's and subcontractors' owners and employees agree to be bound by and adhere to the Federal Department of Transportation (DOT) regulations found in Title 49 CFR 382. All Contractor's and subcontractors' owners and employees who are required to hold commercial licenses and/or who are in safety sensitive positions shall be subject to the provisions of the DOT regulations.

5-2 SPECIAL NOTICES.

MODIFY to ADD the following:

Any notice required or given by one party to the other under the Contract shall be in writing and shall be dated and signed by the party giving such notice or by a duly authorized representative of such party. Any such notices shall not be effective for any purpose whatsoever, unless served in the following manner:

- a) If the notice is given to the Agency, by personal delivery or by depositing the same in the United States mail, enclosed in a sealed envelope addressed to the Agency, postage prepaid and registered.
- b) If the notice is given by the Engineer to the Contractor by personal delivery to said Contractor or to his authorized representative or by depositing the same in the United States mail, enclosed in a sealed envelope addressed to said Contractor at his regular place of business or such other address as may have been established for the conduct of the work under this Contract, postage prepaid and registered.

- c) If notice is given to the surety or any other person by personal delivery to said surety or other person, or by depositing the same in the United States mail, enclosed in a sealed envelope addressed to such surety or person at the address of said surety or person last communicated by him to the party giving the notice, postage prepaid and registered.

5-3 LABOR.

5-3.3 Payroll Records. *MODIFY to ADD the following:*

The Contractor and all its subcontractors shall submit to the City and the Labor Commissioner (Division of Labor Standards Enforcement) certified payroll records every Friday until Notice of Completion is filed and recorded.

The City of Irvine will be using the eComply Solutions software for managing certified payrolls on this project. Accordingly, Contractor shall register in, attend training for, and use the eComply Solutions software for submitting certified payrolls and related tasks as deemed appropriate by the City of Irvine. When the project commences, you will be contacted by an eComply Solutions representative regarding this process. Further information will be provided via a separate communication at that time.

5-4 INSURANCE.

MODIFY to ADD the following:

5-4.1 General. Without limiting Contractor's indemnification obligations, the Contractor shall not commence work until he procures and maintains, at his sole cost and for the duration of this Contract, insurance coverage as provided herein, against all claims for injuries against persons or damages to property which may arise from or in connection with the performance of the Work hereunder by Contractor, its agents, representatives, employees, and/or subcontractors. In the event that Contractor subcontracts any portion of the Work in compliance with 1-6.2 of the Standard Specifications and Special Provisions, the Contract between the Contractor and such subcontractor shall require the subcontractor to maintain the same policies of insurance that the Contractor is required to maintain pursuant to 5-4.

The Insurance obligations under this agreement shall be (1) all the Insurance coverage and/or limits carried by or available to the Contractor; or (2) the minimum Insurance coverage requirements and/or limits shown in this agreement; whichever is greater. Any insurance proceeds in excess of or broader than the minimum required coverage and/or minimum required limits, which are applicable to a given loss, shall be available to the City. No representation is made that the minimum Insurance requirements of this agreement are sufficient to cover the obligations of the Contractor under this agreement.

Insurance policies shall be deemed not in compliance if they include any limiting provision or endorsement that has not been submitted for approval in accordance with 5-4.

The Contractor's insurance shall be "occurrence" rather than "claims made" insurance, except for Professional Liability insurance, which may be for claims made and shall apply separately to each insured against whom claim is made or suit is brought, except with respect to the limits of the insurer's liability.

Any deductibles or self-insured retentions must be declared to and approved by Agency prior to the execution of this Contract by Agency. Prior to commencing work, the Contractor will provide

the Agency, in accordance with 7-3, written confirmation of the deductible for each insurance coverage required by this contract.

Self-insurance will be subject to the Agency's review and prior approval. If the Contractor uses any form of self-insurance, it shall submit:

- a) A notice of election to self-insure.
- b) The coverages for which self-insurance applies.
- c) The amount of self-insurance.
- d) Declaration under penalty of perjury by a certified public accountant certifying the accountant has applied Generally Accepted Accounting Principles (GAAP) guidelines and the Contractor has sufficient funds or other resources to cover the self-insurance amounts.
- e) Copy of its commercial general liability policy and its excess policy, including the declarations page, all amendments, riders, endorsements, and other modifications in effect at the time of contract execution, for those amounts not covered by self-insurance.

Self-insurance programs and self-insured retentions are subject to separate annual review and approval by the Agency as evidence of the Contractor's financial capacity to respond to potential claims. Additionally, self-insurance programs or retentions must provide the Agency with at least the same protection from liability and defense of suits as would be afforded by first-dollar insurance.

All policies shall be endorsed to state that coverage shall not be suspended, voided, cancelled, reduced in coverage or in limits, non-renewed, or materially changed for any reason, without thirty (30) days prior written notice thereof given by the insurer to Agency by U.S. mail, or by personal delivery, except for nonpayment of premiums, in which case ten (10) days prior notice shall be provided.

- a) In lieu of this endorsement, the Contractor shall either:
- b) Submit a letter, signed by the insurance agent or broker, certifying that he/she shall notify the City should the coverage be suspended, voided, cancelled, reduced in coverage or in limits, non-renewed, or materially changed for any reason, without thirty (30) days prior written notice thereof given by the insurer to Agency by U.S. mail, or by personal delivery, except for nonpayment of premiums, in which case ten (10) days prior notice shall be provided; or
- c) Submit evidence that the insurance premium has been paid in full for the life of the policy.

Indemnification. Contractor shall immediately report all claims to its insurance carrier and acknowledge receipt within thirty (30) days.

No officer, employee, or agent of the City, City Representative, the Engineer, or their consultants shall be personally responsible for any liability arising under or by virtue of the Agreement.

To the maximum extent permitted by law, Contractor shall hold harmless, indemnify, and defend the City, **IRWD, CALTRANS, SOUTHERN CALIFORNIA EDISON, IUSD**, City Representatives,

and each of their officers, employees, and agents from and against any and all actions, suits, claims, demands, judgments, attorney's fees, costs, damages to persons or property, losses, penalties, obligations, expenses or liabilities (herein "claims" or "liabilities") that may be asserted or claimed by any person or entity arising out of the willful or negligent acts, errors or omissions of Contractor, its employees, agents, representatives or subcontractors in the performance of any tasks or services for or on behalf of City, whether or not there is concurrent active or passive negligence on the part of City and/or City Personnel, but excluding such claims or liabilities arising from the active negligence or willful misconduct of City or City Personnel. In connection therewith:

- a) Contractor shall defend any action or actions filed in connection with any such claims or liabilities, and shall pay all costs and expenses, including attorney's fees incurred in connection therewith.
- b) Contractor shall promptly pay any judgment rendered against City or any City Personnel for any such claims or liabilities.
- c) In the event City and/or any City Personnel is made a party to any action or proceeding filed or prosecuted for any such damages or other claims arising out of or in connection with the negligent performance or a failure to perform the work or activities of Contractor, Contractor shall pay to City any and all costs and expenses incurred by City or City Personnel in such action or proceeding, together with reasonable attorney's fees and expert witness fees. So much of the money due to the Contractor under and by virtue of the Agreement as shall be considered necessary by the City may be retained by the City until disposition has been made of such actions or claims for damages as aforesaid.

These Indemnification provisions are independent of and shall not in any way be limited by the Insurance Requirements of this Agreement. Entity approval of the Insurance contracts required by this Agreement does not in any way relieve the Contractor from liability under this section.

5-4.2 General Liability Insurance. *DELETE the 2nd paragraph and SUBSTITUTE with the following:*

General Liability (including premises, operations and mobile equipment, products, and completed operations, broad form property damage including completed operations, explosion, collapse and underground hazards, contractual liability, personal injury, independent contractors' liability): with a minimum limit of Five Million Dollars (\$5,000,000) for each occurrence (combined single limit for bodily injury and property damage) and Ten Million Dollars (\$10,000,000) general aggregate. The general aggregate limit shall apply separately to the Contractor's work under this Contract.

If the contractor maintains broader coverage and/or higher limits than the minimums shown above, the City requires and shall be entitled to the broader coverage and/or higher limits maintained by the contractor.

Products-Completed Operations: Contractor shall procure and submit evidence of insurance in accordance with 7-3 of the Standard Specifications and these Special Provisions for a period of at least three (3) years from the time that all Work under this Contract is completed.

5-4.3 Workers' Compensation Insurance. *MODIFY to ADD the following:*

Workers' Compensation and Employer's Liability: Workers' Compensation Insurance in an amount required by the laws of the State of California (Statutory Limits). Employer's Liability Insurance with a minimum limit of One Million Dollars (\$1,000,000) per occurrence.

Such insurance shall be endorsed to waive the insurer's right of subrogation against the City of Irvine and their elected officials, officers, employees, volunteers, boards, and representatives.

In the event Contractor has no employees requiring Contractor to provide Workers' Compensation Insurance, Contractor shall so certify to Agency in writing prior to Agency's execution of this Contract. Agency and Agency Personnel shall not be responsible for any claims in law or equity occasioned by failure of the Contractor to comply with this section or with the provisions of law relating to Workers' Compensation.

If Contractor is providing on-site staffing services, then the Workers' Compensation insurance shall include an Alternative Employers Endorsement.

5-4.4 Automobile Liability Insurance. *DELETE in its entirety and SUBSTITUTE with the following:*

Automobile liability insurance with a limit of liability not less than Two Million dollars (\$2,000,000) each occurrence. The limits shall be provided by either a single primary policy or combination of policies. If limits are provided with excess and/or umbrella coverage the limits combined with the primary will equal the minimum limits set above. Such insurance shall include coverage for all "owned," "hired" and "non-owned" vehicles, or coverage for "any auto."

If the contractor maintains broader coverage and/or higher limits than the minimums shown above, the City requires and shall be entitled to the broader coverage and/or higher limits maintained by the contractor.

ADD:

5-4.5 Contractor's Pollution Liability. Contractors Pollution Liability Insurance covering all of the contractor's operations to include onsite and offsite coverage for bodily injury, property damage, defense costs, cleanup costs, coverage for offsite disposal facilities with minimum limits of Two Million Dollars (\$2,000,000) each loss and Four Million Dollars (\$4,000,000) in the aggregate.

If the contractor maintains broader coverage and/or higher limits than the minimums shown above, the City requires and shall be entitled to the broader coverage and/or higher limits maintained by the contractor.

Prior to commencing work, the Contractor shall provide the City the names and locations of disposal facilities for approval by the City.

The insurance coverage required for General Liability, Automobile Liability and Contractor's Pollution Liability shall be endorsed to provide the following:

The Contractor shall name as additional insured the City of Irvine, Irvine Unified school district (IUSD), IRWD, SCE, their elected officials, officers, employees, volunteers, boards, and representatives with regard to liability and defense of suits or claims arising out of the performance of the Contract.

Additional Insured Endorsements shall not:

- a) Be limited to "Ongoing Operations"
- b) Exclude "Contractual Liability"
- c) Restrict coverage to the "Sole" liability of contractor
- d) Contain any other exclusion contrary to the Contract

This insurance shall be primary and any other insurance, deductible, or self-insurance available to the insured shall be in excess of and shall not contribute with this insurance.

5-4.6 Builders Risk Insurance. At its own expense, the successful Contractor will be required to obtain, pay for, and maintain, for the duration of the Agreement, builders risk insurance for any property constructed on behalf of the City, to cover "all risks" of physical loss providing coverage for loss or damage from collapse, including collapse resulting from builder's design error. The value of the insured shall cover 100% of the completed Contract cost and shall maintain until acceptance of the Work. Proceeds payable under this insurance policy shall be fully payable to the City as Loss Payee.

Such insurance shall be endorsed to waive the insurer's right of subrogation against the indemnified parties.

5-4.7 Professional Liability Insurance. At its own expense, the successful Contractor will be required to obtain, pay for, and maintain, for the duration of the Agreement and for a minimum of five (5) years thereafter, a Professional Liability Insurance Policy (that includes errors and omissions, and professional malpractice) with a minimum limit of Two Million Dollars (\$2,000,000) per claim. The policy shall provide coverage for any loss arising out of or caused by the Contractor's performance of the Agreement.

If the contractor maintains broader coverage and/or higher limits than the minimums shown above, the City requires and shall be entitled to the broader coverage and/or higher limits maintained by the contractor.

5-4.8 Evidence of Insurance. Contractor shall provide to City a Certificate(s) of Insurance evidencing such coverage together with copies of the required policy endorsements no later than five (5) business days prior to commencement of service and at least fifteen (15) business days prior to the expiration of any policy. Coverage shall not be suspended, voided, cancelled, reduced in coverage or in limits, non-renewed, or materially changed for any reason, without thirty (30) days prior written notice thereof given by the insurer to City by U.S. mail, or by personal delivery, except for nonpayment of premiums, in which case ten (10) days prior notice shall be provided.

A statement on an insurance certificate will not be accepted in lieu of the actual endorsement. Insurance policies shall not be in compliance if they include any limiting provision or endorsement that has not been submitted to the City for approval.

The City's insurance certificate tracking services provider, EXIGIS, LLC, will send Contractor an email message providing instructions for submitting insurance certificates and endorsements.

The City project title or description MUST be included in the "Description of Operations" box on the certificate.

Certificate Holder:

City of Irvine
c/o EXIGIS Risk Management Services
P.O. Box 4668 - ECM #35050
New York, NY 10163-4668

5-4.9 Irvine Unified School District Insurance Requirements.

This contains minimum requirements for the project. If awarded, Contractor agrees, at a minimum, to meet these requirements at no additional cost between this document and the insurance requirements included in the Contract.

All policies shall include completed operations endorsements which shall be maintained for a term ending not sooner than the duration of the warranty period and/or as required by the contract documents.

Contractors shall, at their sole cost and expense, obtain and maintain insurance coverage. Certificate of Insurance and associated endorsements are to be provided prior to the issuance of a NTP. Work on this project will not be allowed to commence without your Certificate of Insurance and endorsements on file with the Irvine Unified School District. Every certificate must include the following:

GENERAL LIABILITY**\$1,000,000 OCCURRENCE / \$2,000,000 PER PROJECT AGGREGATE**

- The Project name must be indicated on the endorsement (see sample)
- The per project aggregate endorsement is needed if the "per project aggregate" box is not checked on the original certificate and must contain the policy number.
- **Irvine Unified School District** must be named as Additional Insured with the proper endorsement using ISO Form CG 2010 (11/85), or a combination of CG 2010 (10/01) and CG 2037 (10/01) Any reference to **"liability arising out of your ongoing operations"** is unacceptable **UNLESS** accompanied by a Completed Operations endorsement.
- "Primary Wording" must appear on the additional insured endorsement as follows:
"Primary Clause" - The insurance afforded by this policy for the additional insured(s) is primary insurance and any other insurance maintained by or available to the additional insured(s) is non-contributory. **Any reference to "... only if claim, loss, or liability is determined to be the sole negligence of the named insured" is UNACCEPTABLE.**
- Commercial General Liability insurance written on an "occurrence" form including coverage for: Premises and Operations; Products and Completed Operations; Broad Form Property Damage; Explosion, Collapse, Underground Hazards; Contractual Liability

insuring the obligations assumed by Contractor in this contract; Personal Injury Liability, Severability of Interest. Minimum limits for this coverage shall be at least **\$1,000,000 Bodily Injury/Property Damage each occurrence/\$2,000,000 per project aggregate.** Such insurance shall be underwritten by an A.M. Best rated carrier with no less than an A- VII rating.

- The Commercial General Liability shall include products and completed operations endorsements which shall be maintained for a term ending not sooner than the duration of the warranty period as required by the contract documents and shall be on "an occurrence basis" and not a "claims made" basis.
- Must contain a **Waiver of Subrogation** in favor of **Irvine Unified School District.**
- Certificate shall contain a provision that coverage afforded under such policies shall not be canceled or materially changed without at least thirty (30) calendar days written notice.

AUTO LIABILITY

\$1,000,000 COMBINED SINGLE LIMITS FOR BODILY INJURY & PROPERTY DAMAGE

- The Project Name must be indicated.
- 30-Day cancellation notice to Irvine Unified School District.
- Automobile Liability insurance covering all owned, hired and non-owned vehicles with a combined single limit of not less than \$1,000,000.
- Such insurance shall be underwritten by an A.M. Best rated carrier with no less than an A- VII rating.

WORKER'S COMPENSATION AND EMPLOYER'S LIABILITY

STATUTORY

- The Project Name must be indicated.
- In accordance with the laws of the State of California in an amount that is not less than that required by applicable law, statute or ordinance, with a limit of liability for coverage of at least **\$1,000,000 each occurrence/aggregate,** and containing a **Waiver of Subrogation** in favor of **Irvine Unified School District.** Such insurance shall be underwritten by an A.M. Best rated carrier with no less than an A- VII rating.
- 30-Day cancellation notice to Irvine Unified School District.

EXCESS -UMBRELLA LIABILITY

\$3,000,000 Each Occurrence

- The Project name must be indicated on the endorsement (see sample)
- The "per Occurrence" box is to be checked on the original certificate and must contain the policy number. Such insurance shall be underwritten by an A.M. Best rated carrier with no less than an A- VII rating.
- 30-Day cancellation notice to Irvine Unified School District.
- Minimum limits for this coverage shall be at least **\$3,000,000 Each Occurrence.**

SEXUAL ABUSE/ MOLESTATION

\$1,000,000 OCCURRENCE/ \$2,000,000 PER PROJECT AGGREGATE

- ☐ Per Sample Insurance Certificate attached
- ☐ May be included in GL coverage above or provided as a separate policy.
- ☐ Minimum limits for this coverage shall be at least **\$1,000,000 Each Occurrence.**
\$2,000,000 Aggregate.

NOTE: Original certificate(s) and endorsements must be sent to:

Irvine Unified School District
5050 Barranca Parkway
Irvine, CA 92604
Attn: Risk Management

ACORD™ CERTIFICATE OF LIABILITY INSURANCE		DATE (MM/DD/YYYY) INSERT DATE												
PRODUCER NAME & ADDRESS OF INSURANCE COMPANY		THIS CERTIFICATE IS ISSUED AS A MATTER OF INFORMATION ONLY AND CONFERS NO RIGHTS UPON THE CERTIFICATE HOLDER. THIS CERTIFICATE DOES NOT AMEND, EXTEND OR ALTER THE COVERAGE AFFORDED BY THE POLICIES BELOW.												
INSURED NAME & ADDRESS OF COMPANY/ORGANIZATION	<table border="1" style="width:100%; border-collapse: collapse;"> <tr> <th style="width: 60%;">INSURERS AFFORDING COVERAGE</th> <th style="width: 40%;">NAIC #</th> </tr> <tr> <td>INSURER A: Name of Insurance Company</td> <td></td> </tr> <tr> <td>INSURER B: Name of Insurance Company</td> <td></td> </tr> <tr> <td>INSURER C: Name of Insurance Company</td> <td></td> </tr> <tr> <td>INSURER D: Name of Insurance Company</td> <td></td> </tr> <tr> <td>INSURER E: Name of Insurance Company</td> <td></td> </tr> </table>		INSURERS AFFORDING COVERAGE	NAIC #	INSURER A: Name of Insurance Company		INSURER B: Name of Insurance Company		INSURER C: Name of Insurance Company		INSURER D: Name of Insurance Company		INSURER E: Name of Insurance Company	
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INSURER E: Name of Insurance Company														

COVERAGES

THE POLICIES OF INSURANCE LISTED BELOW HAVE BEEN ISSUED TO THE INSURED NAMED ABOVE FOR THE POLICY PERIOD INDICATED. NOTWITHSTANDING ANY REQUIREMENT, TERM OR CONDITION OF ANY CONTRACT OR OTHER DOCUMENT WITH RESPECT TO WHICH THIS CERTIFICATE MAY BE ISSUED OR MAY PERTAIN, THE INSURANCE AFFORDED BY THE POLICIES DESCRIBED HEREIN IS SUBJECT TO ALL THE TERMS, EXCLUSIONS AND CONDITIONS OF SUCH POLICIES. AGGREGATE LIMITS SHOWN MAY HAVE BEEN REDUCED BY PAID CLAIMS.

INSR LTR	ADD'L INSRD	TYPE OF INSURANCE	POLICY NUMBER	POLICY EFFECTIVE DATE (MM/DD/YY)	POLICY EXPIRATION DATE (MM/DD/YY)	LIMITS												
		GENERAL LIABILITY <input checked="" type="checkbox"/> COMMERCIAL GENERAL LIABILITY <input type="checkbox"/> CLAIMS MADE <input checked="" type="checkbox"/> OCCUR GEN'L AGGREGATE LIMIT APPLIES PER: <input type="checkbox"/> POLICY <input type="checkbox"/> PRO-JECT <input type="checkbox"/> LOC	MANDATORY REQUIREMENTS	Insert Date	Insert Date	<table border="1" style="width:100%; border-collapse: collapse;"> <tr><td>EACH OCCURRENCE</td><td style="text-align: right;">\$ 1,000,000</td></tr> <tr><td>DAMAGE TO RENTED PREMISES (Ea occurrence)</td><td style="text-align: right;">\$ 50,000</td></tr> <tr><td>MED EXP (Any one person)</td><td style="text-align: right;">\$ 5,000</td></tr> <tr><td>PERSONAL & ADV INJURY</td><td style="text-align: right;">\$ 1,000,000</td></tr> <tr><td>GENERAL AGGREGATE</td><td style="text-align: right;">\$ 2,000,000</td></tr> <tr><td>PRODUCTS - COMP/OP AGG</td><td style="text-align: right;">\$ 1,000,000</td></tr> </table>	EACH OCCURRENCE	\$ 1,000,000	DAMAGE TO RENTED PREMISES (Ea occurrence)	\$ 50,000	MED EXP (Any one person)	\$ 5,000	PERSONAL & ADV INJURY	\$ 1,000,000	GENERAL AGGREGATE	\$ 2,000,000	PRODUCTS - COMP/OP AGG	\$ 1,000,000
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		GARAGE LIABILITY <input type="checkbox"/> ANY AUTO				<table border="1" style="width:100%; border-collapse: collapse;"> <tr><td>AUTO ONLY - EA ACCIDENT</td><td style="text-align: right;">\$</td></tr> <tr> <td>OTHER THAN AUTO ONLY:</td> <td style="text-align: right;">EA ACC \$</td> </tr> <tr> <td></td> <td style="text-align: right;">AGG \$</td> </tr> </table>	AUTO ONLY - EA ACCIDENT	\$	OTHER THAN AUTO ONLY:	EA ACC \$		AGG \$						
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		WORKERS COMPENSATION AND EMPLOYERS' LIABILITY ANY PROPRIETOR/PARTNER/EXECUTIVE OFFICER/MEMBER EXCLUDED? If yes, describe under SPECIAL PROVISIONS below	REQUIRED UNLESS REDUCED/WAIVED	Insert Date	Insert Date	<table border="1" style="width:100%; border-collapse: collapse;"> <tr> <td><input checked="" type="checkbox"/> WC STATUTORY LIMITS</td> <td><input type="checkbox"/> OTHER</td> <td></td> </tr> <tr><td>E.L. EACH ACCIDENT</td><td colspan="2" style="text-align: right;">\$ 1,000,000</td></tr> <tr><td>E.L. DISEASE - EA EMPLOYEE</td><td colspan="2" style="text-align: right;">\$ 1,000,000</td></tr> <tr><td>E.L. DISEASE - POLICY LIMIT</td><td colspan="2" style="text-align: right;">\$ 1,000,000</td></tr> </table>	<input checked="" type="checkbox"/> WC STATUTORY LIMITS	<input type="checkbox"/> OTHER		E.L. EACH ACCIDENT	\$ 1,000,000		E.L. DISEASE - EA EMPLOYEE	\$ 1,000,000		E.L. DISEASE - POLICY LIMIT	\$ 1,000,000	
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		OTHER Professional Liability and/or Sexual Abuse/Molestation	MAY BE REQUIRED	Insert Date	Insert Date	\$ 1,000,000 per occurrence \$ 2,000,000 aggregate												

DESCRIPTION OF OPERATIONS/LOCATIONS/VEHICLES/EXCLUSIONS ADDED BY ENDORSEMENT/SPECIAL PROVISIONS

Add Project/School Name

Irvine Unified School District, its Board of Trustees, officers, agents, employees, and volunteers are named as additionally insured on this policy pursuant to written contract, agreement, or memorandum of understanding. Such insurance as is afforded by this policy shall be primary, and any insurance carried by District shall be excess and noncontributory. Sexual Abuse/Molestation is not excluded from coverage under the general liability and excess/umbrella liability policies. (Provide brief description of services/dates).

CERTIFICATE HOLDER

CANCELLATION

Irvine Unified School District 5050 Barranca Parkway Irvine, California 92604 Attention: Risk Management	SHOULD ANY OF THE ABOVE DESCRIBED POLICIES BE CANCELLED BEFORE THE EXPIRATION DATE THEREOF, THE ISSUING INSURER WILL ENDEAVOR TO MAIL DAYS <u>30</u> WRITTEN NOTICE TO THE CERTIFICATE HOLDER NAMED TO THE LEFT, BUT FAILURE TO DO SO SHALL IMPOSE NO OBLIGATION OR LIABILITY OF ANY KIND UPON THE INSURER, ITS AGENTS OR REPRESENTATIVES. AUTHORIZED REPRESENTATIVE _____ SIGNATURE REQUIRED
---	--

ENDORSEMENT

ADDITIONAL COVERED PARTY

COVERED PARTY

(INSERT INSURED NAME)

COVERAGE DOCUMENT

(INSERT POLICY NUMBER)

ADMINISTRATOR

(INSERT NAME OF ADMINISTRATOR)

Subject to all terms, conditions, exclusions, and endorsements, such additional covered party as is afforded by the coverage document shall also apply to the following entity but only as respects to liability arising from the actions and activities of the covered party described below.

Additional Covered Party:

Irvine Unified School District
5050 Barranca Parkway
Irvine, California 92604

Description of Activities:

Irvine Unified School District, its Board of Trustees, officers, agents, employees, and volunteers are named as additionally insured on this policy pursuant to written contract, agreement, or memorandum of understanding. Such insurance as is afforded by this policy shall be primary and any insurance carried by District shall be excess and noncontributory.

Authorized Representative Signature
MUST APPEAR ON THE ENDORSEMENT PAGE

ADD:

5-5.1 Property Rights in Materials. Nothing in the Contract shall be construed as vesting in the Contractor any right of property in the materials used after they have been attached or affixed to the Work or the soil, or after payment has been made for materials delivered to the site of the Work, or stored subject to or under the control of the Agency.

ADD:

5-5.2 Warranty of Title. No materials, supplies or equipment for the Work under this Contract shall be purchased subject to any chattel mortgage or under a conditional sale contract or other agreement by which an interest therein or any part thereof is retained by the seller or supplier. The Contractor warrants clear and good title to all materials, supplies, and equipment installed and incorporated in the Work and agrees upon completion of all Work to deliver the premises together with all improvements and appurtenances constructed or placed thereon by him to the Agency free from any claims, liens, encumbrances, or charges and further agrees that neither he nor any persons, firm, or corporation furnishing any material or labor for any work covered by the Contract shall have any right to a lien upon the premises or any improvement or appurtenance thereon, provided that this shall not preclude the Contractor from installing metering devices or other equipment of utility companies or of municipalities, the title of which is commonly retained by the utility company or the municipality. Nothing contained in this article, however, shall defeat or impair the right of such persons furnishing materials or labor under any bond given by the Contractor for their protection, or any right under any law permitting such persons to look to funds due the Contractor in the hands of the Agency.

The provisions of this subsection shall be physically inserted in all subcontracts and material contracts and notices of its provision shall be given to all persons furnishing materials for the work when no formal contract is entered into for such materials.

5-6 PATENT FEES AND ROYALTIES.

DELETE in its entirety and SUBSTITUTE with the following:

The Contractor shall assume all costs arising from the use of patented materials, equipment, devices, or processes used on or incorporated in the Work and shall hold harmless, indemnify, and defend the Agency, the Engineer, the Agency Representative and each of their officers, employees, and agents from all claims, suits or actions of every nature for or on account of the use of any patented materials, equipment devices, or processes. To the maximum extent permitted by law, all obligations of the Contractor stated in 7-3.2 shall apply in the case of any such claim, suit or action.

5-7.1.2 Work Site Safety Official. MODIFY to ADD the following:

Failure by the Contractor to provide the required Work Site Safety Official shall be grounds for the Agency to direct the cessation of all work activities and operations at no cost to the Agency until the Contractor is in compliance.

ADD:

5-7.1.3 Emergencies. Unusual conditions may arise on the Work which will require that immediate and unusual provisions be made to protect the public from danger or loss or damage to life and property, due directly or indirectly to the prosecution of the Work, and it is part of the service required of the Contractor to make such provisions and to furnish such protection.

The Contractor shall use such foresight and shall take such steps and precautions as his operations make necessary to protect from danger or damage, or loss of life or property, which would result from the interruption or contamination of public water supply, irrigation or other public service, or from failure or partly completed work.

Whenever, in the opinion of the Engineer, an emergency exists against which the Contractor has not taken sufficient precaution for the safety of the public or the protection of utilities or of adjacent structures or property which may be injured by process of construction on account of such neglect; and whenever in the opinion of the Engineer, immediate action shall be considered necessary in order to protect public or private, personal or property interest, or prevent likely loss of human life or damage on account of the operations under the Contract, then and in that event the Agency may provide suitable protection to said interest by causing such work to be done and material to be furnished as, in the opinion of the Agency Representative may seem reasonable and necessary.

The cost and expense of said labor and material, together with the cost and expense of such repairs as may be deemed necessary, shall be borne by the Contractor, and if he shall not pay said cost and expense upon presentation of the bills therefor, duly certified by the Agency Representative, then said cost and expense will be paid by the Agency and shall thereafter be deducted from any amounts due, or which may become due to the Contractor. Failure of the Agency, however, to take such precautionary measure, shall not relieve the Contractor of his full responsibility for public safety.

The foregoing provisions are in addition to and not in limitation of any other rights or remedies available to the Agency.

5-7.2.1 General. *DELETE in its entirety 2nd paragraph and SUBSTITUTE with the following:*

The Contractor shall submit to the Engineer, as a condition of obtaining City issued permits and in advance of excavation, a permit from the Division of Occupational Safety and Health pursuant to Chapter 6 (commencing with Section 6500) of Part 1 of Division 5 of the Labor Code along with a detailed plan showing the design of shoring, bracing, sloping or other provisions to be made for worker protection from the hazard of caving ground during the excavation of any trench or trenches five (5) feet or more in depth. The plan shall be prepared by a registered civil or structural engineer. As a part of the plan, a notice shall be included stating that the registered civil or structural engineer certifies that the plan complies with the CAL/OSHA Construction Safety Orders. A copy of the plan and permit shall be submitted to the Engineer.

In accordance with generally accepted construction practices, the Contractor shall be solely and completely responsible for conditions on the job site, including safety of all persons and property during performance of the Work, and the Contractor shall fully comply with all local, county, state and federal laws, rules, regulations, and orders relating to safety of the public and workers.

The Contractor shall hold harmless, indemnify, and defend the Agency, the Engineer, the Agency Representative and each of their officers, employees, and agents from civil or criminal penalties resulting from a failure to comply with applicable safety laws, rules, regulations and orders. To the maximum extent permitted by law, all obligations of the Contractor stated in 5-4.2 shall apply in the event of any such failure to comply with applicable safety laws, rules, regulations or orders.

The duty, if any, of the Agency Representative to conduct construction review or inspection of the Contractor's performance is not intended to include review or inspection of the adequacy of the Contractor's safety measures in, on, or near the construction site.

5-7.8 Steel Plate Covers. *MODIFY to ADD the following:*

The Contractor shall protect transverse or longitudinal cuts, voids, trenches, holes, and excavations in the right-of-way that cannot be properly completed within one (1) Working Day by adequately designed barricades and structural steel plates (plates) that will support legal vehicle loads in such a way as to preserve unobstructed traffic flow.

The Contractor shall secure approval, in advance, from Engineer concerning the use of any bridging proposed on the Work.

The Contractor shall adequately shore trenches to support the bridging and traffic loads.

The Contractor shall design plates for HS 20-44 truck loading in accordance with Caltrans Bridge Design Specifications Manual.

For spans greater than 5'-3", submit a structural design prepared by a California Registered Civil Engineer to the Engineer.

The surface of the plates shall be skid-resistant with a nominal Coefficient Of Friction (COF) of 0.35 as determined by California Test Method 342.

Plates must provide complete coverage to prevent any person, bicycle, motorcycle or motor vehicle from being endangered due to plate movement causing separations or gaps.

Install and secure plates against movement or displacement by using adjustable cleats, shims, welding, or other devices in a manner that will minimize noise.

The Contractor shall Install plates as follows:

Mill the pavement to a depth equal to the thickness of the plate and to a width and length equal to the dimensions of the plate. Method 2 installation is prohibited.

Alternative installation method may be submitted in accordance with 3-8, "Submittals" for the Engineer's approval.

The Contractor is responsible for maintenance of the plates and shoring, or any other approved device used to secure the plates. The Contractor shall immediately mobilize necessary personnel and equipment after being notified by the Agency Representative, the Agency Code Enforcement or Police Department of a repair needed e.g., plate movement, noise, anchors, and asphalt ramps. Failure to respond to the emergency request within 2 hours will be grounds for Agency to perform necessary repairs that will be invoiced at actual cost including overhead or \$500 per incident, whichever is greater.

When plates are removed, the Contractor shall repair any damage to the pavement with fine graded asphalt concrete mix or slurry seal satisfactory to the Engineer.

Payment for Steel Plate Covers is included in the various bid items of work.

ADD:

5-8 CORRESPONDENCE. Unless specified otherwise or requested by the Engineer, the use of facsimile (fax) machines, text messages, or phone calls shall not be considered official project correspondence. Unless otherwise allowed by the Engineer, all email shall be directed to the Engineer. The email address for the Engineer will be provided at the pre-construction meeting. Correspondence received after 2:00 p.m. shall be considered as being received the following working day. The Engineer will not accept any illegible correspondence.

ADD:

5-9 CONTRACT COORDINATION. The Contractor shall coordinate scheduling, submittals, and the Work to assure efficient and orderly sequence of installation of construction elements, with provisions for accommodating items to be installed later.

In addition to weekly progress meetings, as required by the Agency, the Contractor shall hold coordination meetings and pre-installation conferences with Agency Representatives and subcontractors to assure coordination of Work.

Should the Agency exercise partial Acceptance or beneficial occupancy of premises, the Contractor shall coordinate access to site to complete work or to correct defective work and work not in strict conformance with Contract Documents to minimize disruption of Agency's activities.

ADD:

5-10 CONTRACTOR'S RESPONSIBILITY FOR THE WORK. Until Acceptance of the Work, the Contractor shall have the responsibility, charge and care of the Work and of the materials to be used therein (including materials for which it has received partial payment or materials which have been furnished by the Agency) and shall bear the risk of injury,

loss or damage to any part thereof by the action of the elements or from any other cause, whether arising from the execution or from the non-execution of the Work.

The Contractor shall rebuild, repair, restore, and make good all injuries, losses, or damages to any portion of the work or the material occasioned by any cause before its completion and acceptance and shall bear the expense thereof. Where necessary to protect the work or materials from damage, the Contractor shall at his expense provide suitable drainage and erect such temporary structures as are necessary to protect the work or materials from damage. The suspension of the work from any cause whatever shall not relieve the Contractor of his responsibility for the work and materials as herein specified. If ordered by the Agency Representative, the Contractor shall at his expense properly store materials which have been partially paid for by the Agency or which have been furnished by the Agency. Such storage by the Contractor shall be on behalf of the Agency, the Agency shall at all times be entitled to the possession of such materials, and the Contractor shall promptly return the same to the site of the work when requested. The Contractor shall not dispose of any of the materials so stored, except on written authorization from the Agency.

In an emergency affecting the safety of life or property, including adjoining property, the Contractor, without special instructions or authorizations, is authorized to act at his discretion to prevent such threatened loss or injury, and he shall so act as though instructed to do so by the Agency.

5-11 PROJECT RECORD DOCUMENTS.

5-11.1 Document Control.

Virtual Project Manager (VPM) construction management software, shall be used for all aspects of document control and management. After contract award, the Contractor shall register and create an account utilizing a City-provided Username and Password.

5-11.1.1 Construction Management Software

The Contractor shall process the project documentation as specified or as directed by the City utilizing an online cloud-based project management system. Virtual Project Manager (VPM) allows for paperless documentation and project administration. For more information, go to www.virtual-pm.com.

5-11.1.2 Project Management Documentation and Administration

5-11.1.2.1 General

- a) Virtual Project Manager (VPM) allows for paperless documentation and project administration. All posted information is available to all personnel involved with the project at any time using the internet.
- b) The use of VPM by the Contractor is mandatory. Access to VPM will be provided at no cost to the contractor.

5-11.1.2.2 Equipment and Communication Services

The Contractor shall procure and use the information technology (IT) equipment and communications services required to utilize the VPM. IT equipment necessary include

but are not limited to, a computer, internet access, a digital camera, and a scanner. (IT) equipment shall meet the user software and hardware requirements below, with internet access, and the ability to scan and print up to an 11-inch by 17- inch document. Acquisition, configuration, maintenance and support of the Contractor's computer hardware and software are the Contractor's responsibility. The following are the minimum user software and hardware workstation requirements:

1. Browser Latest version of, Firefox, Chrome, Safari
2. Connection 1.5Mbs / 768 Kbs (recommended minimum download / upload)

5-11.1.2.3 Access and Submittal Procedures

After award, the Contractor will a Username and Password To access VPM, go to www.virtual-pm.com. To Login, from the homepage, select LOGIN and enter the Username and Password that will be provided to you by the agency.

The Contractor shall submit the items associated with this section via Virtual Project Manager (VPM), including, but not limited to, those specified below.

1. Daily/Weekly Logs: Contractor's daily and weekly reports shall be entered electronically via VPM.
2. Change Order Manager: Contractor requests for change order submission, and change order processing will be performed electronically via VPM.
3. Transmittals: Schedules, Pay applications, etc. shall be submitted electronically via VPM.
4. Submittals: Submittals requiring approval shall be submitted electronically via VPM.
5. RFIs: Requests for information (RFIs) shall be submitted electronically via VPM.
6. Miscellaneous: Correspondences, permits, approvals, inspections, drawings, photos, tracking and resolution of Noncompliance Notices, tracking of Action Items created as part of the weekly construction meetings, development and management of the Punch List and any other record documents required in the Standard Specifications and these Special Provisions shall be accomplished electronically via VPM.

5-11.2 Maintenance of Documents and Samples. The Contractor shall maintain one record copy of:

- a) Contract Drawings
- b) Specifications
- c) Addenda
- d) Change Orders and Other Modifications to the Contract
- e) Reviewed Shop Drawings, Product Data, Samples, and approved submittals
- f) Field Test Records

- g) Construction Schedules
- h) Manufacturer's Certificates

The Contractor shall maintain documents in clean, dry, legible condition and not used for construction purposes.

The Contractor shall keep Record Documents and samples accessible for inspection by Agency Representative. Applications for partial payment will not be approved if the Record Documents are not kept current. The Agency Representative must so verify prior to submittal of each Application for Payment.

ADD:

5-11.3 Recording. The Contractor shall record changes to the plans and discoveries of buried objects at the Work on Record Documents with red ball-point pen, label each Document "PROJECT RECORD" in large printed letters, record information concurrently with construction progress, not conceal any work until required information is recorded and legibly mark each item on Contract Drawings and Shop Drawings to record actual construction, including:

- a) Measured depths of elements in relation to fixed datum point
- b) Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements
- c) Measured locations of internal utilities and appurtenances concealed in construction, referenced to visible and accessible features of construction
- d) Field changes of dimension and detail
- e) Changes made by Contract modifications
- f) Details not on original Contract Drawings
- g) Previously unknown buried objects

The Contractor shall legibly mark each item to record actual construction, including:

- a) Manufacturer, Trade Name, and Catalog Number of each product actually installed, particularly optional items and substitute items
- b) Changes made by Addenda or modifications

The Contractor shall maintain other documents per requirements of individual specifications sections.

ADD:

5-11.4 Submittals. At Contract closeout the Contractor shall deliver Record Documents and samples as specified in 5-11.1. Request for final payment will not be approved until all Record Documents have been delivered.

The submittals shall be transmitted with cover letter with signature of Contractor or authorized representative, listing date, project title and number, and number and title of each Record document.

SECTION 6 – PROSECUTION AND PROGRESS OF THE WORK

REVISE as follows:

6-1 CONSTRUCTION SCHEDULE AND COMMENCEMENT OF THE WORK.

DELETE in its entirety and SUBSTITUTE with the following:

The Contractor shall begin the Work on or before the date stipulated in the Notice to Proceed and shall diligently prosecute the Contract to completion within the time limit provided in the Contract.

The Contractor shall notify the Agency Representative of his intent to begin work at least two (2) Working Days prior to the start of any work.

The Contractor may, upon written approval from the Agency, begin work in advance of the date in the Notice to Proceed; however, **no work shall be started in advance of the completed execution of the Contract and approval of the construction progress schedule by the Agency.** The Agency may, but shall not be required to, provide access to the site prior to the date specified in the Notice to Proceed.

6-1.1 General. Within ten (10) days after the date of the City's execution of the Contract, the Contractor shall submit a proposed construction schedule to the Engineer for approval. The construction schedule shall be in accordance with 6-1.2 and 6-1.3 and shall be in sufficient detail to show chronological relationship of all activities of the Work. These include, but are not limited to, estimated starting and completion dates of various activities, submittal of shop drawings to the Engineer for approval, utility relocation efforts, procurement of materials, and scheduling of equipment.

Prior to issuing the Notice to Proceed, the Engineer will schedule a Pre-Construction Meeting with the Contractor to review the proposed construction schedule and delivery dates, arrange utility coordination and clarify inspection procedures.

Notwithstanding any other provisions of the contract, the Contractor shall not be obligated to perform any work and the City shall not be obligated to accept or pay for any work performed by the Contractor prior to delivery of the Notice to Proceed. The City's knowledge of work performed prior to the delivery of the Notice to Proceed shall not obligate the City to accept or pay for such work. The Contractor shall provide the required contract bonds and evidences of insurance prior to commencing work at the site.

6-1.2 Definitions. The following definitions shall apply to this section:

- a) **ACTIVITY** – a task, event or other project element on a schedule that contributes to completing the project. Activities have a description, start date, finish date, duration, and one or more logic ties.
- b) **BASELINE SCHEDULE** – the initial schedule representing the Contractor's work plan on the first working day of the project.

- c) **CONTRACT COMPLETION DATE** – the current extended date for completion of the contract shown on the Weekly Statement of Working Days furnished by the Engineer in conformance with the provisions in 6-3.
- d) **CRITICAL PATH** – the longest continuous chain of activities for the project that has the least amount of total float of all chains. In general, a delay on the critical path will extend the scheduled completion date.
- e) **CRITICAL PATH METHOD (CPM)** – a network based planning technique using activity durations and the relationships between activities to mathematically calculate a schedule for the entire project.
- f) **DATA DATE** – the day after the date through which a schedule is current. Everything occurring earlier than the data date is “as-built” and everything on or after the data date is “planned.”
- g) **FLOAT** – the difference between the earliest and latest allowable start or finish times for an activity.
- h) **FRAGNET** – a fragnet is defined as the sequence of new activities that are proposed to be added to the existing schedule, to demonstrate either added scope, or a change and the corresponding impact. The fragnet shall identify the predecessors to the new activities and demonstrate the impacts to successor activities.
- i) **MILESTONE** – an event activity that has zero duration and is typically used to represent the beginning or end of a certain stage of the project.
- j) **NEAR CRITICAL PATH** – a chain of activities with total float exceeding that of the critical path, but having no more than ten (10) Working Days of total float.
- k) **SCHEDULED COMPLETION DATE** – the planned project finish date shown on the current accepted schedule.
- l) **TOTAL FLOAT** – the amount of time that an activity or chain of activities can be delayed before extending the scheduled completion date.
- m) **UPDATE SCHEDULE** – a current schedule developed from the baseline or subsequent schedule through regular monthly review to incorporate as-built progress and any planned changes.

6-1.3 General Requirements. The Contractor shall meet with the Engineer on a date mutually agreed by the parties with the intent of discussing the schedule requirements. This meeting shall happen before the Contractor begins the work on the Baseline schedule.

The Contractor shall submit to the Engineer baseline, monthly update, look-ahead schedules, and final update schedules, each consistent in all respects with the time and

order of work requirements of the contract. The project work shall be executed in the sequence indicated on the current accepted schedule.

Schedules shall show the order in which the Contractor proposes to carry out the work with logical links between time-scaled work activities and calculations made using the critical path method to determine the controlling operation or operations. The Contractor is responsible for assuring that all activity sequences are logical and that each schedule shows a coordinated plan for complete performance of the work.

The Contractor shall produce schedules using computer software and shall furnish compatible software for the Engineer's exclusive possession and use. The Contractor shall furnish network diagrams and schedule data as parts of each schedule submittal.

The schedule shall be prepared using the latest version of Oracle's Primavera P6 scheduling tool or approved equal. Any tool other than Primavera shall first require approval from the Engineer.

The Contractor shall not sequester float through strategies such as extending activity duration estimates to consume available float, using preferential logic, using extensive crew/resource constraints, using special lead/lag logic restraints, using imposed dates or other float suppression techniques.

Schedules shall include, but not be limited to, applicable activities that show the following:

- a) Project characteristics, salient features, or interfaces, including those with outside entities that could affect time of completion.
- b) Project start date, scheduled completion date, and other milestones.
- c) Work performed by the Contractor, subcontractors, and suppliers.
- d) Submittal development, delivery, review and approval, including those from the Contractor, subcontractors, and suppliers.
- e) Procurement, delivery, installation, and testing of materials, plants, and equipment.
- f) Testing and settlement periods.
- g) Utility notification and relocation.
- h) Erection and removal of false work and shoring.
- i) Lane closures, ramp closures, etc.
- j) Major traffic stage switches.
- k) Finishing roadway and final cleanup.
- l) Schedule shall further include the following:

- 1) A clear and legible description for each activity.
- 2) A detailed Work Breakdown Structure (WBS) or Activity Coding Structure, sufficient to clearly organize, sort, and filter activities as needed.
- 3) A duration of not less than one (1) Working Day, except for event activities, and not more than twenty (20) Working Days, unless otherwise authorized by the Engineer.
- 4) At least one predecessor and one successor activity, except for project start and finish milestones.
- 5) Required constraints.

The Engineer's review and acceptance of schedules shall not waive any contract requirements and shall not relieve the Contractor of any obligation thereunder or responsibility for submitting complete and accurate information. Schedules that are rejected shall be corrected by the Contractor and resubmitted to the Engineer within five (5) Working Days of notification by the Engineer, at which time a new review period of one week will begin.

Errors or omissions on schedules shall not relieve the Contractor from finishing all work within the time limit specified for completion of the contract. If, after a schedule has been accepted by the Engineer, either the Contractor or the Engineer discover that any aspect of the schedule has an error or omission, it shall be corrected by the Contractor on the next update schedule.

The Contractor shall include the following for each schedule submittal:

- a) Two sets of originally plotted, time-scaled network diagrams.
- b) Two copies of a narrative report.
- c) Two copies of each of three (3) sorts of the CPM software-generated tabular reports.
- d) Electronic copy of the schedule data.

The time-scaled network diagrams shall conform to the following:

- a) Show a continuous flow of information from left to right.
- b) Be based on early start and early finish dates of activities.
- c) Clearly show the primary paths of criticality using graphical presentation.
- d) Include a title block and a timeline on each page.

Tabular reports shall be software-generated and provide information for each activity included in the project schedule. Three different reports shall be sorted by (1) activity ID,

(2) early start and (3) total float. Tabular reports shall be 8 ½" x 11" in size and shall include, as a minimum, the following applicable information:

- a) Data date
- b) Activity number and description
- c) Predecessor and successor activity, numbers, and descriptions
- d) Activity codes
- e) Scheduled, or actual and remaining durations (work days) for each activity
- f) Earliest start (calendar) date
- g) Earliest finish (calendar) date
- h) Actual start (calendar) date
- i) Actual finish (calendar) date
- j) Latest start (calendar) date
- k) Latest finish (calendar) date
- l) Free float (working days)
- m) Total float (working days)
- n) Percentage of activity completed and remaining duration for incomplete activities
- o) Lags
- p) Required constraints

Schedule submittals will only be considered complete when all documents and data have been provided as described above.

6-1.4 Computer Software. The software shall be the current version of Oracle's Primavera P6 for Windows or equal. If the Contractor proposes to use a different software than Primavera, the Contractor shall submit to the Engineer for approval a description of proposed software. All software shall be compatible with the latest Windows operating system.

The Contractor shall furnish schedule software and all original software instruction manuals to the Engineer with submittal of the baseline schedule. The furnished schedule software will be returned to the Contractor upon Project Acceptance.

The Contractor shall instruct the Engineer in the use of the software and provide software support until the contract is accepted. Within twenty (20) Working Days of approval of the Contract, the Contractor shall provide a commercial 16-hour training session and training manuals for 3 City employees in the use of the software at a location acceptable to the

Engineer. It is recommended that the Contractor also send at least 3 employees to the same training session to facilitate development of similar knowledge and skills in the use of the software.

6-1.5 Schedule Submittals, Network Diagrams and Reports.

The Contractor shall:

- a) Submit the Baseline Schedule within twenty (20) Working Days after the approval of the Contract. Review 6-1.6 for more details on the Baseline Schedule requirements.
- b) Contractor shall incorporate any revisions deemed necessary by the City after the City's review of the Baseline Schedule.
- c) Once the City approves the Baseline Schedule, the Contractor shall submit two (2) color plots on "E" size sheets (approximately 34" x 44") of each required schedule, four (4) copies of the schedule in 11" x 17" format. A computer copy of the schedule data in the native file format should also be presented.
- d) Submit the Monthly Updated Schedules and reports along with the computer copy of the schedule file, on or within the first working day of each month. The Monthly Updated Schedule shall incorporate the Project's actual progress (or as-built information) as of the data date indicated on the update into the Baseline Schedule or the latest monthly update as appropriate.
- e) Submit a 3-Week Look-Ahead Schedule weekly and at every progress meeting during construction.
- f) Submit Final As-Built Schedule upon completion of the entire Project.

6-1.6 Baseline Schedule. The Contractor shall submit to the Engineer a baseline schedule within ten (10) days after the date of the City's execution of the Contract. The Contractor shall allow three (3) weeks for the Engineer's review after the baseline schedule and all support data are submitted. Beginning the week the baseline schedule is first submitted, the Contractor shall meet with the Engineer weekly to discuss and resolve schedule issues until the baseline schedule is accepted.

The baseline schedule shall include the entire scope of work and shall show how the Contractor plans to complete all work contemplated. The baseline schedule shall clearly identify the activities that define the critical path. Multiple critical paths and near-critical paths shall be kept to a minimum. Not more than 30 percent of the baseline schedule activities shall be critical or near critical, unless otherwise authorized by the Engineer.

The baseline schedule shall not extend beyond the number of Working Days originally provided in these Special Provisions. The baseline schedule shall have a data date of the

first working day of the contract and not include any completed work to date. The baseline schedule shall not attribute negative float or negative lag to any activity.

Each baseline schedule submittal shall include the following:

- a) A Baseline Narrative report which must include the following information:
 - 1) Explanation of the Contractor's general approach to this project and an explanation of what the Contractor considers as key factors to successfully complete the project within the contractual time.
 - 2) A brief explanation of where the work will begin and the how the work and crews will flow through the project.
 - 3) Describe how the Agency's jurisdictional requirements regarding working times and lane closures have been factored in the schedule.
 - 4) A general explanation of the anticipated workdays per week, number of shifts per day, number of hours per shift, and holidays observed.
 - 5) A description of problems, risks or issues anticipated.
 - 6) Typical crew sizes and major equipment to be used in the job.
 - 7) Long lead items.
- b) Hard copy of the schedule in 11" x 17" format.
- c) Color plots in "E" sheet (Approximately 34" x 44".)

6-1.7 Update Schedule. The Contractor shall submit an update schedule and meet with the Engineer to review contract progress, on or before the first day of each month, beginning one month after the baseline schedule is accepted. The Contractor shall allow two (2) weeks for the Engineer's review after the update schedule and all support data are submitted, except that the review period shall not start until any previous month's required schedule is accepted. Update schedules that are not accepted or rejected within the review period will be considered accepted by the Engineer.

The update schedule shall have a date of the last date of the reporting period month or other date established by the Engineer. The update schedule shall show the status of work actually completed to date and the work yet to be performed as planned. The following shall be included with each monthly update:

- a) The electronic copy of the schedule file in the native file format.
- b) Hard copies of the schedule in 11" x 17" format and color plots in "E" sheet size.
- c) A critical path report, showing only the longest path in the project.
- d) A list and detailed description of all changes made to the schedule.

- e) A narrative report. The narrative report shall be organized in the following sequence with all applicable documents included:
 - 1) Contractor's transmittal letter.
 - 2) Work completed during the period.
 - 3) Identification of unusual conditions or restrictions regarding labor, equipment or material; including multiple shifts, 6-day work weeks, specified overtime or work at times other than days or hours.
 - 4) Description of the critical path method.
 - 5) Changes to the critical path and scheduled completion date since the last schedule submittal.
 - 6) Description of the problem areas.
 - 7) Current and anticipated delays:
 - b. Cause of Delay.
 - c. Impacts of delay on other activities, milestones, and completion dates.
 - d. Corrective action and schedule adjustments to correct the delay.
 - 8) Pending Items and status thereof:
 - e. Permits
 - f. Change Orders
 - g. Time adjustments
 - h. Non-compliance notices
 - 9) Reasons for an early or late schedule completion date in comparison to the contract completion date.

6-1.8 Look-Ahead Schedule. The Contractor shall prepare and issue a 3-Week Look Ahead schedule to provide a more detailed day-to-day plan of upcoming work identified on the Baseline/Monthly Update. Each task in the Look Ahead Schedule shall be referenced back to a relevant Activity ID on the Master Schedule (Either the Baseline or the latest Monthly Update). Activities shall not exceed five (5) Working Days in duration and have sufficient level of detail to assign crews, tools and equipment required to complete the work. The Contractor shall update this schedule weekly.

6-1.9 Time Impact Analysis (TIA). The Contractor shall submit a written TIA to the Engineer with each request for adjustment of contract time, or when the Contractor or Engineer consider that an approved or anticipated change may impact the critical path or contract progress. The Contractor shall submit the TIA for review within ten (10) Working Days after the date of the alleged delay impact to the schedule or within ten (10) Working Days after receiving a written request for TIA from the Engineer. Delays of any non-critical

Work shall not be the basis for an extension of Contract time until the delays consume the float associated with that non-critical work activity and cause the work activity to become critical. The City will not grant time extensions unless substantiated by the CPM Schedule, and then not until the project float becomes zero. If the Contractor fails to submit a TIA within the aforementioned time specified, then the City shall deem the Contractor to have agreed that there is no time impact and that the Contractor has irrevocably waived its rights to any additional Contract time.

For each TIA the Contractor shall provide information justifying the request and stating the extent of the adjustment requested for each specific change or alleged delay. Each TIA shall be in a form and content suitable to the Engineer and include the following:

- a) The TIA shall illustrate the impacts of each change or delay on the current schedule completion date or internal milestones, as appropriate.
- b) The TIA shall include a written narrative. The narrative shall detail the proposed methodology for creating the Fragnet, include a chronology of events leading to the delay, and an explanation of how the delay impacted the critical path.
- c) The analysis shall use the accepted schedule that has a data date closest to and prior to the event. If the Engineer determines that the accepted schedule used does not appropriately represent the conditions prior to the event, the accepted schedule shall be updated to the day before the event being analyzed.
- d) The TIA shall include an impact schedule developed from incorporating the event into the accepted schedule by adding or deleting activities, or by changing durations or logic of existing activities. If the impact schedule shows that incorporating the event modifies the critical path and completion date of the accepted schedule, the difference between schedule completion dates of the two schedules shall be equal to the adjustment of Contract time. The Engineer may construct and utilize an appropriate project schedule or other recognized method to determine adjustments in Contract time until the Contractor provides the TIA.

The Contractor shall allow the Engineer 2 weeks after receipt to approve or reject the submitted TIA. If the TIA is accepted, the contract completion time shall be adjusted accordingly. All approved TIA schedule changes shall be shown on the next update schedule.

If the TIA submitted by the Contractor is rejected by the Engineer, the Contractor shall meet with the Engineer to discuss and resolve issues related to the TIA. If agreement is not reached, the Contractor will be allowed 15 days from the meeting with the Engineer to give notice in conformance with the provisions in Section 3. The Contractor shall only show actual as-built work, not unapproved changes related to the TIA, in subsequent update in schedules. If agreement is reached at a later date, approved schedule changes shall be shown on the next update schedule.

6-1.10 Final Update Schedule. The Contractor shall submit a final update, as-built schedule with actual start and finish dates for the activities, within thirty (30) Calendar Days after completion of the Work. The Contractor shall provide a written certificate with this submittal signed by the Contractor's project manager and an officer of the company stating, "To my knowledge and belief, the enclosed final update schedule reflects the actual start and finish dates of the actual activities for the project contained herein." An officer of the company may delegate in writing the authority to sign the certificate to a responsible manager.

6-1.11 Retention. The City will retain an amount equal to 25 percent of the estimated value of the Work performed during each estimate period in which the Contractor fails to submit an acceptable schedule conforming to the requirements of these Special Provisions as determined by the Engineer. Schedule retentions will be released for payment on the next monthly estimate for partial payment following the date that acceptable schedules are submitted to the Engineer or as otherwise specified herein. Upon completion of all contract work and submittal of the final update schedule and certification, any remaining retained funds associated with this section, "Progress Schedule (Critical Path Method)," will be released for payment. Retentions held in conformance with this section shall be in addition to other retentions provided for in the contract. No interest will be due the Contractor on retention amounts.

6-1.12 Payment. Payment for **Construction Schedule** (critical path method) shall be at the contract unit price per **Lump Sum (LS)** and shall include full compensation for furnishing all labor, materials, equipment, and incidentals, including computer software, and for doing all the work involved in preparing, furnishing, and updating schedules, and instructing and assisting the Engineer in the use of computer software, as specified in the Standard Specifications and these Special Provisions, and as directed by the Engineer.

Payment for the construction schedule (critical path method) contract item will be made progressively as follows:

- a) A total of 25 percent of the item amount will be paid upon achieving all of the following:
 - 1) Completion of 5 percent of all contract item work.
 - 2) Software training for Agency staff.
 - 3) Acceptance of all schedules and any time impact analyses required at the time 5 percent of all contract item work is complete.
- b) A total of 50 percent of the item amount will be paid upon completion of 25 percent of all contract item work and acceptance of all schedules and time impact analyses required at the time 25 percent of all contract item work is complete.
- c) A total of 75 percent of the item amount will be paid upon completion of 50 percent of all contract item work and acceptance of all schedules and time

impact analyses required at the time 50 percent of all contract item work is complete.

- d) A total of 100 percent of the item amount will be paid upon completion of all percent of all contract item work and acceptance of all schedules and time impact analyses required at the time all percent of all contract item work is complete, and submittal of the certified final update schedule.

If the Contractor fails to complete any of the work or provide any of the schedules required by this section, the Engineer shall make an adjustment in the compensation in conformance with the provisions in Section 3 "Changes of Work," of the Standard Specifications for the work not performed. Adjustments in compensation for schedules will not be made for any increased or decreased work ordered by the Engineer in furnishing schedules.

Should the Contractor fail to meet the requirements under 6-1 of these Special Provisions, the Engineer reserves the right to withhold payment for work being performed. Furthermore, if after notice is given to the Contractor to perform work to meet these requirements, and the Contractor refuses or for any reason fails to perform sufficiently to meet these schedules, City may withhold or deny payment for work being performed.

6-2 PROSECUTION OF THE WORK.

ADD:

6-2.1 Time of Completion and Forfeiture Due to Delay. The Contractor shall complete the Work called for under the Contract within the time set forth in the Special Provisions.

In accordance with Government Code § 53069.85, Contractor agrees to forfeit and pay to the Agency the amount per day set forth in the Contract for each and every day of delay which shall be deducted from any payments due or to become due the Contractor.

The Agency has endeavored to identify all areas of the site which may contain hazardous waste, as defined by Health and Safety Code § 25117, and unless otherwise noted said hazardous waste in these areas has been mitigated. However, the parties expressly acknowledge the possibility of the existence of further hazardous waste not previously identified. If, during the course of his work, the Contractor encounters any such hazardous waste, he shall promptly notify the Agency through its designated representative. If the material is indeed "hazardous waste" pursuant to Health and Safety Code § 25117, the Agency has the option to have the mitigation work performed by the Contractor or by a separate contract from the work being performed. If the Contractor performs said mitigation work, the cost will be paid for as an addition to the work in accordance with Section 2. To the maximum extent permitted by law, the Agency shall not be liable for any damages beyond an appropriate time extension for delays occasioned by the existence of hazardous waste conditions contemplated herein.

No forfeiture due to delay shall be made because of any delays in the completion of the work due to unforeseeable causes beyond the control and without the fault or negligence

of the Contractor (including but not restricted to acts of nature or of the public enemy, acts of the government, acts of the Agency, or acts of another contractor in the performance of a contract with the Agency, fires, floods, epidemics, quarantine restrictions, strikes, freight embargoes, and unusually severe weather). Any such delays, except for acts of the Agency, shall not entitle the Contractor to any additional compensation. The sole remedy of the Contractor shall be an extension of time obtained in accordance with this section.

The Contractor shall, within ten (10) Calendar Days from the beginning of any such delay, notify the Agency Representative in writing of the cause of delay, whereupon the Agency Representative will ascertain the facts and extent of the delay and extend the time for completing the Work if, in his judgment, the findings of the fact justify such an extension, and the Agency Representative's findings of facts thereon shall be final and conclusive.

ADD:

6-2.2 Order of Work Requirements. When required by these Special Provisions or the Plans, the Contractor shall follow the sequence of operations and restrictions as set forth therein.

The Work shall be performed in conformance with the staging of construction shown on the Plans and indicated below. Subject to approval by the Engineer, non-conflicting work in subsequent stages may proceed concurrently with work in preceding stages, provided satisfactory progress is maintained in the preceding stages of construction. The Engineer's approval of any Contractor-requested modifications to the order of work or staging of the work shall not be grounds for a Change Order request or time extension request by the Contractor. If the Contractor deviates from the specified order of work or the staging plans, it does so at its own risk and shall assume all time impacts and cost associated with such deviations.

The order of work described below is not intended to include all work items necessary to complete a particular construction stage and serves to only summarize the order of major work items.

Milestone	Scope	Working Days	LD Rate
Milestone 1	Phase 1 – Ground Improvements (Geopiers)	40 Working Days from NTP	\$5,000 per Working Day
Milestone 2	Phases 2 & 3 – Over-Ex, Grade Pads, Underground Utilities	50 Working Days from Completion of Milestone 1	\$5,000 per Working Day
Milestone 3	Phase 4A – Pool and Bleachers	180 Working Days from Completion of Milestone 2	\$7,500 per Working Day
Milestone 4	Phase 4B – Buildings and Splash Pads	105 Working Days from Completion of Milestone 3	\$7,500 per Working Day
Milestone 5	Phase 5 & 6 – Substantial Completion (Walnut Parking Lot & Project)	45 Working Days from Completion of Milestone 4	\$12,500 per Working Day

6-4 DELAYS AND EXTENSIONS OF TIME

6-4.2 Extensions of Time. *DELETE in its entirety and SUBSTITUTE with the following:*

The Agency may extend the time fixed for completion of the Work under the Contract from time to time. All applications for extensions of time shall be in writing and shall be filed with the Agency before the expiration of the original time fixed in the Contract or as previously extended.

An extension of time may be granted by the Agency after the expiration of the time originally fixed in the Contract or as previously extended, and the extension so granted shall be deemed to commence and be effective from the date of such expiration. Any extension of time shall not release the sureties upon any bond required under the Contract nor effect forfeitures due to delay.

No extension of time will be granted for delays that are not on the critical path.

6-6 SUSPENSION OF THE WORK.

6-6.1 General. *DELETE in its entirety and SUBSTITUTE with the following:*

The Engineer shall have the authority to suspend the Work wholly or in part, for any time period as the Engineer deems necessary in the interest of Agency, for Agency's convenience, or due to the failure on the part of the Contractor to carry out orders given, or to perform any provision of the Contract. The Contractor shall immediately comply with the written order of the Engineer to suspend the Work wholly or in part. The suspended work shall be resumed as ordered or approved in writing by the Engineer.

Resumption of work shall be predicated on receipt of the following from the Contractor:

- a) A revised schedule showing each task yet to be accomplished and the time line to accomplish each – until final completion.
- b) The work force projections attached to each task listed per workweek.
- c) The cost expenditures attached to each task summarized per each workweek.
- d) Lien releases from each subcontractor, supplier, and vendor to which the Contractor has requested materials, equipment or any other service recognizing the payments received.
- e) An Income and Expense Statement projecting how the Contractor will finance the remainder of the project.

Such suspension shall be without liability to the Contractor on the part of the Agency except as otherwise specified in 6-4.3. For purposes of 6-4.3, delays resulting from suspensions ordered by the Engineer due to the failure on the part of the Contractor to carry out orders given, or to perform any provision of the Contract, shall not be delays for which the Agency is responsible.

In the event that a suspension of Work is ordered as provided above, the Contractor, at the Contractor's expense, shall do all the work necessary to provide a safe, smooth, and unobstructed passageway through construction for use by public traffic during the period of that suspension as provided in 5-7, and as specified in these Special Provisions. In the event that the Contractor fails to perform the work above specified, the Agency will perform that work and, if the suspension is due to Contractor's failure to carry out orders given or to perform any provision of the Contract, the cost thereof will be deducted from monies due or to become due the Contractor.

If a suspension of work is ordered by the Engineer, in accordance with this subsection, the days on which the suspension order is in effect shall be considered working days if those days are working days within the meaning of the definition set forth in 1-2.

The suspension of Work shall not relieve the Contractor of the responsibilities as set forth in the Contract Documents.

6-7 TERMINATION OF THE CONTRACT FOR DEFAULT.

ADD the following:

In the event this Contract is terminated for grounds which are later determined not to justify a termination for breach, such termination shall be deemed to constitute a Termination of the Contract for Convenience pursuant to 6-8.

6-8 TERMINATION OF THE CONTRACT FOR CONVENIENCE.

DELETE in its entirety and SUBSTITUTE with the following:

The Agency reserves the right to terminate the Contract at any time upon a determination by the Engineer that termination of the Contract is in the best interest of the Agency.

If the Agency elects to terminate the Contract, the termination of the Contract and the total compensation payable to the Contractor shall be governed by the following:

- a) The Engineer will issue the Contractor a signed written notice, specifying that the Contract is to be terminated. Upon termination of the Contract, the Contractor will be relieved of further responsibility for damage to the Work (excluding materials) as specified in 4-2 of the Standard Specifications, 5-11 of these Special Provisions and, except as otherwise directed in writing by the Engineer, the Contractor shall:
 - 1) Stop all work under the Contract except that specifically directed to be completed prior to Acceptance.
 - 2) Perform work the Engineer deems necessary to secure the project for termination.
 - 3) Remove equipment and plant from the site of the Work.
 - 4) Take action that is necessary to protect materials from damage.

- 5) Notify all subcontractors and suppliers that the Contract is being terminated and that their contracts or orders are not to be further performed unless otherwise authorized in writing by the Engineer.
 - 6) Provide the Engineer with an inventory list of all materials previously produced, purchased or ordered from suppliers for use in the Work and not yet used in the Work, including its storage location, and such other information as the Engineer may request.
 - 7) Dispose of materials not yet used in the Work as directed by the Engineer. It shall be the Contractor's responsibility to provide the Agency with good title to all materials purchased by the Agency hereunder, including materials for which partial payment has been made as provided in 7-3.2 and with bills of sale or other documents of title for those materials.
 - 8) Subject to the prior written approval of the Engineer, settle all outstanding liabilities and all claims arising out of subcontracts or orders for materials terminated hereunder. To the extent directed by the Engineer, the Contractor shall assign to the Agency all the right, title, and interest of the Contractor under subcontracts or orders for materials terminated hereunder.
 - 9) Furnish the Engineer with the documentation required to be furnished by the Contractor under the provisions of the Contract including, on projects as to which Federal funds are involved, all documentation required under the Federal requirements included in the Contract.
 - 10) Take other actions directed by the Engineer.
- b) Acceptance of the contract as hereinafter specified shall not relieve the Contractor of responsibility for damage to materials. The Contractor shall continue to be responsible for damage to materials after issuance of the Notice of Termination, except as follows:
- 1) The Contractor's responsibility for damage to materials for which partial payment has been made as provided in 7-3.2 and for materials furnished by the Agency for use in the Work and unused shall terminate when the Engineer certifies that those materials have been stored in the manner and at the locations the Engineer has directed.
 - 2) The Contractor's responsibility for damage to materials purchased by the Agency subsequent to the issuance of the notice that the Contract is to be terminated shall terminate when title and delivery of those materials has been taken by the Agency.

When the Engineer determines that the Contractor has completed the Work under the Contract directed to be completed prior to termination and such other work as may have been ordered to secure the project for termination, the Engineer will formally accept the Contract, and immediately upon and after the acceptance by

the Engineer, the Contractor will not be required to perform any further work thereon.

- c) Termination of the Contract shall not relieve the surety of its obligation for any just claims arising out of the work performed.
- d) Where Agency terminates the Contract for Agency's convenience and not due to the fault of Contractor, the total compensation to be paid to the Contractor shall be determined by the Engineer based on the following:
 - 1) The reasonable cost to the Contractor, without profit, for all work performed under the contract, including mobilization, demobilization, and work done to secure the project for termination. In determining the reasonable cost, deductions will be made for the cost of materials to be retained by the Contractor, amounts realized by the sale of materials, and for other appropriate credits against the cost of the work. When, in the opinion of the Engineer, the cost of a contract item of work is excessively high due to costs incurred to remedy or replace defective or rejected work, the reasonable cost to be allowed will be the estimated reasonable cost of performing that work in compliance with the requirements of the Plans and Specifications and the excessive actual cost shall be disallowed.
 - 2) A reasonable allowance for profit on the cost of the work performed as determined under part (1) above, provided the Contractor establishes to the satisfaction of the Engineer that it is reasonably probable that the Contractor would have made a profit had the Contract been completed and provided further, that the profit allowed shall in no event exceed 4 percent of the cost.
 - 3) The reasonable cost to the Contractor of handling material returned to the vendor, delivered to the Agency or otherwise disposed of as directed by the Engineer.
 - 4) A reasonable allowance for the Contractor's administrative costs in determining the amount payable due to termination of the Contract.

All records of the Contractor and the Contractor's subcontractors, necessary to determine compensation in conformance with the provisions in this Section 6-8, shall be open to inspection or audit by representatives of the Agency at all times after issuance of the notice that the Contract is to be terminated and for a period of 3 years, thereafter, and those records shall be retained for that period.

After acceptance of the Work by the Agency, the Engineer may make payments on the basis of interim estimates pending issuance of the final estimate in conformance with the provisions in 7-3.2 and 7-6, when, in the Engineer's opinion, the amount thus paid, together with all amounts previously paid or allowed, will not result in total compensation in excess of that to which the Contractor will be entitled. All payments, including payment upon the final estimate shall be subject to

deduction for prior payments and amounts, if any, to be kept or retained under the provisions of the Contract.

THE PROVISIONS IN THIS SECTION 6-8 SHALL BE PHYSICALLY INCLUDED IN ALL SUBCONTRACTS.

6-9 LIQUIDATED DAMAGES. *DELETE in its entirety and SUBSTITUTE with the following:*

Liquidated damages shall be as specified in the Contract.

SECTION 7 – MEASUREMENT AND PAYMENT

REVISE as follows:

7-2 LUMP SUM WORK.

DELETE 2nd paragraph in its entirety.

ADD:

7-2.1 Detailed Schedule. The Contractor shall furnish the Agency a cost break-down for all contract lump sum items. Cost break-down tables shall be submitted to the Agency Representative for acceptance within fifteen (15) days after award of Contract. Cost break-down tables will be approved, in writing, by the Agency Representative before any partial payment will be made for the applicable items involved.

The Contractor shall determine the quantities required to complete the Work shown on the Plans. The quantities and their values shall be included in the cost break-downs submitted to the Agency Representative for approval. The Contractor shall be responsible for the accuracy of the quantities and values used in the cost break-downs submitted for approval.

The sum of the amounts for the line items of work listed in each cost break-down table for each lump sum item shall be equal to the contract lump sum price bid. Overhead and profit shall be included in each individual line item of work listed in a cost break-down table.

No adjustment in compensation will be made in the contract lump sum prices due to differences between the quantities shown in the cost break-downs furnished by the Contractor and the quantities required to complete the Work as shown on the plans and as specified in the Special Provisions.

Individual line item values in the approved cost break-down tables will be used to determine partial payments during the progress of the Work and as the basis for calculating an adjustment in compensation for the contract lump sum items due to changes in line items of work ordered by the Engineer. When the total of ordered changes to line items of work increases or decreases the lump sum price bid by more than twenty-five percent, the adjustment in compensation for the applicable lump sum item will be determined in the same manner specified for increases and decreases in the total pay quantity of an item of work in Section 3 of the Standard Specifications and the Special Provisions.

7-3 PAYMENT

7-3.1 General. *ADD the following at the end of the 2nd paragraph:*

The cost of items of work not listed in the “Schedule of Work” in the Bidders

Proposal shall be considered to be included in the cost of the other work that is listed and no additional compensation will be allowed therefor.

When an item of work is designated as (F) or (S-F) in the "Schedule of Work," the estimated quantity for that item of work shall be the final pay quantity, unless the dimensions of any portion of that item are revised by the Engineer, or the item or any portion of the item is eliminated. If the dimensions of any portion of the item are revised, and the revisions result in an increase or decrease in the estimated quantity of that item of work, the final pay quantity for the item will be revised in the amount represented by the changes in the dimensions. If a final pay item is eliminated, the estimated quantity for the item will be eliminated. If a portion of a final pay item is eliminated, the final pay quantity will be revised in the amount represented by the eliminated portion of the item of work.

The estimated quantity for each item of work designated as (F) or (S-F) in the "Schedule of Work" shall be considered as approximate only, and no guarantee is made that the quantity which can be determined by computations, based on the details and dimensions shown on the Plans, will equal the estimated quantity. No allowance will be made in the event that the quantity based on computations does not equal the estimated quantity.

In case of discrepancy between the quantity shown in the "Schedule of Work" for a final pay item and the quantity or summation of quantities for the same item shown on the Plans, payment will be based on the quantity shown in the "Schedule of Work."

ADD:

7-3.1.1 Application for Payment. The Contractor shall use the City of Irvine Certified Invoice for Progress Payment Form; furnished to the Contractor.

The Contractor shall type the required information, follow the schedule of work and bid prices in accepted Bidder's proposal for unit price contract, execute certification by signature of an authorized officer, use data on accepted Schedule of Values for lump sum work, provide dollar value in each column for each line item for portion of work performed, list each authorized Change Order number and dollar amount and adjusted Contract Price, and obtain the Agency Representative concurrence on invoiced amounts prior to submittal for payment.

The Contractor shall follow the following submittal procedures: Submit original and one (1) copy of each Application for Payment at times stipulated in 7-3.2; submit under transmittal letter; include submittal date, project title and number and submit updated Progress Schedule with Application for verification of progress. Incomplete application for payment will be rejected.

When Agency Representative requires substantiating information, the Contractor shall submit data justifying line item amounts in question.

The Contractor shall provide one copy of data with cover letter for each copy of submittal, show application number and date, and line item by number and description.

7-3.2 Partial and Final Payment. *DELETE in their entirety 1st and 2nd paragraphs and SUBSTITUTE with the following:*

Payment for services will be made monthly on approved invoices, with payment terms of net thirty (30) days upon receipt of invoice. The Contractor shall submit invoices within fifteen (15) days from the end of each month on the form (Certified Invoice for Progress Payment) provided by the Agency. This estimate shall include the value of the total amount of the work completed by the Contractor during the calendar month previous to that in which the estimate is made.

When the Work has been completed to the satisfaction of the Engineer, the Contractor shall make a final estimate of the total amount of work done thereunder and the amount to be paid therefor under the terms of the Contract and shall certify to the Agency the amount of the final estimate. If the Agency finds the Work has been completed according to the Contract, the Agency will accept the work, will file a notice of completion, and will pay the entire sum so found to be due after deducting therefrom all previous payments and all amounts to be retained under the provisions of the Contract and upon receiving signed unconditional releases upon final payment from all subcontractors and material suppliers. All prior progress estimates and payments shall be subject to correction in the final estimate and payment. The project retention release will not be due and payable until the expiration of the 60 days from the date of filing a notice of completion of the Work by the Agency.

Interest penalties are not required on payment delays due to disagreement between the Agency and Contractor over the payment amount or other issues involving contract compliance.

It is mutually agreed between the parties to the Contract that no certificate given or payment made under the Contract shall be conclusive evidence of performance of the Contract and no payment shall be construed to be an acceptance of any defective work or improper materials.

The Contractor further agrees that the payment and acceptance of the final amount due under the Contract shall release the Agency, the Agency Representative, the Engineer, and their consultants from any and all claims or liability arising out of the Contract.

ADD:

7-3.2.1 Agency's Right to Withhold Certain Amounts and Make Application Thereof. In addition to the amount which the Agency may retain under the above article on progress payments, the Agency may withhold a sufficient amount or amounts from any payment otherwise due to the Contractor as in the Agency's judgment may be necessary to cover:

- a) Payments which may be past due and payable for just claims against the Contractor or any subcontractors for labor or materials furnished in or about the performance of the Work on the project under this Contract.

- b) Estimated or actual costs for correcting defective work not remedied.
- c) Amounts claimed by the Agency as forfeiture due to delay or other offsets.
- d) Any other amounts the Agency is authorized to withhold under the Contract Documents or under applicable law.

The Agency may apply such withheld amount or amounts to the payment of such claims in its discretion. In so doing, the Agency shall be deemed the agent of the Contractor and any payments so made by the Agency shall be considered as a payment made under the Contract by the Agency to the Contractor, and the Agency shall not be liable to the Contractor for such payment made in good faith. Such payments may be made without prior judicial determination of the claim or claims. The Agency will render to the Contractor a prior account of such funds disbursed in behalf of the Contractor.

ADD:

7-3.2.2 Substitution of Securities. Upon the Contractor's request, the Agency will make payment of funds withheld from progress payments pursuant to the requirements of Public Contract Code Section 22300 if the Contractor deposits in escrow with a bank acceptable to the Agency, securities eligible for the investment of State funds under Government Code Section 16430 or bank or savings and loan certificates of deposit, upon the following conditions:

- a) The Contractor shall bear the expense of the Agency and the Escrow Agent in connection with the escrow deposit made.
- b) Securities or certificates of deposit to be placed in escrow shall be of a value at least equivalent to the amounts of retention to be paid to the Contractor pursuant to this section.
- c) The Contractor shall enter into an escrow agreement satisfactory to the Agency, such agreement shall include provisions governing inter alia;
 - 1) The amount of securities to be deposited,
 - 2) The providing of powers of attorney or other documents necessary for the transfer of the securities to be deposited,
 - 3) Conversion to cash to provide funds to meet defaults by the Contractor including, but not limited to, termination of the Contractor's control over the Work, stop notices filed pursuant to law, assessment of liquidated damages or other amounts to be kept or retained under the provisions of the Contract,
 - 4) Decrease in value of securities on deposit, and
 - 5) The termination of the escrow upon completion of the Contract.
- d) The Contractor shall obtain the written consent of the surety of such agreement.

7-3.4 Mobilization *DELETE in its entirety and SUBSTITUTE with the following:*

ADD:

7-3.4.1 General. Mobilization shall consist of preparatory work and operations including, but not limited to, those necessary for the movement of personnel, equipment, materials and incidentals to the project site necessary for work on the project and for all other work and operations which must be performed or costs incurred including bonds, insurance, and financing prior to beginning work on the various contract items on the project site.

Mobilization shall also include the cost, time and labor to move the necessary construction equipment to and from the job site, supervisory time on the job by the Contractor's personnel to keep the construction site in a safe condition, and all other related work as required for all non-working days during the course of construction. Contractor is responsible for securing an adequate storage site for equipment and materials.

The Contractor shall have on the work site at all times, as its agent, a competent English-speaking superintendent capable of reading and thoroughly understanding the plans, specifications, other related documents, and directions from Agency's Representative.

ADD:

7-3.4.2 Measurement and Payment. Mobilization is eligible for partial payment if the Contract includes a bid item for mobilization. Payment for **Mobilization and Demobilization** shall be per the **Lump-Sum (LS)** price bid and shall include obtaining and paying for all permits and business licenses as required from the City of Irvine, State of California and other agencies. The City of Irvine will waive its permit fee. The Contractor shall comply with the requirements specified by each license or permit. No payment for Mobilization will be made until the Contractor's Construction Schedule has been submitted, reviewed and accepted and is current. Progress payments for this item shall be paid in accordance with the percentage completion of the project, and shall include the costs of such mobilization and administration for the entire contract period including construction schedule as specified in these specifications. Payments shall be made upon the basis of the following:

- a) When the monthly partial payment estimate of the amount earned, not including the amount earned for mobilization, is 5 percent or more of the original contract amount, 50 percent of the contract item price for mobilization or 5 percent of the original contract amount, whichever is the lesser, will be included in the estimate for payment.
- b) When the monthly partial payment estimate of the amount earned, not including the amount earned for mobilization, is 10 percent or more of the original contract amount, the total amount earned for mobilization shall be 75 percent of the contract item price for mobilization or 7.5 percent of the original contract amount, whichever is the lesser, and that amount will be included in the estimate for payment.

- c) When the monthly partial payment estimate of the amount earned, not including the amount earned for mobilization, is 20 percent or more of the original contract amount, the total amount earned for mobilization shall be 95 percent of the contract item price for mobilization or 9.5 percent of the original contract amount, whichever is the lesser, and that amount will be included in the estimate for payment.
- d) When the monthly partial payment estimate of the amount earned, not including the amount earned for mobilization, is 50 percent or more of the original contract amount, the total amount earned for mobilization shall be 100 percent of the contract item price for mobilization or 10 percent of the original contract amount, whichever is the lesser, and that amount will be included in the estimate for payment.
- e) Upon completion of all work on the project, payment of any amount bid for mobilization in excess of 10 percent of the original contract amount shall be paid.

7-3.5 Contract Unit Prices

7-3.5.1 General. *ADD the following after the 3rd paragraph:*

In the case of such an increase or decrease in a Major Bid Item, the use of this basis for the adjustment of payment will be limited to that portion of the change, which together with all previous changes to that item, is not in excess of twenty-five percent of the total cost of such item based on the original quantity and Contract Unit Price.

7-3.5.2 Increases of More Than 25 Percent. *MODIFY to ADD the following:*

If payment for units of a bid item that exceeds 125 percent of the price shown on the Bid Item List is less than \$5,000 at the unit price, the Engineer may not adjust the unit price unless asked to do so in writing by the Contractor.

7-3.7 Agreed Prices. *ADD the following after the 1st sentence:*

Agreed prices shall be negotiated before commencement of the changed work.

7-4 PAYMENT FOR EXTRA WORK

7-4.2 Basis for Establishing Costs.

7-4.2.3 Tool and Equipment Rental. *DELETE the 2nd paragraph in its entirety and SUBSTITUTE with the following:*

The rates to be used for determining equipment rental costs shall be those rates listed for such equipment in the State of California, Department of Transportation (Caltrans) publication entitled "Equipment Rental Rates and Labor Surcharge", which is in effect on the date upon which the work is accomplished, regardless of ownership and any rental or other agreement entered into by the Contractor, if such may exist, for the use of such equipment. If it is deemed necessary by the Engineer to use equipment not listed in the said publication, the Engineer will establish a suitable rental rate for such equipment. The

Contractor may furnish any cost data, which might assist the Engineer in the establishment of such rental rate. Equipment Rental Rates and Labor Surcharge publication is available from Caltrans at <https://dot.ca.gov/programs/construction>. Rental time will not be allowed while equipment is inoperative due to breakdowns.

Operators of rented equipment will be paid for as provided in 7-4.

7-4.3 Markup.

7-4.3.1 Work by the Contractor. *DELETE in its entirety and SUBSTITUTE with the following:*

The following percentages will be added to the Contractor's costs as determined under 3-3.2.2 and shall constitute the markup for all overhead, increase in Contractor's bonds, administrative expenses, and profit on work by the Contractor:

- a) Labor _____ 20%
- b) Materials _____ 15%
- c) Equipment Rental _____ 15%
- d) Other Items and Expenditures _ 15%

7-4.3.2 Work by a Subcontractor. *DELETE in its entirety and SUBSTITUTE with the following:*

When any part of the extra work is performed by a subcontractor, of any tier, the markup established in 7-4.3.1 shall be applied to the subcontractor's actual cost of such work. Contractor markup on subcontractor work shall be limited to five percent.

No payment shall be made for any item not set forth in 7-4.3.1 and 7-4.3.2, including without limitation, Contractor's overhead, general administrative expense, supervision or damages claimed for delay in prosecuting the remainder of the work.

This provision shall not be construed to preclude the recovery of damages by the Contractor stemming from delay for which the Agency is responsible, which is unreasonable under the circumstances involved, and which was not within the contemplation of the Agency and the Contractor.

7-4.4 Daily Reports. *ADD the following after the 1st sentence:*

The Contractor shall notify the Agency Representative at the beginning of each day when extra work is in progress. No payment will be made for work not verified by the Agency Representative.

ADD:

7-6 RESOLUTION OF CONSTRUCTION CLAIMS.

Any claims submitted by the Contractor against the Agency for Work covered by this Contract in the amount of \$375,000 or less shall be subject to the procedures specified in Public Contract Code § 20104, *et seq.*

ADD:

7-7 PROMPT PAYMENT.

In addition to requirements specified elsewhere, the following shall also apply: Subsection (f) of Section 20104.50 of the Public Contract Code, Article 1.7 of Part 3 of Division 2.

ARTICLE 1.7

§ 20104.50 Timely progress payments; legislative intent; interest; payment requests:

- a) It is the intent of the Legislature in enacting this section to require all local governments to pay their Contractors on time so that these Contractors can meet their obligations. In requiring prompt payment by all local governments, the Legislature hereby finds and declares that the prompt payment of outstanding receipts is not merely a municipal affair, but is instead a matter of statewide concern.
- b) It is the intent of the Legislature in enacting this article to fully occupy the field of public policy relating to the prompt payment of local governments' outstanding receipts. The Legislature finds and declares that all government officials, including those in local government, must set a standard of prompt payment that any business in the private sector which may contract for services should look towards for guidance.
- c) Any local agency which fails to make any progress payment within 30 days after receipt of an undisputed and properly submitted payment request from a contractor on a construction contract shall pay interest to the contractor equivalent to the legal rate set forth in subdivision (a) of Section 685.010 of the Code of Civil Procedure.
- d) Upon receipt of a payment request, each local agency shall act in accordance with both of the following:
 - 1) Each payment request shall be reviewed by the local agency as soon as practicable after receipt for the purpose of determining that the payment request is a proper payment request.
 - 2) Any payment request determined not to be a proper payment request suitable for payment shall be returned to the Contractor as soon as practicable, but not later than seven days, after receipt. A request returned pursuant to this paragraph shall be accompanied by a

document setting forth in writing the reasons why the payment request is not proper.

- e) The number of days available to a local agency to make a payment without incurring interest pursuant to this section shall be reduced by the number of days by which a local agency exceeds the seven-day return requirement set forth in paragraph (2) of subsection (c).
- f) For purposes of this article:
 - 1) A "local agency" includes, but is not limited to, a city, including a charter city, a county, and a city and county, and is any public entity subject to this part.
 - 2) A "progress payment" includes all payments due Contractors, except that portion of the final payment designated by the Contract as retention earnings.
 - 3) A payment request shall be considered properly executed if funds are available for payment for the payment request, and payment is not delayed due to an audit inquiry by the financial officer of the local agency.
- g) Each local agency shall require that this article, or a summary thereof, be set forth in the terms of any contract subject to this article.

SECTION 8 – FACILITIES FOR AGENCY PERSONNEL

8-1 GENERAL.

ADD the following after the 4th paragraph:

Prior to installation of field office, the Contractor shall consult with Agency Representative on location, access, and related facilities. The facilities shall be structurally sound, weather tight, with floors raised above ground.

At Contractor's option, portable or mobile buildings may be used. Mobile homes, when used, shall be modified for office use. Mobile homes shall not be used for living quarters.

The Contractor shall pay fees and charges for applications, permits, and building inspections.

The Contractor shall fill and/or grade site for temporary structures to provide surface drainage. Construct temporary field office on proper foundations, provide connections for utility services. Secure portable or mobile buildings when used. Provide steps and landings at entrance doors.

With approval from the Agency Representative, the Contractor shall remove the temporary field office, contents and services when no longer needed. The Contractor shall remove foundations and debris and restore site to required elevations and clean the areas.

8-2.1 Class "A" Field Office. *ADD the following before the 1st paragraph:*

The office for Agency Representative shall be a separate space for sole use of the Agency with lockable entrance door and two (2) keys.

Interior lighting shall be provided at desk and table. Exterior lighting shall be provided at entrance door.

PART 2 – CONSTRUCTION MATERIALS

SECTION 200 – ROCK MATERIALS

200-1 ROCK PRODUCTS

200-1.4 Coarse Aggregate for Portland Cement Concrete. *ADD the following:*

The Cleanliness Value requirement of Section 200-1.4 shall be replaced with the following:

<u>Tests</u>	<u>Test Method No.</u>	<u>Requirements</u>
Sand Equivalent	California 227	
Individual Test		70 Min*
Moving Average		75 Min*

200-1.5 Sand.

200-1.5.3 Sand for Portland Cement Concrete. *DELETE the sand equivalent requirement and replace with the following:*

<u>Tests</u>	<u>Test Method No.</u>	<u>Requirements</u>
Sand Equivalent	California 217	
Individual Test		70 Min*
Moving Average		75 Min*

* For 2500 or less class concrete, except concrete pavement, a minimum 65 Individual Test Result and a minimum 70 Moving Average will be acceptable if 17 mpa (2500 psi) 28-day strength criteria of Section 201-1.1.4 are met, at 150 mm (6") slump or greater. The EMA Materials Laboratory will make the testing and acceptance determination.

Evaluation of Sand Equivalent and Cleanliness Value shall conform to the provisions of Subsection 400-1.4.

200-2 UNTREATED BASE MATERIAL

200-2.1 General. *ADD the following:*

Untreated base shall be Crushed Aggregate Base conforming to the requirements of Subsection 200-2.2 or shall be Class 2 Aggregate Base complying with the Caltrans Standard Specifications, Section 26-1.02B.

200-2.2 Crushed Aggregate Base. *DELETE footnote number 1 of Table 200-2.2.3 and replace with the following:*

The minimum R-value requirement will not be waived.

SECTION 201 – CONCRETE, MORTAR, AND RELATED MATERIALS

REVISE as follows:

201-1 PORTLAND CEMENT CONCRETE.

201-1.1 Requirements.

201-1.1.1 General. ADD the following:

Prior to the start of construction, the Contractor shall furnish to the Engineer laboratory data for the particular mix design he will use. The data will include the following:

- A. A detailed concrete mix design including the type and amount of cement used; complete gradation and source of the aggregate used; the amount of water used and any proposed admixtures.*
- B. Flexural strength test data for the same batch of concrete used in "A" above showing the compressive strength of the concrete at 3, 7, and 28 days.*

DELETE the third paragraph and replace with the following:

No admixtures will be allowed unless approved in advance by the Engineer.

DELETE the fourth paragraph and replace with the following:

No rapid-hardening cement or reclaimed concrete material may be used.

201-1.2.1 Concrete Specified by Class and Alternate Class. ADD the following:

For corrosive soils Type V cement or Type II/V shall be used otherwise Type II cements shall be used.

201-1.3.3 Concrete Specified by Class and Alternate Class. ADD the following to Table 201-1.3.3:

Headwall, Concrete Class 560-C-3250

ADD the following:

The following concrete mix designs shall be used for the various corresponding flatwork:

Curb and Gutter and Sidewalk.....520-C-3250

Concrete for Utility Adjustments.....660-C-3750

201-1.4 Mixing.

201-1.4.1 General. *ADD the following to the end of the section:*

Mixed concrete delivered to the site shall be by Transit Mixer as called for in Section 201-1.4.3 "Transit Mixer" of the Standard Specifications.

201-2 REINFORCEMENT FOR CONCRETE.

201-2.2.1 Reinforcing Steel. *REVISE first paragraph of this SECTION as follows:*

All reinforcing steel for reinforced concrete construction shall be Grade 60 billet steel conforming to ASTM A-615.

SECTION 203 – BITUMINIOUS MATERIALS

203-6 ASPHALT CONCRETE.

203-6.1 General. *ADD the following:*

Asphalt Concrete base course and leveling course shall be $\frac{3}{4}$ " maximum aggregate Type III-B2-PG 64-10 per Section 203-6.5 of the Standard Specifications

SECTION 207 – GRAVITY PIPE

207-2 REINFORCED CONCRETE PIPE (RCP).

207-2.1 General. *ADD the following:*

The Contractor shall furnish a detailed "pipe layout diagram" to the City prior to the pre-construction meeting. Said diagram shall list all main line and lateral pipe, D-load classification, stations of junctions / BC's / EC's / angle points, sections of pipe, length of sections, type of section (straight, horizontal curve bevel, vertical curve bevel, etc.) and other relevant information required to properly plan and construct the proposed storm drain RCP improvements.

207-2.5 Joints. *DELETE the first 2 paragraphs and REPLACE with the following:*

All RCP joints shall be rubber-gasketed (water-tight) type. The Contractor shall submit a joint detail to the Engineer, for review and approval, prior to manufacturing the RCP.

207-2.8 Cause for Rejection. *ADD the following before the last paragraph:*

Various lots of pipe may be inspected and tested at the manufacturing plant by the Public Works Department or by an approved testing laboratory.

All pipe delivered to a City of Irvine project shall have a manufacturer's certificate of compliance furnished at the time of delivery.

Any pipe delivered to the job site without prior inspection shall be inspected upon delivery and subjected to acceptance or rejection as a result of that inspection.

Any damage to the pipe from shipping or handling, such as any broken ends with exposed steel, cracks or breakage due to mishandling, may be cause for rejection of the pipe even after delivery to the job site

SECTION 214 – TRAFFIC STRIPING, CURB AND PAVEMENT MARKINGS AND PAVEMENT MARKERS

REVISE as follows:

214-4 PAINT FOR STRIPING AND MARKINGS.

214-4.1 General. *MODIFY to ADD the following:*

All paint, beads, and other materials used in painting traffic stripes and markings shall conform to the requirements of the State Standard Specifications, Section 84 and all other applicable sections. Certificates of Compliance for each material shall be submitted prior to use on this Contract.

214-5 THERMOPLASTIC MATERIAL FOR TRAFFIC STRIPING AND MARKINGS.

214-5.1 General. *After the first paragraph, ADD the following:*

Green thermoplastic material must be PreMark ViziGrip as manufactured by Ennis-Flint. You may obtain PreMark ViziGrip from the manufacturer:

ENNIS-FLINT
115 TODD COURT
THOMASVILLE, NC 27360
<http://www.ennisflintamericas.com/>
(800) 331-8118

214-6 PAVEMENT MARKERS. *MODIFY to ADD the following:*

All pavement markers, and other materials used in painting traffic stripes and markings shall conform to the requirements of the State Standard Specifications, Section 81, Section 84 and all other applicable sections. Certificates of Compliance for each material shall be submitted prior to use on this Contract.

214-6.1 Types of Markers. *MODIFY to ADD the following:*

Reflective pavement markers shall conform to the following:

- a) Type B, 2-Way Clear Reflective Markers shall be Model 290-2W as manufactured by 3M Company or approved equal.
- b) Type C, 2-Way Red-Clear Reflective Markers shall be Model 290-WR as manufactured by 3M Company or approved equal.
- c) Type D, 2-Way Yellow Reflective Markers shall be Model 291-2Y as manufactured by 3M Company or approved equal.
- d) Type G, 1-Way Clear Reflective Markers shall be Model 290-W as manufactured by 3M Company or approved equal.

- e) Type H, 1-Way Yellow Reflective Markers shall be Model 291-Y as manufactured by 3M Company or approved equal.
- f) Type I, Blue - 2-Way Blue Reflective Markers shall be Model 295-2B as manufactured by 3M Company or approved equal.

SECTION 215 – STORMWATER BIOFILTRATION SYSTEM

215-1 GENERAL

The following general specifications describe the components and installation requirements for a Filterra stormwater bioretention filtration system that utilizes physical, chemical and biological mechanisms of a soil, plant and microbe complex to remove pollutants typically found in urban stormwater runoff. The Filterra treatment system shall be a fully equipped, pre-casted, drop-in-place unit designed for applications in the urban landscape to treat contaminated runoff from impervious surfaces. The dealer or manufacturer shall furnish all required engineering assistance required to properly size and install all components of the treatment device in accordance with the approved drawings and these specifications. The contractor will be responsible for unloading and installation of the delivered product. Manufacturer shall provide, at no additional cost, maintenance of the treatment system for no less than a period of one year.

215-2 QUALITY CONTROL

- A. The quality of precast concrete components, underdrain materials, filter media, landscape materials and all other appurtenances and their assembling process shall be subject to inspection prior to or upon delivery of the unit at the work site.
- B. The unit and all components shall be inspected by the manufacturer for completeness, consistency with approved drawings, appearance, dimensions, engineered filter media and type of plant materials.
- C. All plant materials shall comply with the type and size required by the manufacturer and shall be alive and free of obvious signs of disease.
- D. Filter media shall be visually inspected to ensure appropriate volume, texture and consistency with the approved procedures to meet or exceed the filter media minimum flow rates, annual volume treatment capacity, pollutant removal efficiency and soil content (sand, silt, clay and organic material) of the plant filter.

215-3 SUBMITTALS

215-3.1 Installation, operation and maintenance manual. The contractor shall submit the manufacturers approved Filterra bioretention filtration system installation, operation, and maintenance manual for the system. It will be the responsibility of the unit

owner/operator or their contractor to ensure the unit is operated and maintained in accordance with the manual.

215-3.2 Drawings. The contractor shall be provided dimensional drawings and, when specified, utilize these drawings to show details for construction, materials, specifications, reinforcing, pipe joints and any maintenances.

215-3.3 Manufacturers Guarantee. The manufacturer shall guarantee all components of the units for a minimum period of one year provided the unit is operated and maintained in accordance with the manual. Improper operation, maintenance or accidental or illegal activities (ie. Dumping or pollutants, vandalism, etc.) Will void guarantee.

215-4 MATERIALS AND DESIGN

Each manufactured Filterra unit shall consist of a precast concrete container together with an underdrain system, filter media, plant material, and appropriate grate landscape cover where applicable.

Concrete for precast unit shall conform to the following:

1. The wall thickness shall not be less than 6" or as shown on the dimensional drawings. In all cases, the wall thickness shall be no less than the minimum thickness required to meet loading requirements of the application.
2. The precast concrete unit shall be cured by an approved method. The unit shall not be shipped until the concrete has attained 85% of its design compressive strength.
3. The connections shall be provided to accept pipes of the specified size(s) and material(s).

215-5 PERFORMANCE CRITERIA

- A. The media shall achieve a flow rate equivalent to 80-100 inches per hour.
- B. The unit shall remove 80% total suspended solids and a minimum of 65% phosphorous.
- C. The unit shall be located to ensure that high flow events shall bypass the filter media preventing erosion and resuspension of pollutants.
- D. The filtered effluent shall be discharged to all appropriate storm drainage systems in accordance with the approved drawings.

SECTION 217 – BEDDING AND BACKFILL MATERIAL

217-1 GENERAL

Bedding and backfill material for pipes shall be in conformance with Section 217 of the Standard Specifications and these Special Provisions.

217-2 PAYMENT

There will be no additional payment for bedding and backfill material. It will be considered incidental to the price of the relevant pipe section and/or drainage or water quality structure.

PART 3 – CONSTRUCTION METHODS

SECTION 300 – EARTHWORK

REVISE as follows:

300-1 CLEARING AND GRUBBING

300-1.3 Removal and Disposal of Materials

300-1.3.1 General. ADD the following:

The Contractor shall scan the work area using a metal detector of adequate strength prior to any saw cutting, excavation or cold milling of the existing pavement. The Contractor shall be responsible for locating and protecting manhole, water valve, utility access frames and covers or other metal appurtenances buried below the existing pavement surface whether shown on the plans or not.

All existing asphalt concrete pavement that is to be joined by new construction shall be sawcut in a straight line. The Contractor shall not disturb or damage existing improvements to be protected in place. Any damage done by the Contractor and/or its equipment shall be repaired or replaced as called out in Section 7-9 of the Standard Specifications at Contractor's expense. The Contractor shall call USA prior to excavation and shall "pothole" existing utilities that fall within the proposed pavement "dig-out" areas to determine their depth.

AC pavement shall be sawcut to full depth around entire join perimeter. Removal of existing pavement sections shall be to the depth required for construction of the replacement roadway sections as shown on the plans and will include the removal of existing AC pavement, cement treated base and/or aggregate base. All removed material becomes the property of the Contractor and shall be hauled away and legally disposed of properly outside of the roadway right of way.

No crushing operations by Contractor will be allowed at the job site or within the Irvine City limits. Contractor shall price the unclassified excavation and other related bid items accordingly

After paragraph c) ADD the following:

The following items of work are included in all types of concrete improvements' excavation:

- Saw-cutting, removal and disposal of existing concrete curb and gutter, sidewalk, and concrete ramps within the project site and as shown on the plan or directed by

the Engineer, and in addition, 1 foot full-depth AC or PCC pavement removal adjacent to the proposed concrete improvements.

- Removal of excess spoil from milling, excavation, disposal of debris, shrubs, rubbish and excess material away from site and disposal and payment of all required fees at a licensed disposal site.
- Maintaining dust control at all times by watering.
- Removal and disposal of any additional items not specifically mentioned herein, which may be found within the work limits or are shown on the plans to be removed.
- Removal and disposal of unnamed concrete improvements.
- Restoration and clean-up of the site.
- Protecting in place of existing water mains, sewers, storm drains, meters, valve covers, walls, fences, curbs, fire hydrants, telephone and power poles, and other existing structures.
- Providing all necessary means to avoid tracking of asphaltic material on existing or new asphalt pavement during paving operations including landscaped and hardscaped facilities.
- Removing and relocating all sprinkler lines, heads, valves, etc. interfering with construction of improvements.

All materials removed shall be lawfully disposed of at a site secured by the Contractor. The Contractor will make every effort to recycle excavated and demolition materials. The Contractor shall provide the Engineer with a letter indicating the final disposition of all excavated and demolition materials from the project within five (5) working days after project completion.

No excavated or demolition materials will be left in the public right of way overnight.

Saw-cutting shall consist of cutting existing Portland cement concrete to facilitate its removal. Cutting shall be accomplished by the use of a power driven saw. The depth of the cut shall be deep enough to provide a clean, straight break without loosening, cracking, or damaging adjoining asphalt or concrete. Under this item, the use of a grinder will not be allowed in lieu of power-driven saw. Residue from saw-cutting shall be vacuumed up while saw-cutting.

After paragraph c) ADD the following sub-section:

- a) **Trees.** All trees called out for removal shall be removed and disposed of per the standard specifications, City of Irvine Standards and per the direction of the City Engineer.

The stumps and roots shall be ground down a minimum three (3) feet below the planned sidewalk subgrade. Any stump grindings strewn on the street or sidewalk shall be removed and placed on the grass area around the stump hole by the contractor before leaving the site. The contractor shall place a barricade in each hole before leaving the site.

All twigs, branches, chips and other debris caused by the removal shall be immediately cleaned up before moving to a new location.

All equipment to be used and all work to be performed must be in full compliance with the most current revision of American National Standards Institute, Standard Z-133.1 (Safety Requirements for Pruning, Trimming, Repairing, Maintaining, Remove trees and for Cutting Brush).

This work item shall also include all necessary import, fill and compaction of material to bring the existing ground of to the necessary finished surface or subgrade level.

300-1.3.2 Requirements. *After paragraph a) ADD the following:*

Bituminous Pavements

Removal of the existing asphalt concrete or concrete pavement adjacent to the construction limit shall be done by saw cutting. Removal of aggregate base shall be considered as "Unclassified Excavation". No additional compensation will be paid by the Agency.

300-1.4 Payment. *ADD the following:*

Measurement and Payment for **CLEARING AND GRUBBING** shall be made at the contract unit price bid per **Lump Sum (LS)**, per the line, grade, dimensions, and limits shown on the contract plans, and shall include full compensation for furnishing all labor, materials, tools, equipment and incidentals necessary to accomplish the work, complete in place, conforming to the requirements herein, including but not limited to, construction staging/sequencing, protection of exiting improvements to remain, clearing and grubbing, demolishing, excavation, cleanup, acceptance, removal and disposal of existing materials at a legal disposal site as shown on the plans, the Standard Specifications and these Special Provisions, as approved by the Engineer and no additional compensation will be allowed therefor. This bid item includes payment for all removals required that are not paid for by a separate contract bid item and no additional compensation will be allowed therefor.

Measurement and Payment for **DEMOLITION** shall be at the contract unit price bid per **Lump Sum (LS)**, per the line, grade, dimensions, and limits shown on the contract plans, and shall include full compensation for furnishing all labor, materials, tools, equipment and incidentals necessary to accomplish the work, complete in place, conforming to the requirements herein, including but not limited to, construction staging/sequencing, protection of existing improvements to remain, clearing and grubbing, demolishing, removal of trees (roots and stumps), hauling, excavation, cleanup, acceptance, removal and disposal of existing materials at a legal disposal site as shown on the plans, the Standard Specifications and these Special Provisions, as approved by the Engineer and no additional compensation will be allowed therefor. This bid item includes payment for all removals required that are not paid for by a separate contract bid item and no additional compensation will be allowed therefor.

Measurement and Payment for **EARTHWORK** shall be at the contract unit price bid per **Cubic Yard (CY)**, per the line, grade, dimensions, and limits shown on the contract plans, and shall include full compensation for furnishing all labor, materials, tools, equipment and incidentals necessary to accomplish the work, complete in place, conforming to the requirements herein, including but not limited to, construction staging/sequencing, protection of existing improvements to remain, hauling, excavation, cleanup, acceptance, removal and disposal of existing materials at a legal disposal site as shown on the plans, the Standard Specifications and these Special Provisions, as approved by the Engineer and no additional compensation will be allowed therefor.

300-4 UNCLASSIFIED FILL

REVISE as follows:

300-4.1 General. *MODIFY to ADD the following:*

Fill should consist of approved earth materials free of trash debris, roots, vegetation, or other deleterious material.

300-4.2 Preparation of Placement Areas. *DELETE the last part of the 2nd sentence and SUBSTITUTE with the following:*

. . . to a relative compaction of at least 90 percent.

300-4.5 Placing Materials for Fill. *1st paragraph, DELETE the last sentence and SUBSTITTE with the following:*

All fill should be placed in 6- to 8-inch lifts, brought to about optimum moisture content, and compacted to at least 90% relative compaction. Fill should consist of approved earth materials free of trash debris, roots, vegetation, or other deleterious material.

300-4.9 Measurement & Payment. *After the first paragraph, ADD the following:*

Measurement and Payment for **IMPORTED SUBGRADE, UNCLASSIFIED FILL** shall be at the contract unit price bid per **Cubic Yard (CY)**, as field measured, compacted in place,

per the line, grade, dimensions, and limits shown on the contract plans, calculated using the average end area method, and shall be considered full compensation for furnishing all labor, materials, tools, equipment and incidentals necessary to accomplish the work, complete in place, conforming to the requirements herein, including but not limited to, submittals, samples, testing, acceptance, import, stockpiling, loading, hauling, subgrade preparation, conditioning, placement, watering, and compaction of material, and proper disposal of surplus material at a legal disposal site, as shown on the plans, as specified in the Standard Specifications and these Special Provisions, as approved by the Engineer and no additional compensation will be allowed therefor.

SECTION 301 – TREATED SOIL, SUBGRADE PREPARATION, AND PLACEMENT OF BASE MATERIALS

301-1 SUBGRADE PRPARATION

301-1.2 Preparation of Subgrade. *Replace this section with the following:*

Prior to placement of the new structural pavement sections, the subgrade soils should be prepared appropriately. The upper 18 inches of the subgrade beneath the proposed pavement sections, concrete curbing, and other hardscape improvements should be removed, moisture-conditioned, and re-compacted to a relative compaction of 90 percent as evaluated by ASTM International (ASTM) test method D1557.

301-2 UNTREATED BASE.

301-2.4 Measurement & Payment. *After the last paragraph, ADD the following:*

Measurement and Payment for **AGGREGATE BASE** shall be at the contract unit price bid per **Ton (TON)**, based on delivered weight, placed per the line, grade, dimensions, and limits shown on the contract plans, compacted, in place, and shall be considered full compensation for furnishing all labor, materials, tools, equipment and incidentals necessary to accomplish the work, complete in place, conforming to the requirements herein, including but not limited to, construction staging/sequencing, certificates, submittals, samples, testing, approvals/acceptance, quality control/quality assurance, layout, import, stockpiling, loading, hauling, subgrade preparation, conditioning, placement, watering, and compaction of material, and proper disposal of surplus material at a legal disposal site, as shown on the plans, as specified in the Standard Specifications and these Special Provisions, as approved by the Engineer and no additional compensation will be allowed therefor.

The Contractor shall furnish to the Engineer at the time of delivery of the material on the job site a legible copy of a licensed weighmaster's certificate showing gross, tare, and net weight of each truckload of aggregate base material.

SECTION 302 – ROADWAY SURFACING

302-5 ASPHALT CONCRETE PAVEMENT

302-5.1 **General.** *After the last paragraph, ADD the following:*

All soils and materials are subject to testing by AGENCY.

The asphalt concrete design mix shall be submitted for approval by the City a minimum of two weeks prior to the start of AC construction.

302-5.5 **Distribution and Spreading.** *After the last paragraph, ADD the following:*

The Contractor shall be responsible for maintaining location of and access to all water line gate valves during construction operations. Locations of water valves shall be marked to IRWD standards.

302-5.6 **Rolling**

302-5.6.1 **General.** *After the last paragraph, ADD the following:*

Initial or breakdown compaction shall consist of a minimum of three coverages of a layer of asphalt mixture. A pass shall be a movement of a roller in both directions over the same path. A coverage shall be as many passes as are necessary to cover the entire width being paved. Overlap between passes during any coverage made to insure compaction without displacement of material in accordance with good rolling practice shall be considered a part of the coverage being made and not a part of a subsequent coverage. Each coverage shall be completed before subsequent coverages are started. Pneumatic rollers shall not be used without prior approval of the Engineer. The top layer of each lane, once commenced, shall be placed without interruption.

302-5.9 **Measurement and Payment.** *After the last paragraph, ADD the following:*

Measurement and Payment for **ASPHALT CONCRETE (4" AND 5")** shall be made at the contract unit price bid per **Ton (TON)**, based on delivered certified material tickets and shall be considered full compensation for furnishing all labor, materials, tools, equipment, and incidentals necessary to accomplish the work, complete in place, conforming to the requirements herein, including but not limited to removals, disposal, certified weigh tickets, subgrade and surface preparation, weed kill, placing tack coat and sealing existing cracks, placing, rolling, testing and protecting asphalt concrete, as shown on the Plans, as specified in the Standard Specifications and these Special Provisions, as approved by the Engineer and no additional compensation will be allowed therefor.

The Contractor shall furnish to the Owner's Representative a legible copy of a licensed weighmaster's certificate showing net weight of asphalt concrete in each truck load. The labeled certificate must be delivered to the Owner's Representative on site on the same day that the asphalt concrete is delivered. If any of these conditions are not met, the City

will not allow payment for the certificates. The compaction after rolling shall have a relative compaction of 95%.

The City will not compensate the Contractor for any additional costs incurred by change or lack of availability of asphalt binders.

Temporary asphalt concrete work, where required by the Engineer for traffic control or other purposes shall be considered included in the lump sum price bid for Traffic Control and no additional compensation will be allowed therefor.

SECTION 303 – CONCRETE AND MASONRY CONSTRUCTION

303-1 CONCRETE STRUCTURES

303-1.1 GENERAL.

ADD after the last paragraph the following:

The installation of the Bioretention system shall be performed by a manufacturer-approved installation Contractor. The installation Contractor shall be licensed and insured in accordance with City requirements and listed as a sub-Contractor in the appropriate section of the project Contract Documents.

It is the City's intent that the specified Bioretention system device will be completely compatible with the various storm drain inlets and that they will function exactly as specified herein and per the manufacturer's intent. However, it shall be the Contractor's ultimate responsibility to confirm the exact compatibility and intents detailed herein and on the Plans are met at the time of order of the Bioretention system from the manufacturer. If the Contractor or installation sub-contractor notes any discrepancy between these specifications and the manufacturer's, the Contractor shall notify the City immediately so that said discrepancy can be resolved without delay or extra compensation due to the Contractor.

The installation contractor shall supply the City with an installation record, denoting the date of installation, drainage inlet location, type of drainage inlet and type and size Bioretention system device, for the City's use in developing a future maintenance schedule.

- a. Each unit shall be constructed at the locations according to the sizes shown on the approved drawings. Any modifications to the elevation or location shall be at the direction of and approved by the Engineer.
- b. If the Bioretention system device is stored before installation, the top slab must be placed on the box using the 2x4 wood provided, to prevent any contamination from the site. All internal fittings supplied (if any), must be left in place as per the delivery.
- c. The unit shall be placed on a compacted sub-grade with a minimum 6-inch gravel base matching the final grade of the curb line in the area of the unit. The unit is to

be placed such that the unit and top slab match the grade of the curb in the area of the unit. Compact undisturbed sub-grade materials to 95% of maximum density at +1- 2% of optimum moisture. Unsuitable material below sub-grade shall be replaced to the site engineer's approval.

- d. Outlet connections shall be aligned and sealed to meet the approved drawings with modifications necessary to meet site conditions and local regulations.
- e. Once the unit is set, the internal wooden forms and protective mesh cover must be left intact. Remove only the temporary wooden shipping blocks between the box and top slab. The top lid should be sealed onto the box section before backfilling, using a nonshrink grout, butyl rubber or similar waterproof seal. The boards on top of the lid and boards sealed in the unit's throat must **NOT** be removed. The Supplier (Americast or its authorized dealer) will remove these sections at the time of activation. Activation is to be performed by supplier or its authorized dealer. Backfilling should be performed in a careful manner, bringing the appropriate fill material up in 6" lifts on all sides. Precast sections shall be set in a manner that will result in a watertight joint. In all instances, installation of the Bioretention system unit shall conform to ASTM specification C891 "Standard Practice for Installation of Underground Precast Utility Structures", unless directed otherwise in contract documents.

303-1.11 Measurement & Payment. *ADD the following:*

Measurement and Payment for **(12.5'X 8', 6'X 4', 4'X 4', 8'X6', AND 8'X8')**

STORMWATER BIOFILTRATION SYSTEM, shall be made at the contract unit price bid per **Each (EA)**, per the line, grade, dimensions, and limits shown on the contract plans, and shall be considered full compensation for furnishing all labor, materials, tools, equipment, and incidentals necessary to accomplish the work, complete in place, conforming to the requirements herein, including but not limited to, submittals, testing, acceptance, construction staging/sequencing, quality control/quality assurance, layout, saw cutting, breaking, excavation removal of existing curb and gutter, excavation, root pruning, subgrade preparation, utility modifications and adjustments, sprinkler system modifications and adjustment (temporary and permanent), Filterra unit installation, media and tree installation, covers, rims, grates, frames, collars, cone, bases, steps, clean up; installation of "No Dumping – Drains to Ocean" stenciling, doweling, backfill, compaction, forming, sidewalk installation, and all related appurtenances, reinforcing steel, concrete installation, concrete protection and replacement of damaged or marked concrete, backfill and infill of the one (1) foot wide full-depth AC pavement adjacent to the proposed concrete improvement removal and disposal of excess spoils and materials, as shown on the Plans, in accordance with the manufacturer's specifications and per the details shown on the Plans, and maintenance, as specified in the Standard Specifications and these Special Provisions, as approved by the Engineer and no additional compensation will be allowed therefor.

Measurement and Payment for **CATCH BASIN TYPE I, AND II (W=10', W=21' & W=22')**, shall be made at the contract unit price bid per **Each (EA)**, per the line, grade, dimensions,

and limits shown on the contract plans, shall include local depression and shall be considered full compensation for furnishing all labor, materials, tools, equipment, and incidentals necessary to accomplish the work, complete in place, conforming to the requirements herein, including but not limited to, submittals, testing, acceptance, construction staging/sequencing, quality control/quality assurance, layout, saw cutting, breaking, excavation, root pruning, subgrade preparation, utility modifications and adjustments, sprinkler system modifications and adjustment (temporary and permanent), forming, reinforcing steel placement, concrete placement, covers, rims, grates, frames, collars, cone, bases, steps, clean up; installation of "No Dumping – Drains to Ocean" stenciling, backfill, compaction, concrete protection and replacement of damaged or marked concrete, backfill and infill of the one (1) foot wide full-depth AC pavement adjacent to the proposed concrete improvement, removal and disposal of excess spoils and materials, as shown on the Plans, and detailed by City of Irvine Standard Plans 301 through 303, as specified in the Standard Specifications and these Special Provisions, as approved by the Engineer and no additional compensation will be allowed therefor.

Measurement and Payment for **JUNCTION STRUCTURE NO. 1 (W/ MANHOLE)** shall be made at the contract unit price bid per **Each (EA)**, per the line, grade, dimensions, and limits shown on the contract plans, and shall be considered full compensation for furnishing all labor, materials, tools, equipment, and incidentals necessary to accomplish the work, complete in place, conforming to the requirements herein, including but not limited to, submittals, testing, acceptance, construction staging/sequencing, quality control/quality assurance, layout excavation of the trench, the preparation of sub-grade, advanced utility potholing, backfilling and compacting the trench, temporary resurfacing, required trench-related cold milling of existing pavement, replacement of all interfering surface improvements, and all other work necessary to install Junction Structure No. 1 by open trench, as shown on the Plans, and detailed by City of Irvine Standard Plan 306 and 306A, as specified in the Standard Specifications and these Special Provisions, as approved by the Engineer and no additional compensation will be allowed therefor.

Measurement and Payment for **JUNCTION STRUCTURE (W/O MANHOLE)** shall be made at the contract unit price bid per **Each (EA)**, per the line, grade, dimensions, and limits shown on the contract plans, and shall be considered full compensation for furnishing all labor, materials, tools, equipment, and incidentals necessary to accomplish the work, complete in place, conforming to the requirements herein, including but not limited to, submittals, testing, acceptance, construction staging/sequencing, quality control/quality assurance, layout excavation of the trench, the preparation of sub-grade, advanced utility potholing, backfilling and compacting the trench, temporary resurfacing, required trench-related cold milling of existing pavement, replacement of all interfering surface improvements, and all other work necessary to install Junction Structure by open trench, as shown on the Plans, and detailed by City of Irvine Standard Plan 306 and 306A, as specified in the Standard Specifications and these Special Provisions, as approved by the Engineer and no additional compensation will be allowed therefor.

Measurement and Payment for **CONCRETE COLLARS** shall be made at the contract unit price bid per **Each (EA)**, per the line, grade, dimensions, and limits shown on the contract plans, and shall be considered full compensation for furnishing all labor, materials, tools,

equipment, and incidentals necessary to accomplish the work, complete in place, conforming to the requirements herein, including but not limited to, submittals, testing, acceptance, construction staging/sequencing, quality control/quality assurance, layout excavation of the trench, the preparation of sub-grade, advanced utility potholing, backfilling and compacting the trench, temporary resurfacing, required trench-related cold milling of existing pavement, replacement of all interfering surface improvements, and all other work necessary to install concrete collars by open trench, as shown on the Plans, and detailed by City of Irvine Standard Plan 310, as specified in the Standard Specifications and these Special Provisions, as approved by the Engineer and no additional compensation will be allowed therefor.

Measurement and Payment for **U-CHANNEL** shall be made at the contract unit price bid per **Each (EA)**, per the line, grade, dimensions, and limits shown on the contract plans, and shall be considered full compensation for furnishing all labor, materials, tools, equipment, and incidentals necessary to accomplish the work, complete in place, conforming to the requirements herein, including but not limited to, submittals, testing, acceptance, construction staging/sequencing, quality control/quality assurance, the preparation of sub-grade, and all other work necessary to install concrete u-channel, as shown on the Plans, as specified in the Standard Specifications and these Special Provisions, as approved by the Engineer and no additional compensation will be allowed therefor.

Measurement and Payment for **WHEELSTOPS** shall be made at the contract unit price bid per **Each (EA)**, per the line, grade, dimensions, and limits shown on the contract plans, and shall be considered full compensation for furnishing all labor, materials, tools, equipment, and incidentals necessary to accomplish the work, complete in place, conforming to the requirements herein, including but not limited to, submittals, testing, acceptance, construction staging/sequencing, quality control/quality assurance, the preparation of sub-grade, and all other work necessary to install each wheelstop, as shown on the Plans, as specified in the Standard Specifications and these Special Provisions, as approved by the Engineer and no additional compensation will be allowed therefor.

303-5 CONCRETE CURBS, WALKS, GUTTERS, AND ACCESS RAMPS

303-5.1 Requirements

303-5.1.1 General. *ADD the following:*

Sidewalk and curb access ramps shall be opened to pedestrian access on the day following concrete placement. In addition, all forms shall be removed, irrigation systems shall be repaired, and backfill or patch back shall be placed within 72 hours following concrete placement.

303-5.1.1.1 Curb and Gutter

Concrete Curb and Gutter shall be constructed to the line and grades shown on the plans or as ordered by the Engineer. Existing curb and gutter to be joined shall be sawcut on a

neat, straight line at the join location. Curb and gutter construction shall occur prior to all cold milling and paving operations.

303-5.1.1.2 Sidewalk

Concrete sidewalk shall conform to the City of Irvine Std. Plan No. 201.

Concrete sidewalk shall be constructed to the line, grades and designs shown on the plans or as ordered by the Engineer. Existing surfaces to be joined shall be sawcut on a neat, straight line at the join location. The contractor shall remove and replace any new concrete work with graffiti markings and blemishes at no additional cost to the City.

This work item shall also include all necessary natural ground and miscellaneous excavation, removal and export as may be required to install the new 4" PCC Sidewalk and necessary irrigation system modifications, protection and adjustments that may be required. The Contractor shall also be required to conduct all necessary grading at the new back of walk in order to ensure that full ADA compliance is achieved within the new sidewalk areas.

303-5.1.1.3 Curb Ramps

Concrete Curb Ramps within the City of Irvine shall be constructed per City of Irvine Std. Plan No. 202.

Curb and Gutter within the ramp limits shall be paid for under the respective curb and gutter bid item, and shall not be included in the unit bid price for the curb ramp construction.

All work including the ramp and adjacent sidewalk behind the back of curb between the BCR and ECR at the corner shall be considered as part of the curb ramp construction.

Concrete Curb Ramps shall be constructed to the line, grades and designs shown on the plans or as directed by the Engineer. Existing surfaces to be joined shall be sawcut on a neat, straight line at the join location. All sawcut locations along existing cross gutters shall be cut in a curve conforming to the existing curb return and shall be cut at a set offset from the flow line as approved by the City Engineer. The flow line shall be maintained, ensuring that ponding does not occur in the existing cross gutter.

All water or gas valve can and lids within curb ramp limits shall also be adjusted to the finished grade of the new curb ramp and shall be paid for per the unit price for each respective bid item.

The City Engineer shall have final say regarding the case and type of curb ramp to be installed and shall retain the right to revise the ramp designation at any point prior to construction.

303-5.1.1.4 Detectable Warning System

Additionally, all curb ramps shall have a detectable warning surface that extends the full width of the ramp and 3 feet minimum length. The finished surfaces of the detectable warning surface shall be free from blemishes.

The detectable warning surface in the City of Irvine shall be in conformance with the requirements in the City of Irvine Standard Plan No. 202. The detectable warning surface required for new PCC curb ramps shall be cast-in-place manufactured by Armorcast Products Company, (818) 982-3600, www.armorcastprod.com or approved equal. The Detectable Warning Surface for Retrofit Installations shall be Flexible Detectable Warning Surface Manufactured by Detectable Warning Systems INC, (866) 999-7452, www.detectable-warning.com or Manufactured by Armorcast Products Company or approved equal. The color shall be black, and shall be 4' x 3'. The truncated dome mat shall be installed across the entire width of the bottom of the access ramp and shall be installed per the manufacturer's installation recommendations, per City of Irvine Standard Plan 202, as directed by the Engineer.

Both retrofit and new ramp construction shall receive wet-set truncated domes. For ramps designated for retrofit of a truncated dome system, the Contractor shall sawcut the necessary amount of underlying PCC concrete, pour a new surface with a 0" lip at the flowline and install the required wet set truncated domes per City standards.

At a minimum, the Contractor shall adhere to the truncated dome mat manufacturer's installation requirements including proper surface preparation and protection of the work and surrounding area for both agencies.

303-5.5 Finishing

303-5.5.4 Gutter. *After the last paragraph, ADD the following:*

The Contractor shall hold the flow line tolerances to within 0.01 feet of those elevations shown on the plan.

303-5.9 Measurement & Payment. *ADD the following:*

Measurement and Payment for **CURB AND GUTTER (TYPE D), CURB (TYPE B-6), CURB TRANSITION (TYPE B-6 & C-6) (0" TO 6")**, **MEDIAN CURB AND GUTTER (TYPE D MODIFIED), CURB (TYPE C-6), CURB (TYPE B-6 VARIABLE HEIGHT MODIFIED)** shall be made at the contract unit price bid per **Linear Foot (LF)**, as field measured, per the line, grade, dimensions, and limits shown on the contract plans, and shall be considered full compensation for furnishing all labor, materials, tools, equipment, and incidentals necessary to accomplish the work, complete in place, conforming to the requirements herein, including but not limited to, construction staging/sequencing, certificates, submittals, approvals, quality control/quality assurance, layout, saw cutting, excavation, root pruning, installation of moisture barrier, grading, subgrade preparation, forming, doweling, reinforcing steel, concrete installation, joints/scoring, finish, curing, concrete protection and replacement of damaged or marked concrete, installation of moisture barrier, backfill, slot repair, protection, removal/replacement of rejected curb, cleanup, proper disposal of excess materials at a legal disposal site, as shown on the

plans, as specified in the Standard Specifications, City of Irvine Standard Plans 200, 222 and 223A, and these Special Provisions, as approved by the Engineer and no additional compensation will be allowed therefor.

Measurement and Payment for **PCC SLOUGH WALL** shall be made at the contract unit price bid per **Linear Foot (LF)**, as field measured, per the line, grade, dimensions, and limits shown on the contract plans, and shall be considered full compensation for furnishing all labor, materials, tools, equipment, and incidentals necessary to accomplish the work, complete in place, conforming to the requirements herein, including but not limited to, construction staging/sequencing, certificates, submittals, approvals, quality control/quality assurance, layout, excavation, root pruning, installation of moisture barrier, grading, subgrade preparation, forming, reinforcing steel, concrete installation, expansion joints/joint filler, weep hole installation, finish, curing, concrete protection and replacement of damaged or marked concrete, 6" square steel wire/1/2" mesh hardware cloth, pervious backfill, protection, removal/replacement of rejected slough wall, cleanup, proper disposal of excess materials at a legal disposal site, as shown on the plans, as specified in the Standard Specifications, and these Special Provisions, as approved by the Engineer and no additional compensation will be allowed therefor.

Measurement and Payment for **SIDEWALK** shall be made at the contract unit price bid per **Square Foot (SF)**, as field measured, per the line, grade, dimensions, and limits shown on the contract plans, and shall be considered full compensation for furnishing all labor, materials, tools, equipment, and incidentals necessary to accomplish the work, complete in place, conforming to the requirements herein, including but not limited to, construction staging/sequencing, certificates, submittals, approvals, quality control/quality assurance, layout, ADA compliance, saw cutting, excavation, export, root pruning, installation of moisture barrier, grading, subgrade preparation, existing irrigation adjustments, forming, doweling, reinforcing steel, concrete color/texture matching, concrete installation, joints/scoring, finish, abrasive blasting, curing, concrete protection and replacement of damaged or marked concrete, backfill, protection, removal/replacement of rejected sidewalk/PCC, cleanup, proper disposal of excess materials at a legal disposal site, as shown on the plans, as specified in the Standard Specifications, City of Irvine Standard Plan 201, and these Special Provisions, as approved by the Engineer and no additional compensation will be allowed therefor.

Measurement and Payment for **VALLEY GUTTER** shall be made at the contract unit price bid per **Square Foot (SF)**, as field measured, per the line, grade, dimensions, and limits shown on the contract plans, and shall be considered full compensation for furnishing all labor, materials, tools, equipment, and incidentals necessary to accomplish the work, complete in place, conforming to the requirements herein, including but not limited to, construction staging/sequencing, certificates, submittals, approvals, quality control/quality assurance, layout, ADA compliance, saw cutting, excavation, export, root pruning, installation of moisture barrier, grading, subgrade preparation, existing irrigation adjustments, forming, doweling, reinforcing steel, concrete color/texture matching, concrete installation, joints/scoring, finish, abrasive blasting, curing, concrete protection and replacement of damaged or marked concrete, backfill, protection, removal/replacement of rejected sidewalk/PCC, cleanup, proper disposal of excess

materials at a legal disposal site, as shown on the plans, and these Special Provisions, as approved by the Engineer and no additional compensation will be allowed therefor.

Measurement and Payment for **CURB RAMP** shall be made at the contract unit price bid per **Each (EA)** per the line, grade, dimensions, and limits shown on the contract plans and shall include the area of the entire curb return from BCR to ECR, including sidewalk areas, curb & gutter, and adjacent AC/AB pavement and shall be considered full compensation for furnishing all labor, materials, tools, equipment, and incidentals necessary to accomplish the work, complete in place, conforming to the requirements herein, including but not limited to , construction staging/sequencing, certificates, submittals, approvals, quality control/quality assurance, layout, ADA compliance, temporary pedestrian access, saw cutting, excavation, root pruning, removal and disposal of existing improvements at a legal disposal site, installation of moisture barrier, grading, subgrade preparation, utility modifications, adjustments and adjustment of pull box frame and covers to finished grade, sprinkler system modifications and adjustment (temporary and permanent), forming, concrete installation, curing, installation of detectable warning surface, construction and joining into adjacent curb and gutter, any required retaining curb along the back and sides of the ramp, and replacement of the pavement strip at the edge of gutter for those locations outside the road reconstruction limits, and scoring patterns and grooving, concrete protection and replacement of damaged or marked concrete, backfill and infill of a two (2) foot wide full-depth AC pavement slot repair adjacent to the proposed concrete improvement, if necessary, as shown on the Plans, and as detailed per the applicable curb and gutter type, as specified in the Standard Specifications, City of Irvine Standard Plans 202 and 223A, and these Special Provisions, as approved by the Engineer and no additional compensation will be allowed therefor.

Measurement and Payment for **TRUNCATED DOMES** shall be made at the contract unit price bid per **Square Feet (SF)** per the line, grade, dimensions, and shall be considered full compensation for furnishing all labor, materials, tools, equipment, and incidentals necessary to accomplish the work, complete in place, conforming to the requirements herein, including but not limited to , construction staging/sequencing, certificates, submittals, approvals, quality control/quality assurance, layout, ADA compliance, removal and disposal of existing improvements at a legal disposal site, installation of moisture barrier, as shown on the Plans, and as detailed per the applicable Standard Specifications, City of Irvine Standard Plans 202, and these Special Provisions, as approved by the Engineer and no additional compensation will be allowed therefor.

SECTION 306 – OPEN TRENCH CONDUIT CONSTRUCTION

306-15 Measurement & Payment. *ADD the following:*

Measurement and Payment for **HDPE PIPE (8", 10", 12", AND 15")** shall be made at the contract unit price per **Linear Foot (LF)**, to be constructed by open trench operations, field measured and shall be considered full compensation for furnishing all labor, materials, tools, equipment, and incidentals necessary to accomplish the work, complete in place, conforming to the requirements herein, including but not limited to, submittals, calculations, certificates, approvals, construction staging/sequencing, approvals, procurement of reinforced concrete pipe, delivery, storage, layout, advanced utility potholing, sawcutting, excavation, shoring, dewatering, subgrade compaction, bedding, transitions, joints, cutting, cleaning, quality control/quality assurance, placing and joining reinforced concrete pipe, concrete collars, gaskets, grouting, anchorage, backfill, and compacting the trench or cement slurry backfill, temporary resurfacing, cleanup, testing, acceptance, protection, proper disposal of surplus material at a legal disposal site, and all other work necessary to install the pipe by open trench, as shown on the plans, as specified in the Standard Specifications, City of Irvine Standard Plans 310, and 318, and these Special Provisions, as approved by the Engineer and no additional compensation will be allowed therefor.

Measurement and Payment for **CLEANOUT** shall be made at the contract unit price per **Each (EA)**, to be constructed by open trench operations, field measured and shall be considered full compensation for furnishing all labor, materials, tools, equipment, and incidentals necessary to accomplish the work, complete in place, conforming to the requirements herein, including but not limited to, submittals, calculations, certificates, approvals, construction staging/sequencing, approvals, procurement of reinforced concrete pipe, delivery, storage, layout, advanced utility potholing, sawcutting, excavation, shoring, dewatering, subgrade compaction, bedding, transitions, joints, cutting, cleaning, quality control/quality assurance, backfill, and compacting the trench or cement slurry backfill, temporary resurfacing, cleanup, testing, acceptance, protection, proper disposal of surplus material at a legal disposal site, and all other work necessary to install the vertical pipe, including concrete collars and traffic grated lids, by open trench, as shown on the plans, as specified in the Standard Specifications, and these Special Provisions, as approved by the Engineer and no additional compensation will be allowed therefor.

SECTION 314 – TRAFFIC STRIPING, CURB AND PAVEMENT MARKINGS, AND PAVEMENT MARKERS

REVISE as follows:

314-1 GENERAL.

After the last paragraph, ADD the following:

Apply PreMark ViziGrip Green thermoplastic material under the manufacturer's instructions.

314-2 REMOVAL OF TRAFFIC STRIPING AND CURB AND PAVEMENT MARKINGS.

314-2.1 General. MODIFY to ADD the following:

All conflicting striping, pavement markings, and curb paint shall be removed by wet sandblasting or other approved method prior to installation of new striping. All conflicting raised pavement markers shall be removed.

Pavement that is damaged due to removal of markers or striping shall be repaired to the satisfaction of the Agency Representative.

314-4 APPLICATION OF TRAFFIC STRIPING AND CURB AND PAVEMENT MARKINGS.

314-4.1 General. MODIFY to ADD the following:

The Contractor shall furnish and apply traffic stripes and pavement markings as shown on the Plans and as directed by the Agency's Representative. Placement of striping and markings shall conform to the requirements of Section 84 of the State Standard Specifications, latest edition, the City of Irvine Standard Plans and these Special Provisions.

Signing and striping shall conform to part 2 signs & part 3 markings of the (MUTCD), latest edition, these Plans and Special Provisions.

Detail 9 lane line striping pattern in part 3 markings shall be used on all multilane streets regardless of street design speed.

Pavement legends shall match the City stencils (Hawkins stencils or equivalent).

All striping and pavement markings shall be reflectorized and applied in two coats. A minimum of seven days shall be provided between first and second coats.

The Contractor shall contact the City of Irvine inspection services for inspection 48 hours prior to beginning of construction.

Contractor shall verify all existing conditions and dimensions before starting work. If conditions exist which are contrary to those shown on these Plans, the City of Irvine inspection services shall be notified before proceeding with work.

Striping shall be cat tracked and approved by the Agency Representative prior to final installation.

Crosswalk shall conform to the City of Irvine Standard Plan No. 203.

314-4.3.6 Measurement and 314-4.3.7 Payment. *DELETE and SUBSTITUTE with the following:*

314-4.3.6 Measurement and Payment. Full compensation for furnishing all labor, materials, tools, equipment and incidentals, and for doing all the work involved in painting pavement markings, complete in place, as shown on the Plans, as specified in the Standard Specifications and these Special Provisions, and as directed by the Engineer is included in the contract **LUMP SUM** price paid for **STRIPING, MARKINGS AND MARKERS**, and no additional compensation will be allowed therefor.

314-5 PAVEMENT MARKERS.

314-5.4 Placement. *MODIFY to ADD the following:*

All pavement markers shall comply with Sections 81 and 84 of the State Standard Specifications. Non-reflective markers shall be ceramic. All new markers shall have glass faces or be 3M series 290.

Blue raised reflective pavement marker shall be installed adjacent to all existing fire hydrants in accordance with the latest MUTCD.

314-5.6 Measurement and 314-5.7 Payment. *DELETE and SUBSTITUTE with the following:*

314-5.6 Measurement and Payment. Full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all the work involved in furnishing and installing pavement marker, complete in place, as shown on the Plans, as specified in the Standard Specifications and these Special Provisions, and as directed by the Engineer is included in the contract **LUMP SUM** price paid for **STRIPING, MARKINGS AND MARKERS**, and no additional compensation will be allowed therefor.

Full compensation for removal of existing pavement markers and placing temporary pavement markers is included in the contract **LUMP SUM** price paid for **TRAFFIC CONTROL**, and no additional compensation will be allowed therefor.

SECTION 315 – STORMWATER DETENTION

315-1 CONSTRUCTION

- A. Each system shall be constructed at the locations and elevations according to the sizes shown on the plans. Any modifications to the elevation or location shall be at the direction of and with approval by the Engineer.
- B. Inlet and outlet connections shall be aligned to meet the plans with modifications necessary to meet site conditions.
- C. Once the system is set, backfilling should be performed in a careful manner, bringing the appropriate fill material up in 6" lifts on all sides. In all instances installation of detention pipes shall conform to ASTM specification C891 "Standard Practice for Installation of Underground Utility Structures"

315-2 MEASUREMENT & PAYMENT

Measurement and Payment for **DETENTION PIPE (60" AND 66")** shall be included in the contract **Cubic Feet (CF)** price paid, and shall be considered full compensation for furnishing all labor, materials, tools, equipment, and incidentals necessary to accomplish the work, complete in place, conforming to the requirements herein, as specified in the Standard Specifications and these Special Provisions, as approved by the Engineer and no additional compensation will be allowed therefor.

SECTION 316 – BASEBALL NETTING AND FOUNDATION DEFERRED SUBMITTAL

316-1 MATERIALS

Concrete: Comply with Section 201-1 of the Standard Specifications and Table 201-1.1.2 for Cast-In-Place piles. Additional requirements as necessary for the Contractor's Engineer will be considered.

Reinforcement: Comply with Section 201-2 of the Standard Specifications.

Comply with the following requirements for Structural Steel:

- A. Section 304-1 of the Standard Specifications
- B. Anchor Bolts: ASTM F1554
- C. Steel Plates: ASTM A36
- D. Steel Tubing: ASTM A500
- E. Steel members design to resist seismic loading ANSI/AISC 341 and ANSI/AISC 360
- F. Welding: AWS D1.1 Continuous inspection is required for all welding
- G. Wires and Ties: See Section 206-6.4 of the Standard Specifications

- H. Attachments and appurtenances shall be either stainless steel, galvanized steel, or painted.

Comply with the following requirements for Coatings:

- A. See Section 210 of the Standard Specifications.
- B. Provide a sample of each finish coat color at a size satisfactory to the Engineer. The sample shall be inspected and approved by the Engineer before proceeding with the work.
- C. See Section 206-6.8 of the Standard Specifications for repair of damage galvanized coating.

316-2 CONSTRUCTION

The Baseball Netting and Foundation work will be provided as a deferred submittal due to the specialty materials, design, and fabrication of very tall netting protection systems.

The system supplier shall demonstrate the successful delivery of a minimum of 10 similar projects over the last 10 years.

This work will be designed by the Contractor's engineer and submitted for approval. Submit working drawings, shop drawings, supporting information, installation instructions, and the manufacturer's Operation, Maintenance, and Warranty Instructions per Section 3.8 of the Standard Specifications.

Provide submittals, structural calculations, and plans stamped and sealed by a Civil Engineer registered in the State of California

316-3 Measurement and Payment

Full compensation for baseball netting and foundation shall be included in the contract **Lump Sum (LS)** price paid for **BASEBALL NETTING AND FOUNDATION DEFERRED SUBMITTAL**, and shall be considered full compensation for furnishing all labor, materials, tools, equipment, and incidentals necessary to accomplish the work, complete in place, including drilled shafts, concrete piles, reinforcing steel, structural steel poles, fence mesh, cables, wires, ties, and coatings conforming to the requirements herein, as specified in the Standard Specifications and these Special Provisions, as approved by the Engineer and no additional compensation will be allowed therefor.

PART 4 – EXISTING IMPROVEMENTS

SECTION 400 – PROTECTION AND RESTORATION

REVISE as follows:

400-1 GENERAL. *ADD the following before the 1st paragraph:*

Material shown on the Plans or designated in the Special Provisions which is to be salvaged or used in the reconstructed work and which has been damaged or destroyed as a result of the Contractor's operations, shall be repaired or replaced by the Contractor at his expense.

ADD:

400-1.1 Preservation of Property. The Contractor shall exercise due care to avoid injury to existing improvements or facilities, utility facilities, adjacent property, and trees and shrubbery that are not to be removed.

All damage done to existing improvements by the Contractor shall be repaired by him to the satisfaction of the Engineer. Where sidewalks, curbs or gutters are to be repaired, the repairs shall be made by removing and replacing the damaged section back to the nearest scoring lines.

All trees and shrubbery that are not to be removed, and pole lines, fences, signs, survey markers and monuments, buildings and structures, conduits, pipelines under or above ground, sewer and waterlines, all highway or street facilities, and any other improvements of facilities within or adjacent to the work shall be protected from injury or damage, and the Contractor shall provide and install suitable safeguards to protect such objects from injury or damage. If such objects are injured or damaged by reason of the Contractor's operation, they shall be replaced or restored at the Contractor's expense to a condition as good as when the Contractor entered upon the work or as good as required by the Plans and Specifications if any such objects are a part of the work being performed.

The fact that any such pipe or other underground facility is not shown on the Plans shall not relieve the Contractor of his responsibility under this article. It shall be the Contractor's responsibility to ascertain the existence of any underground improvement or facilities which may be subject to damage by reason of his operations.

In addition to any requirements imposed by law, the Contractor shall shore up, brace, underpin, and protect as may be necessary, all foundations and other parts of all existing structures adjacent to and adjoining the site of the work which are in any way affected by the excavations or other operations connected with the performance of the Work.

Whenever any notice is required to be given by the Agency or the Contractor to any adjacent or adjoining landowner or other party before commencement of any work, such notice shall be given by the Contractor.

ADD:

400-1.2 Video Recording and Photographing of Pre-existing Conditions. The Contractor shall video record and photograph pre-existing conditions of the project site prior to any construction activities such as, but not limited to:

- a) Property markers
- b) Right of way and easement conditions
- c) Utility markings and USA markings
- d) Existing property damages
- e) Survey conditions
- f) Pavement conditions, markings, and striping
- g) Adjacent property conditions
- h) Sidewalk, median, curb, and gutter conditions
- i) Safety conditions
- j) Unusual conditions or equipment
- k) Existing landscape conditions (including vegetation and irrigation) along the project limit.

The Contractor shall submit recordings/photographs on CD, DVD or USB media to the Engineer no later than (five) 5 Working Days after Notice to Proceed.

Payment for video recording and photographing services shall be included in the various Bid Items and no additional compensation will be allowed therefor.

SECTION 402 – UTILITIES

REVISE as follows:

ADD:

402-0 GENERAL. For purposes of this Section 402, the terms referenced below are defined as follows:

An “unidentified” underground main or trunk line utility is one that is not indicated at all on the Plans, and a “misidentified” underground main or trunk line utility is one that is not indicated on the Plans with reasonable accuracy (a “misidentification”). An underground main or trunk line utility is indicated on the Plans with reasonable accuracy unless its actual location is substantially and materially different from that indicated on the Plans.

The term “rearrangement” of utilities means the relocation, alteration, reinstallation, and/or reconstruction of utilities (including removal of existing utilities incidental thereto) as necessary in order to accommodate the Work. Whenever in this Section 402 reference is made to any one or more of these rearrangement activities, such reference shall be deemed to include all other such activities as required in order to accommodate the Work.

402-1 LOCATION. *MODIFY to ADD the following:*

A list of utility companies that have facilities located within or near the construction area is included in the Special Provisions. The Engineer has endeavored to determine the existence of utility substructures at the site of the Work by reviewing the records of the owners of known utilities in that vicinity and consulting with those owners, and based on that information has indicated on the Plans those utility substructures (except for service connections) that may affect the Work.

The Contractor acknowledges that the utility information provided on the Plans and Special Provisions has not been verified and may not be accurate or complete. Except as expressly provided in this Section 402, the Contractor may not rely upon such utility information and the City assumes no responsibility for its accuracy or completeness. Changed conditions within the scope of 2-9 do not include utilities.

The Contractor shall determine the exact location (both horizontal and vertical), type, and size of all existing utilities, including service connections, prior to commencing work which could result in damage to such utilities or could otherwise affect or be affected by such utilities or interfere with the service they provide. Where underground main distribution conduits such as water, gas, sewer, electric power, telephone or cable television are shown on the Plans, the Contractor shall assume that every adjacent property parcel will be served by a service connection for each type of utility shown. The Contractor shall do such investigation, research, surveys, and potholing as the Contractor deems necessary to make such determinations. The Contractor shall immediately notify the Engineer as to any utility discovered by it which is in a different position than indicated on the Plans or is not indicated at all on the Plans.

The Contractor's cost of locating any unidentified or misidentified underground main or trunk line utility will be paid for as an addition to the Work in accordance with Section 2; provided, however, that the Contractor will not be entitled to such additional compensation if the existence and location (with reasonable accuracy) of such utility was (or should have been) known to the Contractor as of the date on which the Bids were due or could otherwise have been inferred at that time from the presence of visible facilities such as buildings, meters, junction boxes or identifying markers. The cost of locating all other utilities shall be considered as included in prices in the Bid for other items of the Work.

The information regarding underground and internal utilities and appurtenances which the Contractor is required to record in the Record Documents as specified in 5-10 shall include (but not be limited to) the accurate locations of underground utilities determined pursuant to this 402-1 and remaining in place, as well as utilities rearranged by either the Contractor or the utility owners.

At least two (2) Working Days prior to commencing any excavation, the Contractor shall contact the regional notification center (Underground Service Alert of Southern California [USA] at 1-800-422-4133) to obtain an inquiry identification number. The Contractor shall comply in all respects with California Government Code § 4216 *et seq.*

Caltrans is not required by Section 4216 *et seq.* to become a member of the regional notification center. The Contractor shall contact Caltrans for the location of its subsurface installations. In addition, the Contractor shall be aware that non-pressurized sewer lines, non-pressurized storm drains, and other non-pressurized drain lines are not required by § 4216 *et seq.* to be marked by the respective owners. The Contractor shall contact those utility owners as necessary to locate their subsurface installations.

The Contractor shall request the City of Irvine Traffic Operations Division at 949-724-7649 to locate any existing traffic signal conductors and interconnect within the construction area before performing Work that may affect or be affected by the existing facilities.

Except as expressly provided in this Section 402 with respect to unidentified or misidentified underground main or trunk line utilities, the failure of any utility company to accurately mark its facilities shall not be justification for a time extension or for additional compensation from the City.

The Contractor shall obtain photographs of all markings made by its forces as well as all USA markings. All such photographs shall show the subject markings in relation to one or more identifiable landmarks that will remain in place after completion of the Work and completion of any utility removal and/or rearrangement work in the vicinity.

The right is reserved to governmental agencies and to the owner of utilities to enter at any time upon any street, alley, right of way, or easement for the purpose of maintaining and making repairs to their property.

402-1.2 Payment. *DELETE in its entirety and SUBSTITUTE with the following:*

Payment for utility location by the Contractor shall be included in the various items of work and no additional compensation will be allowed therefor.

402-2 PROTECTION. *DELETE in its entirety and SUBSTITUTE with the following:*

The Contractor shall not interrupt the service function or disturb the support of any utility without authority from the utility owner or direction from the Engineer. Valves, switches, vaults, and meters shall be maintained readily accessible for emergency shutoff.

Where protection is required to ensure support of utilities potentially impacted by the Work, the Contractor shall, unless otherwise specified on the Plans or in the Special Provisions, furnish and place the necessary protection and support.

Any additional cost incurred by the Contractor for protecting and supporting an unidentified underground main or trunk line utility or resulting from the misidentification of an underground main or trunk line utility will be paid for as an addition to the Work in accordance with Section 2, unless such utility's existence and location (with reasonable accuracy) was (or should have been) known to the Contractor as of the date on which the Bids were due or could otherwise have been inferred at that time from the presence of visible facilities such as buildings, meters, junction boxes or identifying markers. The cost of protecting and supporting all other utilities shall be considered as included in prices in the Bid for other items of the Work.

The Contractor shall immediately notify the Engineer and the utility owner if any utility is disturbed or damaged in the course of the Work. The Contractor shall, if directed by the Engineer, restore, repair or replace any such disturbed or damaged utility.

For any unidentified or misidentified underground main or trunk line utility that is disturbed or damaged in the course of the Work, the cost of restoration, repair or replacement incurred by the Contractor, if not made necessary by the Contractor's failure to perform its obligations pursuant to the Contract Documents (including without limitation Section 402-1) or to otherwise exercise reasonable care, will be paid for as an addition to the Work in accordance with Section 2. Except where additional compensation is allowed pursuant to this paragraph, all utilities disturbed or damaged in the course of the Work shall be restored, repaired or replaced at the Contractor's cost and expense, either by the utility owner or by the Contractor.

To the maximum extent permitted by law, all obligations of the Contractor stated in 5-4.2 shall apply in the case of any claims or liabilities (as defined therein) that may be asserted or claimed by any person or entity arising out of any disturbance or damage to utilities caused by the act or omission of the Contractor, whether or not such utilities are accurately marked either on the Plans or by the utility owner in the field, and whether or not there is concurrent active or passive negligence on the part of City and/or City Personnel, but excluding any such claims or liabilities arising from the sole active negligence or willful misconduct of City or City Personnel. All claims and liabilities for which

the Contractor is responsible pursuant to this paragraph are sometimes referred to herein as "Utility Damage Claims."

When placing concrete around or contiguous to any non-metallic utility installation, the Contractor shall at its expense:

- a) Furnish and install a 2-inch (50 mm) cushion of expansion joint material or other similar resilient material; or
- b) Provide a sleeve or other opening which will result in a 2-inch (50 mm) minimum-clear annular space between the concrete and the utility; or
- c) Provide other acceptable means to prevent embedment in or bonding to the concrete.

Where concrete is used for backfill or for a structure which would result in embedment, or partial embedment, of a metallic utility installation; or where the coating, bedding or other cathodic protection system is exposed or damaged by the Contractor's operations, the Contractor shall notify the Engineer, shall arrange to secure the advice of the affected utility owner regarding the procedures required to maintain or restore the integrity of the system, and shall implement such procedures at the Contractor's expense.

402-4 RELOCATION. *DELETE in their entirety 2nd and 3rd paragraphs and SUBSTITUTE with the following:*

If utilities are found to interfere with the Work after award of the Contract, such utilities will be rearranged by the respective utility owners, or the Engineer may order the Contractor to perform such rearrangement, as an addition to the Work in accordance with Section 2. Alternatively, the Engineer may order changes in the Work to avoid such interference, in accordance with Section 2. All work by the Contractor on utilities shall be done to the reasonable satisfaction of the utility owner as well as complying with the requirements of the Contract Documents.

When the Plans or Special Provisions provide for the Contractor to rearrange a utility as part of the Work, all costs for such work shall be considered included in the Bid for the items of work necessitating such work. However, if an underground main or trunk line utility to be rearranged by the Contractor is misidentified in the Plans, any additional cost incurred by the Contractor for such work resulting from the misidentification shall be treated as an addition to the Work in accordance with Section 2, unless the utility's location (with reasonable accuracy) was (or should have been) known to the Contractor as of the date on which the Bids were due or could otherwise have been inferred at that time from the presence of visible facilities such as buildings, meters, junction boxes or identifying markers. Except as provided in this paragraph, the Contractor shall not be entitled to any additional compensation on account of inaccuracies in the Plans with respect to rearrangements of utilities that are included in the Work.

Temporary or permanent rearrangement of utilities requested by the Contractor for its convenience shall be its responsibility and the Contractor shall make all arrangements

necessary for such work and bear all related costs. The Contractor shall not be entitled to any additional compensation on account of any such utilities or work.

ADD the following at the beginning of the last paragraph:

The provisions of this paragraph are subject to the provisions of the previous paragraph. Where the Plans or Special Provisions provide for the Contractor to rearrange any service connections, such work is considered included in the Bid for the items of work necessitating such work.

402-5 DELAYS DUE TO UTILITY CONFLICTS. *DELETE in its entirety and SUBSTITUTE with the following:*

The construction schedule developed in accordance with 6-1 shall allow adequate time for the necessary protection, removal, and rearrangement of utilities by either the utility owner or the Contractor, as applicable. For work to be performed by a utility owner, the construction schedule shall allow for the time period required by the utility owner for such work. The Contractor shall notify the Engineer in writing of any subsequent changes in the construction schedule which will affect the time available for protection, removal, or rearrangement of utilities, and shall obtain the Engineer's approval of such changes.

The Contractor will not be entitled to any extensions of the Contract time or compensation for damages incurred due to delays attributable to utilities at the site of the Work except as otherwise provided in 6-4.1 or as provided below. Delays described below will not be considered delays for which the City is responsible within the meaning of 6-4.3.

- a) Subject to 6-4.2 and 6-4.4, the Contractor shall be entitled to an extension of the Contract time to the extent that any delay in the Work is directly attributable to an unidentified underground main or trunk line utility or the misidentification of an underground main or trunk line utility in the Plans, unless the utility's location (with reasonable accuracy) was (or should have been) known to the Contractor as of the date on which the Bids were due or could otherwise have been inferred at that time from the presence of visible facilities such as buildings, meters, junction boxes or identifying markers. If the Contractor is entitled to such a time extension, the Contractor also shall be entitled to compensation for idle time of equipment on account of such delay, determined by the Engineer in the same manner as determinations are made for equipment used in the performance of Extra Work in accordance with Section 2. The Contractor shall not be entitled to any other compensation or damages on account of such delay.
- b) The Contractor may be given an extension of time (but no additional compensation) for unforeseen delays attributable to failure of a utility owner to complete utility rearrangement work within the time period reasonably scheduled for such work in the construction schedule, or to timely complete utility rearrangement work which the Contract Documents indicate will be completed in advance of the Contractor's construction operations.

The Contractor shall not be entitled to any time extension or additional compensation for any delays or losses described in 402-5: (a) to the extent resulting from the Contractor's actions or omissions or which could have been avoided by any reasonable means, such as the judicious handling of forces, equipment or plant, or (b) arising in connection with utilities being rearranged for the Contractor's convenience. The determination of what damages the Contractor could have avoided will be made by the Engineer.

The Contractor shall immediately notify the Engineer of any delays to the Contractor's operations described in 402-5. Delays described in 402-5 are not considered right of way delays within the scope of 2-3.

ADD:

402-7 CONTRACTOR RESPONSIBILITIES.

The Contractor shall:

- a) Cooperate with utility personnel; provide access to work site.
- b) Coordinate Work of the Contract with affected utilities. All USA markings shall be removed after completion of the work for which the markings were provided, and before Agency's Acceptance and/or approval of the Work.
- c) Asphalt concrete pavement not overlaid or slurry sealed as part of the project bid items which is damaged by trenching, potholing or where the contractor otherwise damages pavement shall be slurry sealed after the pavement section is repaired. "Perpendicular" street cuts shall be slurry sealed ten (10) feet each side of the cut and for "longitudinal" cuts shall be slurry sealed from pavement lane to pavement lane line for the entire damaged area or as directed by the Agency Representative. Type I slurry shall be used on non-arterial streets and Type II slurry shall be used on arterial streets. Damaged traffic striping, legends and markers shall also be replaced if damaged. "Patchwork" application of slurry shall be avoided by joining closely grouped areas of slurry applications. Compensation for this requirement shall be considered as included in the prices paid for the related items of work and no additional compensation will be allowed therefor.

ADD:

402-8 PERMANENT UTILITIES. Contractor shall contact and make all arrangements with utility owners and coordinate all provisions for installation and connection of all permanent utilities that are necessary for the Work, such as, but not limited to, natural gas, electricity, water, sewer, and telephone. All costs for such installation and connection, as well as costs for operating permanent utilities prior to acceptance of the Work by the Agency, shall be considered as included in the prices in the Bid for the related items of work.

402-8.1 UTILITY CONTACT & CONSTRUCTION TABLE.

Utility Company	Contact/Phone	Estimated Construction Window / Duration in Working Days¹	Work Description Includes But Is Not Limited To:
SCE	Jimmy Ochoa/951-970-6868	TBD	New Services and associated work.

The construction durations listed represent total accumulated time for the installation of the utilities. It is anticipated that each utility will require several mobilizations to complete their work in conjunction with the Contractor's operations. The following additional information is provided to facilitate coordination between the Contractor and each respective utility company:

¹ Note: Working days include multiple mobilizations.

PART 6 – TEMPORARY TRAFFIC CONTROL

SECTION 600 – ACCESS

REVISE as follows:

600-2 VEHICULAR ACCESS. *DELETE in its entirety and SUBSTITUTE with the following:*

Vehicular access to residential driveways shall be maintained to the property line except when necessary construction precludes such access for reasonable periods of time. If backfill has been completed to the extent that safe access may be provided, and the street is opened to local traffic, the Contractor shall immediately clear the street and driveways and provide and maintain access.

Safe, adequate, continuous, and unobstructed vehicular access shall be maintained to fire hydrants, residences, commercial and industrial establishments, churches, schools, parking lots, service stations, motels, fire and police stations, bus stops, hospitals, etc., unless otherwise approved by the Engineer.

During non-working hours or when work is not scheduled, all roadway lanes shall be returned to their full traffic use by backfilling and paving open trenches unless otherwise approved by the Engineer. At the end of the workday, the Contractor shall remove all Traffic Control Devices not in use.

The Contractor shall replace vehicle loop detectors damaged by the Contractor's operations, at its own expense within 24 hours of the damage. The Contractor shall replace existing loop detectors, shown on the plans to be replaced, within 24 hours from when they are removed from service.

Should the Contractor fail to replace the vehicle loop detectors within 24 hours from when they are damaged or removed from service, or the installed signal loops are not functional, the Agency, at its option and at the Contractor's sole cost and expense, may install such temporary detection methods as may be necessary. The Agency will deduct cost of such work from any monies due the Contractor. Failure of the Agency, however, to install such temporary detection methods, shall not relieve the Contractor of his full responsibility for public safety per 5-7 of the Standard Specifications and the Special Provisions.

If the Contractor proposes temporary alternate detection methods, video or wireless, the Contractor shall provide submittals of the alternate methods for acceptance by the Engineer in accordance with 3-8 of the Standard Specifications and the Special Provisions. The cost for providing all temporary detection methods shall be as included in the various items of Work and no additional compensation will be allowed therefor.

600-3 PEDESTRIAN ACCESS.

DELETE in its entirety and SUBSTITUTE with the following:

Safe, adequate, continuous and unobstructed pedestrian access shall be maintained to sidewalks, cross walks, residences, commercial and industrial establishments, churches, schools, parking lots, service stations, motels, fire and police stations, hospitals, etc., unless other arrangements satisfactory to the Agency have been made by the Contractor and accepted by the Agency. Pedestrian access and paths shall meet federal, state, and Agency ADA requirements.

ADD:

600-4 CONSTRUCTION PARKING CONTROL.

The Contractor shall control vehicular parking to preclude interference with public traffic or parking, access by emergency vehicles, owners operations, or construction operations, and monitor parking or construction personnel private vehicles by maintaining free vehicular access to and through parking areas and prohibit parking on or adjacent to access roads, or in non-designated areas.

ADD:

600-5 SITE ACCESS.

When entering or leaving roadways carrying public traffic, contractors' equipment, whether empty or loaded, shall in all cases yield to public traffic.

The Contractor shall comply with the following City of Irvine truck route restrictions:

DESIGNATED TRUCK ROUTES – ORD. NO. 92-09

<u>Name of Street</u>	<u>Portion Designated</u>
a) Alton Parkway	Sand Canyon Avenue to Irvine Boulevard
b) Bake Parkway	Rockfield Boulevard to easterly City limit
c) Barranca Parkway	Red Hill Avenue to Jamboree Road
d) Campus Drive	Jamboree Road to MacArthur Boulevard
e) Irvine Boulevard	Culver Drive to Jeffrey Road
f) Irvine Boulevard	Alton Parkway to easterly City limit
g) Jamboree Road	Warner Avenue to MacArthur Boulevard
h) Laguna Canyon Road	Alton Parkway to State Route 133
i) Laguna Freeway (133)	
j) MacArthur Boulevard	Daimler Street. to Campus Drive

- | | |
|---------------------------|--|
| k) MacArthur Boulevard | Jamboree Road to Ford Road |
| l) Main Street | Jamboree Road to westerly City limit |
| m) Red Hill Avenue | Barranca Parkway to San Diego Fwy. (I-405) |
| n) Rockfield Boulevard | Bake Parkway to easterly City limit |
| o) Sand Canyon Avenue | San Diego Fwy. (I-405) to northerly City limit |
| p) San Diego Fwy. (I-405) | |
| q) Santa Ana Fwy. (I-5) | |

RESTRICTED ROUTES, SEVEN TON (14,000 POUNDS) GROSS WEIGHT - ORD. NOS. 92-09 AND 98-16

<u>Name of Street</u>	<u>Portion Designated</u>
a) Campus Drive	Jamboree Road to University Drive
b) Culver Drive	Santa Ana Fwy. (I-5) to northerly City limit
c) Jeffrey Road	Irvine Center Drive to Santa Ana Fwy. (I-5)
d) Jeronimo Road	Goodyear to 400 feet westerly of Bake Pkwy.
e) Toledo Way	Goodyear to 400 feet westerly of Bake Pkwy.
f) Trabuco Road	400 feet easterly of the northbound Santa Ana Freeway off-ramp near Culver Drive and the easterly City limits
g) Walnut Avenue	Harvard Avenue to Culver Drive
h) Harvard Avenue	Walnut Avenue to Irvine Center Drive

THREE TON (6,000 POUNDS) GROSS WEIGHT - ORD. NO. 92-09

<u>Name of Street</u>	<u>Portion Designated</u>
a) Bonita Canyon Road/Shady Canyon	Newport Coast Drive to Sunnyhill
b) Culver Drive	Michelson Drive to Bonita Canyon Road
c) University Drive	Ridgeline Drive to Harvard Avenue

SECTION 601 – TEMPORARY TRAFFIC CONTROL FOR CONSTRUCTION AND MAINTENANCE WORK ZONES

REVISE as follows:

601-1 GENERAL.

DELETE in its entirety and SUBSTITUTE with the following:

The Contractor shall provide and maintain all construction area traffic controls in accordance with Part 6 of the Standard Specifications, the latest version of the (MUTCD), and Work Area Traffic Control Handbook (WATCH), and these Special Provisions.

Portable delineators (traffic cones are not allowed) which conform to the current California Manual of Uniform Traffic Control Devices (CA MUTCD) shall be spaced as necessary for proper delineation of the travel way. The spacing between delineators shall not exceed 50 feet. The minimum lane transitions shall be a 50 to 1 taper unless otherwise shown on the plans. Double base delineators will be required.

If the portable delineators are damaged, displaced or are not in an upright position, from any cause, said portable delineators shall immediately be replaced or restored to their original location, in an upright position, by the Contractor.

Where construction detours and signing conflict with existing signing, the Contractor shall cover existing signs in a manner approved by the Agency's Representative. The Contractor shall also provide temporary traffic delineation per Section 601-4 at the conclusion of each working day, if not sooner, as approved by the Agency's Representative, for any centerline, painted median or lane line which is obliterated by construction.

The Contractor shall provide temporary delineation as directed/accepted. Temporary delineation shall include removal of conflicting markings by accepted means; 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. Conflicting existing and temporary striping, as required for traffic control during construction, shall be removed by the Contractor by methods accepted by the Engineer. Blacking out the pavement will not be allowed. Temporary reflective striping tape may be used, except that it shall not be applied to final asphalt surfaces. Tape shall be removed from temporary surfaces prior to placement of additional asphalt.

The Contractor shall maintain a 24-hour emergency service to remove, install, relocate, and maintain warning devices and shall furnish to the Agency's Representative, names and telephone numbers of three persons responsible for this emergency service. In the event the Contractor does not promptly respond when notified, the Agency may make corrections at Contractor's expense.

Each workday, the Contractor shall ensure traffic control is in place prior to starting construction.

Should the Contractor appear, in the opinion of the Engineer, to be lacking in providing adequate warning devices and protective measures as above provided, the Engineer may direct attention to the existence of a hazard, and the necessary warning and protective measures shall be furnished and installed by the Contractor, at his/her expense. Should the Engineer point out the inadequacy of warning and protective measures, such action on the part of the Engineer shall not relieve the Contractor from responsibility for public safety or abrogate its obligation to furnish and pay for these devices.

The Contractor shall notify local Police and Fire Departments of its intent to begin work at each location at least ten (10) days before work is to begin. The Contractor shall cooperate with local authorities relative to handling traffic through the area. The Contractor shall also coordinate with OCTA to ensure the safe operation of buses and access to bus stops in the construction area.

No work that interferes with public traffic shall be performed except during the hours specified for lane closures 601-6.6.

Existing traffic loop detector replacement shall be required as necessary such that no traffic signal loop is out of operation at the end of the workday. The cost for providing all temporary traffic signal loop detectors shall be included into the various related items of work and no additional compensation will be allowed; this includes traffic signal loop detectors damaged by the Contractor's operations not designated for replacement in the contract plans.

Areas requiring edge cold mill shall be cold milled not more than three (3) Calendar Days prior to AC paving. Areas requiring digouts shall be repaved and open for traffic at the end of the same day.

The Contractor shall maintain access to all driveways at all times.

601-2 TRAFFIC CONTROL PLAN (TCP).

601-2.1 General.

DELETE in their entirety 2nd, 4th and 5th paragraphs and SUBSTITUTE with the following:

The Contractor shall provide a plan prepared and stamped by registered civil engineer in the State of California for approval by the Agency prior to commencing Work of the Contract. Allow a minimum of fifteen (15) Working Days for the first Agency review and ten (10) Working Days for subsequent reviews.

The Contractor shall legibly indicate the following information on a reproducible drawing.

- a) All lane closures and/or detours anticipated during construction.

- b) Temporary signage, striping and delineation.
- c) Special traffic control requirements.

The Contractor shall submit two (2) prints of approved drawings to Agency Representative and retain one (1) print at construction site.

601-2.2 Payment.

MODIFY to ADD the following:

The contract Lump Sum price paid for **Traffic Control** includes full compensation for furnishing all labor, materials, tools, equipment and incidentals and for preparing traffic control plans, doing all the work involved in all temporary traffic control related work involving placing, removing, storing, maintaining, moving to new locations, replacing and disposing of the components of traffic control system, complete in place, temporary Asphalt Concrete including installation and removal; all associated temporary signing and striping; flashing arrow signs; flagging and/or flagger costs; and project notifications, as shown on the Plans, as specified in the Standard Specifications and these Special Provisions, and as approved by the Engineer.

ADD:

601-7 STREET CLOSURE, DETOURS, BARRICADES.

Unless shown on the plans, no street closure shall be allowed.

The Contractor shall construct the proposed improvements to minimize public inconvenience. The Contractor shall provide ADA accessible pedestrian detours around construction areas.

The Contractor shall have all Traffic Control Devices properly installed prior to commencing construction and shall maintain these devices to ensure proper flow and safety of traffic while working in the street.

The contractor shall be responsible for any additional Traffic Control Devices deemed necessary by the Engineer to assure public safety at all times.

ADD:

601-8 STORAGE OF EQUIPMENT.

Unless otherwise authorized in writing by the Engineer, construction materials may not be stored in streets, roads, or highways beyond the end of each Working Day. No equipment shall be stored within limits of the acquired temporary construction easements at any time.

Construction equipment shall not be stored at the work site before its actual use on the Work nor for more than two (2) Calendar Days after it is no longer needed on the Work. Time necessary for repair or assembly of equipment may be authorized by the Agency.

Excavated materials, except that which is to be used as backfill in the adjacent trench, may not be stored in public streets, roads, temporary construction easements, or highway unless otherwise permitted. After placing backfill, all excess material shall be removed immediately from the site.

The Contractor shall submit an equipment-staging plan for approval by the Engineer. The plan shall address the use of private property for the staging, unloading, loading, and storing of equipment. The Contractor shall obtain an agreement from private property owners prior to the start of the project. The agreement shall release and hold the Agency, the Engineer, the Agency Representative and their consultants harmless from claims for damages. Failure to file a plan or obtain written approval from private property owners is considered a breach of Contract and subject to all remedies and enforcement procedures specified in the Contract Documents.

ADD:

601-9 TRAFFIC REGULATIONS.

601-9.1 General. Furnish, install, and maintain Traffic Control Devices, equipment, materials, and other safeguards to provide safe and effective work areas, and to warn, control, protect and expedite vehicular and pedestrian traffic.

On daily basis, remove temporary traffic delineation, signage and other devices when no longer required. Restore areas to original or to specified conditions.

601-9.2 Related Requirements. Traffic control work and Traffic Control Devices for construction shall conform to the latest edition of:

- a) MUTCD
- b) Work Area Traffic Control Handbook (WATCH manual)
- c) Standard Specifications
- d) O.S.H.A. requirements
- e) California Vehicle Code

601-9.3 Construction Area Signs. The Contractor shall:

- a) Use only signs that conform to the dimension, color, legend, reflectorization and lighting requirements of the current WATCH, MUTCD and the Contract Documents.
- b) All sign panels shall be the product of a commercial sign manufacturer, but need not be new. Used sign panels clean and in good repair, as determined by the Agency Representative, may be used.
- c) Sign panels for portable signs may be metal, cotton drill fabric, flexible industrial nylon fabric or other approved fabric.

- d) Temporary stop signs shall have a minimum clearance of seven (7) ft. from bottom of sign to existing ground or pavement.
- e) Further requirements as discussed in the Contract Documents.

601-9.4 Flaggers. The Contractor shall provide flaggers as deemed necessary by the Engineer to give adequate warning to traffic or to the public of any dangerous conditions to be encountered, and employ only flaggers trained in flagging fundamentals and procedures referred to in the "Flagger Handbook" available on the Internet at the following website: <https://dot.ca.gov/programs/construction/safety-traffic/flagging-handbook>. Payment for flagging is considered as included in the various items of work and no additional compensation will be allowed therefor.

601-9.5 Temporary Closure of Existing Traffic Lanes. Unless the traffic control, working hours and lane requirements are modified in the Special Provisions, the following requirements shall be followed:

- a) When permitted by the Engineer, one (1) lane on each roadway adjacent to the working area may be closed to public traffic. Use of reflective or lighted traffic delineators to direct traffic away from excavations or other obstructions will be considered as a lane closure.
- b) A minimum of one (1) lane of traffic, twelve (12) feet wide, fourteen (14) feet wide if a lane is adjacent to an outside curb, in each direction, shall be maintained through the work area at all times.
- c) A minimum of two (2) lanes of traffic, each being twelve (12) feet wide, fourteen (14) feet wide if a lane is adjacent to an outside curb, in each direction, shall be maintained through the work area at all times when the work area is within a major arterial highway unless otherwise approved.
- d) When work is in progress within three (3) feet of a lane being used by public traffic, Contractor shall close the lane adjacent to the work. Reflective or lighted traffic delineators shall be placed to direct public traffic around the construction area in accordance with the requirements of this section. During non-working hours or when work is not in progress, position and maintain reflective traffic delineators in the 1 to 1-1/2 foot width of the existing traffic lane adjacent to the work.
- e) On roads open to public travel, temporary lane closures are limited between the hours of 9:00 a.m. and 3:00 p.m. Closures of roads on Sundays, holidays, or between the hours of 3:00 p.m. and 9:00 a.m. are prohibited unless otherwise approved by the Engineer.

All Traffic Control Devices used between dusk and 6:00 a.m. shall be lighted or reflectorized. Agency approved arrow board(s) shall be used to direct public traffic on all roads.

Prior to the start of each work day, the Contractor shall perform all necessary work incidental to and commensurate with the proper signing, detouring, barricading, etc., that is required for that particular day's schedule of operations. No construction shall be permitted until such signing and detouring operations have been completed.

601-9.6 Lane Requirements/Working Hours.

Working Hours:

Monday through Friday: 7:00 a.m. to 4:00 p.m.

Saturday: No work permitted

Sunday: No work permitted

Legal holidays: No work permitted

Work requiring lane closures may be in progress during the following hours:

Monday through Friday: 9:00 a.m. to 1:00 p.m.

Saturday: No work permitted

Sunday: No work permitted

Legal holidays: No work permitted

No lane closures shall be permitted on dates when sporting, pool, facility, or other special events are scheduled. The Contractor shall coordinate all proposed lane closures with the City in advance and obtain approval prior to implementation. No additional compensation will be allowed.

601-9.7 Closure Schedule. The Engineer shall be provided a list of any street lane closures, ramp closures, trail closures, sidewalk closures or detours for review and acceptance at least three (3) weeks advance of the closure.

Contractor shall submit a written schedule of planned closures utilizing the closure schedule request form, furnished by the Engineer. The closure schedule shall show the number of lanes, locations and times of the proposed closures, a precise description of work to be performed. Closure schedules submitted to the Engineer with incomplete or inaccurate information will be rejected and returned for correction and resubmittal. The Contractor will be notified of disapproved closures or closures that require coordination with other parties as a condition of approval.

Upon approval of the closure schedule by the Engineer and at least three (3) Working Days in advance of closing a lane, the Contractor shall notify the Police, Fire, Orange County Transportation Authority (OCTA) bus service, the Agency Representative and all other affected jurisdictional agencies, and comply with their requirements.

Closure schedule amendments, including adding additional closures, shall be submitted by noon to the Engineer, in writing, at least five (5) Working Days in advance of a planned closure. Approval of closure schedule amendments will be at the discretion of the Engineer.

The Engineer, the Police, Fire, Orange County Transportation Authority (OCTA) bus service, and all other affected jurisdictional agencies shall be notified of cancelled closures two (2) Working Days before the date of closure

The Contractor shall notify by email the City of Irvine four (4) Working Days prior to commencing any work within 250 feet of any signalized intersection (measured from the nearest cross street curb), implementing any road closure, and/or implementing any detour of traffic. Email notifications shall be sent to roadworkcoordination@cityofirvine.org.

Closures that are cancelled due to unsuitable weather may be rescheduled at the discretion of the Engineer.

601-9.8 Late Reopening of Closures and Required Contingency Plan. If a closure is not reopened to public traffic by the specified time, work shall be suspended in conformance with the provisions in 6-6 of the Special Provisions. No further closures shall be made until the Engineer has accepted a contingency plan, submitted by the Contractor that will ensure future closures will be reopened to public traffic at the specified time. A detailed contingency plan shall be prepared and submitted to the Engineer within one business day of the Engineer's request. The Engineer will have two (2) Working Days to accept or reject the Contractor's proposed contingency plan. The Contractor will not be entitled to compensation for the suspension of work resulting from the late reopening of closures.

601-9.9 Compensation. The Engineer shall be notified of delays in the Contractor's operations due to the following conditions:

- a) The Contractor's proposed closure schedule is denied and his planned closures are within the time frame allowed for closures in the Special Provisions, except that the Contractor will not be entitled to compensation for amendments requested by the Contractor to the closure schedule that are not approved.
- b) The Contractor is denied a confirmed closure.

If, in the opinion of the Engineer, the Contractor's controlling operation is delayed or interfered with by reason of these conditions, and the Contractor's loss due to that delay could not have been avoided by rescheduling the affected closure or by judicious handling of forces, equipment and plant, the delay will be considered a right of way delay and will be compensated in conformance with the provisions in 2-8 of the Standard Specifications and the Special Provisions.

Should the Engineer direct the Contractor to remove a closure before the time designated in the approved closure schedule, delay to the Contractor's schedule due to removal of the closure will be considered a right of way delay and compensation for the delay will be determined in conformance with the provisions in 2-3 of the Standard Specifications and these Provisions.

ADD:

601-10 Authority of agency representative.

Provisions of this section may be modified or altered if, in the opinion of the Agency Representative, public traffic will be better served and work expedited.

601-10.1 Execution. The Contractor shall field check all temporary traffic control signs, barricades, and other devices at least three (3) times every day, including Saturdays, Sundays and holidays to insure their proper maintenance and conformance to the Contract Documents and detailed instructions by the Agency Representative.

Should Contractor fail to properly place and/or maintain delineated lane closures or work areas, the Agency, at its option and at Contractor's sole cost and expense, may place delineation, barricades, or other devices, as may be necessary, to protect the public. Agency may in its discretion withhold the cost of such work from any monies due the Contractor at an amount equal to the rates shown below:

Delineation

Delineator	\$2.00/day plus-labor & equipment
Lighted Barricade	\$5.00/day plus-labor & equipment
8 Foot Wood Barricade	\$7.50/day plus-labor & equipment
Temporary Signs	\$25.00/day plus-labor & equipment
Type III Barricade	\$10.00/day plus-labor & equipment

Labor (2 Hour Minimum) – Regular Time

Lead Street Maintenance Technician	\$52.88
Street Maintenance Technician	\$40.82
Equipment Operator I	\$46.14
Equipment Operator II	\$49.74
Street Maintenance Supervisor	\$62.99
Street Superintendent	\$79.80

Equipment

Arrow Board	\$15.00/hour
Pickup	\$10.00/hour
Sweeper	\$45.00/hour
5-Yard Dump	\$25.00/hour
Loader	\$25.00/hour
Water Truck	\$25.00/hour
1-Ton Truck	\$10.00/hour

Agency shall have no obligation to Contractor with respect to Agency's decision whether or not to exercise Agency's options pursuant to this subsection.

ADD:

601-11 PORTABLE CHANGEABLE MESSAGE SIGNS (PCMS).

Portable changeable message signs shall be furnished, placed, operated, and maintained as designated by the Engineer in conformance with the provisions in Section 12, "Construction Area Traffic Control Devices," of the State Standard Specifications and these Provisions. The Contractor shall furnish 2 **(two)** PCMS. PCMS shall be in place a minimum of two (2) weeks prior to start of construction.

Approximate locations of the PCMS are as follows:

- a) Insert location of signs
- b) Insert location of signs

601-11.1 Payment. Full compensation for conforming to the requirements for PCMS, including furnishing all labor, tools, equipment, materials and incidentals required for doing all the work involved in furnishing, installing, maintaining, relocating, changing sign message (regardless of the number of times directed by the Engineer), replacing, repairing, and when no longer required, removing of all PCMS as specified in the Standard Specifications and these Special Provisions, and as directed by the Engineer, shall be considered as included in the Contract Lump Sum price paid for Traffic Control and no separate compensation will be allowed therefor.

601-12 FLASHING ARROW SIGNS.

Flashing arrow sign shall be mounted on a truck or on a trailer and shall be capable of operating while the vehicle is moving or as directed by the Engineer. Signs mounted on the cab of a truck shall be mounted to provide a minimum of 7 feet between the bottom of the sign and the roadway. Signs mounted on a trailer, or on anything other than the cab of a truck, shall be mounted to provide a minimum of 8 feet between the bottom of the sign and the roadway.

The total weight of trailer mounted flashing arrow sign including the trailer, sign, power source and other components shall not exceed 1,500 pounds and the height of the level trailer bed shall be no higher than 21 inches above the roadway. The trailer shall be equipped with a minimum of 3 leveling jacks.

Electrical energy to operate the sign shall be obtained from the vehicle on which the sign is mounted. The supply of electrical energy shall be capable of operating the sign in the manner specified. The electronic circuitry shall provide between 30 and 45 complete operating cycles of the sign per minute in each of the modes specified.

Alternative types of lamps may be used in flashing arrow signs if visibility is equal to the specified lamps. Each type AX flashing arrow sign shall be a minimum of 2 feet high and 4 feet wide, and shall be furnished with flat black enamel. A minimum of 13 No. 4414AX 12-volt, yellow or amber lamps shall be installed in the panel. The lamp configuration shall be for 3 arrowheads or an arrow shaft with 2 arrowheads, one pointing in each direction on the face of the sign with a minimum of 5 lamps forming each arrowhead. Each lamp shall be provided with a visor.

The lamp shall be activated by a switch on a control panel and shall be controlled by electronic circuitry to provide a minimum of 4 selectable modes of operation as follows:

Pass Left Mode – Sequencing of lighted arrowheads or sequencing the lamps forming the arrow shaft and arrowhead to the left or a flashing left arrow with the lamps in the arrow shaft and arrowhead flashing on and off simultaneously.

Pass Right Mode – Sequencing of lighted arrowheads or sequencing the lamps forming the arrow shaft and arrowhead to the right or a flashing right arrow with the lamps in the arrow shaft and arrowhead flashing on and off simultaneously.

Simultaneous Mode – Either the outside arrowheads pointing in opposite directions are continuously illuminated, except for the center lamp forming each arrowhead, while the arrow shaft lamps flash on and off simultaneously or the outside arrowhead pointing in opposite directions and the arrow shaft lamps all flash simultaneously to indicate passing on either side.

Travel Mode – Travel or caution mode shall flash in a manner not resembling any other mode.

Full compensation for conforming to the requirements of this section shall be considered as part of Bid Item **Traffic Control** and no additional compensation will be allowed therefor.

PART 7– STREET LIGHTING AND TRAFFIC SIGNAL SYSTEMS

REVISE as follows:

SECTION 700 – MATERIALS

700-1 General *DELETE "and traffic signals."*

700-3.3 Standards *DELETE in its entirety*

700-3.4 Mast Arms *DELETED*

700-3.5.4 Rigid Non Metallic Conduit *DELETE "UL 65B (HDPE)"*

700-3.7 Pull Boxes *ADD the following*

Pull boxes for Parking Lot Lighting shall be Brooks Products, Jenson Precast or approved equal. Pull boxes shall be concrete cast with bolt down concrete covers with legend "Parking Lot Lighting" ½" (min.) block recessed letters cast into cover. Boxes called out on plan are to be 10-1/2" x 17-1/4", 17" x 30" and 24" x 36" Brooks Products or approved equal and have been and sized according to the 2013 C.E.C. art. 214.28.

The grade of the top of the pull box shall be set flush in paved and lawn areas and 1 inch above natural grade in planter and natural grade areas.

700-4.1 Reinforced Concrete Standards *ADD the following*

Concrete light pole shall be Ameron 1C614 with black and white marble and anchor base type aggregate, including Amershield anti-graffiti coating.

700-4.2.2 Series Conductor *DELETED*

700-4.3.3 Terminal Blocks *DELETED*

700-4.4 High Pressure Sodium Luminaires *DELETE in its entirety and SUBSTITUTE with the following:*

700-4.4 LED Luminaires

Pole mounted luminaire shall be Echo Lighting Inc. EPF Series EL-EPF/TS-BS-126W-LED-277V-3K-SF3OD-TYPEIV-W/7 PIN REC-DALI INTERFACE-DBZ fixture includes LED lamp components and 7-pin shorting cap and house side shield (HSS) where indicated on Project Drawings.

700-5 TRAFFIC SIGNAL MATERIALS *DELETED*

SECTION 701 – CONSTRUCTION

701-1 General *ADD the following to the section.*

Upon receiving the Notice to Proceed, because of the length of time required for delivery of poles and lighting fixtures, the Contractor shall immediately place an order for the poles and light fixtures and provide the City with documentation confirming the placement of the order and the expected dates of delivery.

The term "Street Lighting Standard" shall mean "Bike Trail Light(s)" or "Light(s)".

Should there be an underground utility or other conflict with the 2-foot diameter by 4'-6" deep light pole foundation the contractor shall use the alternate shallow footing foundation.

Payment for contract Bid Items will be considered full compensation for furnishing all labor, materials, tools, equipment and incidentals necessary to accomplish the work complete in place, conforming to the requirements herein, as shown on the plans, as specified in the Standard Specifications and these Special Provisions, as approved by the Engineer and no additional compensation will be allowed therefore.

701-7.2 Trenches *ADD the following to the section.*

The Contractor shall hand excavate any trench portion below 1' in depth, protecting existing tree root systems or perform directional boring, within the drip line of existing trees that have an 8" or larger trunk diameter.

The Contractor shall receive the Engineer's prior approval before performing any root pruning. Necessary root pruning shall be performed in accordance with ANSI A300 standards.

Any tree damaged by the Contractor's operations shall be removed and replaced, in kind, with a tree similar in size and stature (including a 90 day plant establishment period), at the Contractor's sole expense, as approved by the Engineer and no additional compensation will be allowed therefor.

701-8.2 *ADD the following to the end of the paragraph*

The portion of the foundation above ground shall be formed by using a sonotube.

The type of footing to be used will be at the City's discretion. The Contractor shall verify location constraints and recommend the footing type to be used for each new light pole for the Engineer's approval. Installation will not begin without approval of the Engineer.

701-8.6 Payment – Foundations *DELETE and SUBSTITUTE with the following:*

Payment for work associated with parking lot lighting foundation installation, including full compensation for furnishing all labor, materials, tools, equipment, and incidentals necessary to accomplish the work, complete in place shall be included in the **INSTALL PARKING LOT LIGHT** unit price.

701-10.4 Payment (Street Light Standards and Meter Pedestals) *DELETE* and *SUBSTITUTE with the following:*

Payment for **PARKING LOT LIGHTS** will be at the contract price per **Each (EA)** and shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals necessary to accomplish the work, complete in place, conforming to the requirements herein, including, but not limited to, potholing of utilities to determine clearances, protection of existing improvements, saw cutting, removal and replacement of concrete, asphalt pavement, rip-rap, shotcrete, removal and replacement/repair of landscaping, shoring, excavation, material haul away and disposal, backfill, compaction, form work, concrete work for the foundation, foundation, alternate/shallow foundation installations (if necessary), anchor bolt, pole and fixture installation, electrical work (including conduit and conductors connections, splices, fuses and terminations within the pole/fixture/foundation), grading, resurfacing, system energizing and installation of miscellaneous equipment as shown on the plans as specified in the Standard Specifications, Standard Plans and these Special Provisions, as approved by the Engineer and no additional compensation will be allowed therefor.

Payment for **PEDESTAL, PULL BOXES, BRANCH CIRCUITING, CONDUIT AND CONDUCTORS** will be at the contract price per **Lump Sum (LS)** and shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals necessary to accomplish the work, complete in place, including, but not limited to, potholing of utilities to determine clearances, protection of existing improvements, saw cutting, removal and replacement of concrete, asphalt pavement, rip-rap, shotcrete, shoring, excavation/trenching (including protection of existing tree roots and replacement of damaged trees) and/or directional boring, material haul away and disposal, conduit (including spares) and conductor installation, connections, splices, fuses and terminations, backfill, compaction, restoration of jacking pits, grading, resurfacing, coordination, utility and pull box modifications and adjustments, installation of miscellaneous equipment as shown on the plans as specified in the Standard Specifications, Standard Plans and these Special Provisions, as approved by the Engineer and no additional compensation will be allowed therefor.

Payment for **PANELBOARDS** will be at the contract price per **EACH (EA)** and shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals necessary to accomplish the work, complete in place, including, but not limited to, potholing of utilities to determine clearances, protection of existing improvements, saw cutting, removal and replacement of concrete, asphalt pavement, rip-rap, shotcrete, shoring, excavation/trenching (including protection of existing tree roots and replacement of damaged trees) and/or directional boring, material haul away

and disposal, conduit (including spares) and conductor installation, connections, splices, fuses and terminations, backfill, compaction, restoration of jacking pits, grading, resurfacing, coordination, utility and pull box modifications and adjustments, installation of miscellaneous equipment as shown on the plans as specified in the Standard Specifications, Standard Plans and these Special Provisions, as approved by the Engineer and no additional compensation will be allowed therefor.

701-11.3 Payment – Pull Boxes *DELETE and SUBSTITUTE with the following:*

Payment for work associated with pull box installation and for conforming to the requirements of this section, including full compensation for furnishing all labor, materials, tools, equipment, and incidentals necessary to accomplish the work, complete in place shall be included in the **Each (EA)** contract price paid for **PULL BOXES, CONDUIT AND CONDUCTORS** and no additional compensation will be allowed therefor.

701-12.1 General *DELETE the 2nd and 3rd sentence and SUBSTITUTE with the following:*

Conduit shall be installed by directional boring method where shown on plans or when under concrete sidewalk and driveways, asphalt pavement or artificial turf. Trenching and/or directional boring method can be used in all other cases or when approved by the Engineer.

701-12.7 Payment – Conduit *DELETE and SUBSTITUTE with the following:*

Payment for work associated with c installation and for conforming to the requirements of this section, including full compensation for furnishing all labor, materials, tools, equipment, and incidentals necessary to accomplish the work, complete in place shall be included in the **Lump Sum (LS)** contract price paid for **PULL BOXES, CONDUIT AND CONDUCTORS** and no additional compensation will be allowed therefor.

701-13.4 Payment – Conductors *DELETE and SUBSTITUTE with the following:*

Payment for work associated with wire, conductor and cable installation and for conforming to the requirements of this section, including full compensation for furnishing all labor, materials, tools, equipment, and incidentals necessary to accomplish the work, complete in place shall be included in the **Lump Sum (LS)** contract price paid for **PULL BOXES, CONDUIT AND CONDUCTORS** and no additional compensation will be allowed therefor.

701-14 SERVICES *ADD the following to the section*

701-14.5 Payment. *DELETE and SUBSTITUTE with the following:*

Payment for **ELECTRICAL UTILITY SERVICE** will be at the contract price per **Lump Sum (LS)** and shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals necessary to accomplish the work, complete in place, conforming to the requirements herein, including, but not limited to potholing of utilities to determine clearances, protection of existing improvements, drilling/coring, saw cutting, removal and replacement of concrete, asphalt pavement, rip-rap, shotcrete, removal and replacement/repair of landscaping, shoring, excavation/trenching (protecting existing tree roots) and/or directional boring, material haul away and disposal, form work, concrete foundation, reinforcement; anchor bolts, circuit breakers, conduit and conductor installation, connection to existing panel with new branch circuit connection, new branch feeders connections, splices, fuses and terminations, backfill, compaction, restoration of jacking pits, grading, resurfacing, coordination, utility and pull box modifications and adjustments, installation of miscellaneous equipment as shown on the plans as specified in the Standard Specifications, Standard Plans and these Special Provisions, as approved by the Engineer and no additional compensation will be allowed therefor

Payment for **EV CHARGERS** will be at the contract price per **EACH (EA)** and shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals necessary to accomplish the work, complete in place, conforming to the requirements herein, including, but not limited to potholing of utilities to determine clearances, protection of existing improvements, drilling/coring, saw cutting, removal and replacement of concrete, asphalt pavement, removal and replacement/repair of landscaping, shoring, excavation/trenching (protecting existing tree roots) and/or directional boring, material haul away and disposal, form work, concrete foundation, reinforcement; anchor bolts, circuit breakers, conduit and conductor installation, connection to existing panel with new branch circuit connection, new branch feeders connections, splices, fuses and terminations, backfill, compaction, restoration of jacking pits, grading, resurfacing, coordination, utility and pull box modifications and adjustments, installation of miscellaneous equipment as shown on the plans as specified in the Standard Specifications, Standard Plans and these Special Provisions, as approved by the Engineer and no additional compensation will be allowed therefor.

PART 8 – LANDSCAPING AND IRRIGATION

SECTION 800 – MATERIALS

REVISE as follows:

800-1 LANDSCAPING MATERIALS.

800-1.2 Soil Fertilizing and Conditioning Materials

800-1.2.3 Commercial Fertilizer. *DELETE entire section and SUBSTITUTE with the following:*

Commercial fertilizer for back fill mix shall be free-flowing material delivered in unopened sacks. Material which becomes caked or otherwise damaged shall not be used. Exact composition and type of fertilizer to be determined by the agronomic soils test and will be supplied by the Contractor at no additional cost to the City. Organic/JTM Complete is the city's preferred fertilizer.

Organic/JTM fertilizer application applied at the following rates:

For pre-plant landscape application (Turf and Groundcover)	Apply 30 pounds per 1000 square feet		
Container Size	1 gallon	5 gallon	15 gallon
Application Rates	2 oz.	6 oz.	19 oz.

800-1.2.4 Organic Soil Amendment. *DELETE entire section and SUBSTITUTE with the following:*

Organic Soil Amendment for back fill mix shall be Type 1. Nitrogen Stabilized Organic soil amendment shall be redwood sawdust free of shavings or particles of other woods such as fir or pine, supplied in bulk and 0.5% nitrogen stabilized by standard techniques. An acceptable substitute is nitrogen stabilized fir or cedar sawdust ground to 0-1/4" particle size and 1.0% nitrogen stabilized.

800-1.2.5 Mulch. *DELETE entire section and SUBSTITUTE with the following:*

Contractor shall install 2" thick layer of mulch in all planter areas. Install mulch per Irvine standard plan #601, 602, 606, and 607. Mulch to be installed after the planting of shrubs.

The Contractor shall maintain a 6" clear "no-mulch" zone around the base of each new and existing shrub and tree.

Mulch to be "Forest Floor" (0-2"), or approved equal:

a) Available from

Tierra Verde Industries
7913 Marine Way
Irvine, CA 92618
(949) 551-0363

- b) Product shall be woodchips ½" to 3" in length, meet Caltrans Standard Specifications 20-2.08 for Mulch, contain only toxic free mineral based colorant, **and contain reused City of Irvine Green Waste.**
- c) The Contractor shall submit one sample of mulch materials for City approval.
- d) The Engineer has the right to reject all samples and request additional samples until a suitable mulch material is approved.

800-1.4 Plants. ADD the following:

Contractor to provide 1-year guarantee for all shrubs.

800-1.4.1 General. DELETE entire section and SUBSTITUTE with the following:

Shrubs and ground covers shall be grown by an established nursery having been in the business of growing shrubs and ground covers a minimum of five (5) years. At the option of the Engineer, plants shall be inspected and tagged at the nursery prior to shipment to the planting site. Shrubs shall be of the specified type and size, selected from high quality, well-shaped nursery stock. Plant names indicated or listed in the "Plant Legend" on the Plans, conform to the approved names given in "An Annotated Checklist of Woody Ornamental Plants in California, Oregon, and Washington, Manual 4091", published by the University of California (1979), and in accordance with American Nurseryman standards. Except for names not covered therein, the established custom of the nursery shall be followed. Condition of plants shall be in accordance with the California State Department of Agriculture's regulations for nursery inspections, rules, and grading and shall be symmetrical, typical for variety and species, sound, healthy, vigorous, free from plant disease, insect pests, or their eggs, and shall have healthy normal root systems, well filling their containers, but not to the point of being root bound.

Plants shall not be pruned prior to delivery, except as authorized by the City. The size of the plants shall correspond with that normally expected for species and variety of commercially available nursery stock, or as specified on the Plans. The minimum acceptable size of all plants, measured before pruning with the branches in normal position, shall conform to the measurements, if any, specified on the Plans. Plants larger in size than specified may be used with the approval of the City, but the use of larger

plants shall not serve as the basis for a change order. All plant material shall be subject to the inspection and acceptance of the City before planting. A representative number of plants as determined by the City may be inspected for size and condition of root growth, insects, injuries and defects. Plants not accepted are to be removed from the site immediately and replaced with suitable plants. The City reserves the right to reject entire lots of plants represented by defective samples. The contractor shall provide a plant material order invoice to the Engineer at the preconstruction meeting.

800-1.6 Miscellaneous Landscape Materials. *ADD the following Section:*

800-1.6.1 General. Whenever a material or process is delineated or specified by patent, proprietary name or process, or manufacturer's name, such specifications are used for the purpose of facilitating the description of material or process desired. Approved equals are acceptable as approved by the engineer. Suppliers and manufacturer's directions, specifications and recommendations will be followed in all cases where the materials used furnish directions and cover points not delineated on the Plans or in the Specifications. The specifications only indicate the quality and workmanship to be performed rather than a detailed description of the performance of the work. In the event of any discrepancies between the Plans or Specifications, the final decision as to which will be followed shall be made by the Engineer. In the event the installation is contradictory to the direction of the Engineer, the installation shall be rectified by the Contractor at no additional cost to the City.

All workmanship and materials incorporated shall be the best available grade of their respective kind. Provide a sample of each material specified. Accepted samples may be used in the Work. Submit three (3) sets of a type written list of materials as specified to the Engineer within twenty-one (21) days after award of contract. This list shall give the name, material number, and the manufacturer, and shall be accompanied by cut sheets or reproductions of catalog pages for all of the material to be installed. Approval of substitutions will not relieve the Contractor from complying with the requirements of the Contract Documents, Plans and Specifications. Pay at Contractor's sole expense for all changes caused by approved substitution which affect other items of work.

800-1.6.2 Herbicide. All herbicides shall be organic. Organic herbicide for weed abatement shall be Suppress EC, or approved equal.

800-1.6.3 Pre-emergent. Pre-emergent weed control material shall be Organic.

800-2 IRRIGATION SYSTEM MATERIALS.

800-2.1.3 Plastic Pipe for Use with Solvent Weld Socket or Threaded Fittings.

DELETE 2nd Paragraph and REPLACE with the following:

All pressure supply lines downstream of the strainer assembly unit shall be Schedule 40 solvent weld PVC 1-1/2" or smaller and Class 315 solvent weld PVC for 2" or larger. Piping shall conform to ASTM 1785. All non-pressure lines downstream of the remote control valve shall be Schedule 40 solvent weld PVC conforming to ASTM D1785. Pipe shall be marked continuously with manufacturer's name, nominal pipe size,

schedule or class, PVC type and grade, National Sanitation Foundation approval, Commercial Standards designation, and date of extrusion. All plastic pipe shall be extruded of an improved PVC virgin pipe compound in accordance with ASTM D2241 or ASTM D1785.

All solvent weld PVC fittings shall be standard weight Schedule 80 and shall be injection molded of an improved virgin PVC fitting compound. Slip PVC fittings shall be the "deep socket" bracketed type. Threaded plastic fittings shall be injection molded. All tees and angled fittings shall be side gated.

All fittings shall conform to ASTM D2466. All threaded nipples shall be standard weight Schedule 80 with molded threads and shall conform to ASTM D1785.

All solvent cementing of plastic pipe and fittings shall be a two-step process, using primer and solvent cement applied per the manufacturer's recommendations. Cement shall be of a fluid consistency, not gel-like or ropy. Solvent cementing shall be in conformance with ASTM D2564 and ASTM D2855. When connection is plastic to metal, female adapters shall be hand tightened, plus one turn with a strap wrench. Joint compound shall be non-lead base Teflon paste, tape, or approved equal.

800-2.2.2 Gate Valves. *DELETE entire section and SUBSTITUTE with the following:*

Gate valves shall be of the manufacturer, size, and type indicated on the Plans.

800-2.2.4 Remote Control Valves. *DELETE entire section and SUBSTITUTE with the following:*

Automatic control valves shall be of the manufacturer, size, and type indicated on the Plans. Automatic control valves shall be electrically operated. Drip zone valves shall be accompanied with pressure regulators and filters per the manufacturer.

800-2.2.7 Valve Boxes. *DELETE entire section and SUBSTITUTE with the following:*

Valve boxes shall be fabricated from a durable, weather-resistant plastic material resistant to sunlight and chemical action of soils. The valve box cover shall be green in color and secured with dual locks to be supplied. The cover and box shall be capable of sustaining a load of 1,500 pounds. Valve box extensions shall be by the same manufacturer as the valve box. Automatic control valve boxes shall be rectangular and sized per plan. Valve box covers shall be marked "RCV" with the valve identification number "heat branded" onto the cover in 2 inch high letters / numbers. Gate valve boxes shall be 10" circular size. Valve box covers shall be marked with either "GV" "heat branded" onto the cover in 2 inch high letters. Line flushing valve boxes shall be 10" circular size. Valve box covers shall be marked with either "FV" "heat branded" onto the cover in 2 inch high letters. Heat branding method, craftsmanship, and lettering orientation to be approved by city prior to branding lids.

800-2.2.8 Line Flushing Valves. *ADD the following Subsection:*

Line flushing valves shall be the size and type as indicated on the plans.

800-2.4 Sprinkler Equipment. *DELETE entire section and SUBSTITUTE with the following:*

Irrigation heads and nozzles shall be of the manufacturer, size, type, with radius of throw, operating pressure, and discharge rate indicated on the Plans. Irrigation heads and nozzles shall be used as indicated on the Plans.

Drip line shall be of the manufacturer, size, type with discharge rate, emitter spacing and operating pressure as indicated on the Drawings. All fittings, line flushing valves and anchor staples shall be of the same manufacturer as the drip line.

800-2.5 Miscellaneous Landscape Materials. *ADD the following Section:*

All materials supplied for this project shall be new and free from any defects. All defective materials shall be replaced immediately at no additional cost to City. After award of contract and before any irrigation system materials are delivered to the job site, submit to the Engineer a complete list of all irrigation systems, materials, or processes proposed to be furnished and installed as part of this Contract. Show manufacturer's name and catalog number for each item, furnish complete catalog cuts and technical data, furnish the manufacturer's recommendations as to the method of installation. No substitutions will be allowed without prior written acceptance by the Engineer. Manufacturer's warranties shall not relieve the Contractor of liability under the guarantee. Such warranties shall only supplement the guarantee. If the Contractor wishes to substitute any equipment or materials for equipment or materials listed on the irrigation Drawings and Specifications, it may do so by providing the following information to the Engineer for approval:

- a) Provide a written statement indicating the reason for making the substitution.
- b) Provide catalog cut sheets, technical data, and performance information for each substitute item.
- c) Provide in writing the difference in installed price if the item is accepted.

The contractor shall furnish all materials as specified in the plans and specifications and turn over a fully functional irrigation system complete with programming as coordinated by the City and accommodating for the new irrigation controller within the new landscape.

Additionally, the contractor shall be responsible for repairing any landscape damaged or removed for the purpose of installation of the irrigation.

All irrigation materials provided and installed shall be specifically designed and manufactured for use within reclaimed irrigation systems.

800-3 ELECTRICAL MATERIALS.

800-3.2.2 Conductors. *DELETE entire section and SUBSTITUTE with the following:*

Remote control wire shall be direct-burial AWG-UF type, size as indicated on the Drawings, and in no case smaller than 14 gauge. Connections shall be Scotchlok 3M DBY Direct Bury Splice Kit per city std. plan 516. Kit shall include a Scotchlok Y Spring connector, a Polypropylene tube prefilled with waterproof sealing gel. Ground wires shall be white in color. Control wires shall be red (where two or more controllers are used, the control wires shall be a different color for each controller. These colors shall be noted on the "Record Drawings" Plans located on controller door). The Contractor shall provide 4 spare control wires per City of Irvine Landscape Manual, Section V Irrigation Specifications (under Products and Installation, item 24, item c).

800-3.3 Controller Unit. *DELETE entire section and SUBSTITUTE with the following:*

The Controller unit shall be of the manufacturer, and type indicated on the plans.

SECTION 801 – INSTALLATION

REVISE as follows:

801-1 GENERAL.

This section includes specifications for the preparation, planting, and irrigation system construction for landscape areas shown on the Plans. Unless otherwise curbs, planter boxes, walks, irrigation systems, and similar improvements shall be constructed following rough grading and before landscaping.

801-2 EARTHWORK AND TOPSOIL PLACEMENT.

801-2.2 Topsoil Preparation and Conditioning.

801-2.2.1 General. *DELETE 1st sentence in the 4th paragraph, and ADD at end of section the following:*

TURF KILL PROGRAM. FOR WALNUT STREET PARKWAY ONLY - due to required Six (6) weeks,(or more)to complete, the turf kill program shall commence during Civil demolition operations and continue after grading to remove all turf as required. All turf grass is to be removed to a depth of 4" below the soil. Removed soil contains grass seed and shall not be used within project site planters and removed from project site. Spray with an approved nonselective translocative herbicide, to be applied by an approved licensed pest control advisor and applicator. Leave sprayed turf intact for at least 15 days.

Water four (4) times daily for fourteen (14) consecutive days, until new growth appears. Reapply herbicide. Remove new turf grass after herbicide has had sufficient time to kill. Repeat until no turf emerges.

Do not plant until herbicide manufacturer indicates new planting will not be affected by herbicide residue.

WEED ABATEMENT OPERATIONS. The irrigation system, soil preparation operations, and finish grade shall be approved by the Engineer prior to weed abatement operations.

Contractor shall operate the irrigation system to keep planting areas uniformly moist for a period of two (2) weeks (14 calendar days). At the end of the two (2) week period, Contractor shall spray all visible weeds with an approved organic, non-selective, post emergent herbicide. Application rate and method shall be recommended by the manufacturer. After spraying, planting areas shall remain unwatered for a minimum of forty-eight (48) hours.

After seven (7) calendar days from the chemical application, weeds and debris shall be disposed of off-site.

Contractor shall apply spray chemicals when air currents are still; preventing drifting onto adjoining property and preventing any toxic exposure to persons whether or not they are in or near the project.

After weed abatement operations, and as determined by the Engineer, planting areas shall be scarified to a depth not to exceed one inch (1").

Weeds and debris shall be disposed of off-site.

801-2.2.2 Fertilizing and Conditioning Procedures. *ADD the following after the last paragraph:*

Fertilizing and soil amendment guidelines under agronomic soils testing shall be used for bidding purposes for planting areas, however, Contractor shall amend it as necessary per the soils test report at no additional cost to the City.

801-2.3 Finish Grading. *DELETE 2nd paragraph and ADD the following after the last paragraph:*

Finish grades are existing having been previously established the contractor shall maintain the existing finished grade elevations. Finish grading will only be required in raking out/feathering spoils from planting installations.

801-4 PLANTING.

801-4.1 General. *ADD the following after the last paragraph:*

Prior to excavation for planting or placing of stakes, locate all utilities, electric cables, conduits, underground irrigation lines, heads, valves and valve control wires, and all utility lines so that proper precautions may be taken not to damage such improvements. In the event of a conflict between utilities and plant locations, promptly notify the Engineer who will arrange for one or the other to be relocated. If contractor fails to follow this procedure it shall repair all damages resulting from the work at contractor's sole expense. Plant materials shall be furnished in the quantities and/or spacing as shown or noted for each location, and shall be of the species, kinds, sizes, etc., as symbolized, and/or described in the Plant Legend, as indicated on the Plans. Verify all sizes and quantities on the Plans. Promptly report any discrepancy to the Engineer. Install Landscape fabric in Walnut Street parkway shrub area before planting *Rhaphiolepis*.

Any plant material or any development materials specified by trade name or equal, shall be according to these Plans and Specifications. Installation and use of substitute items shall not be made until the Contractor is in receipt of written approval from the Engineer. Substitution proposals for plant material must be accompanied by written proof of non-availability within a five hundred mile radius of the project site for material originally specified and proof that material was ordered in a timely manner upon award of contract. Regularly water all nursery stock in containers and place them in a cool area protected from sun and drying winds. Do not allow plants to dry out before or while being planted. Keep exposed roots moist by means of wet sawdust, peat moss or burlap at all times during planting operations. Do not expose roots to the air except while being placed in the ground. Wilted or diseased plants, whether in place or not, will not be accepted and shall be replaced at the Contractor's sole expense. Moisten prepared surface immediately prior to installing plant material. Install plant material immediately after delivery to site, within 24

hours after delivering to prevent deterioration. Hand water landscaped areas immediately after installation with a minimum of 1" of water.

801-4.5 Tree and Shrub Planting. *DELETE 4th paragraph and REPLACE with the following:*

In the event that underground construction work or obstructions are encountered in the planting operation, alternate locations for plant material will be selected by the City. Operation shall be done at no extra cost to the City. The following material shall be thoroughly blended and used as a backfill mix:

- a) 6 parts by volume on-site soil
- b) 4 parts by volume Organic Amendment 1 lbs. 16-20-0 per cubic yard of mix
- c) 2 lbs. Iron Sulfate per cubic yard of mix

The actual material and amounts, as determined by the agronomic soils test, shall be supplied by the Contractor at no additional cost to the City. No mixing for individual planting holes is permitted. Mix planting soil prior to backfilling and stockpile at the site. Iron sulfate shall not contact cement surfaces because severe staining could occur; repair or replace stained cement at Contractor's sole cost. Remove all plants from their containers and set so that, when settled, they bear the same relation to the required grade as they bore to the natural grade before being transplanted. Set the directed amount of plant fertilizer to be used with each plant on the top of the root ball so the required fertilizer amount to be used in each hole can be easily verified and approved by the Engineer. Improper planting may delay the maintenance period and extend working days causing liquidated damages. Planting holes shall be compacted with no more than 1" settlement from finished grade.

Add:

801-4.5.1 Mulch. *ADD the following Subsection:*

All shrubs and ground cover areas shall be mulched after planting with 2 inches of mulch. Maintain a 6 inch clear "no-mulch" zone around the base of each tree and shrub.

801-5 IRRIGATION SYSTEM INSTALLATION.

801-5.1 General. *ADD the following after the last paragraph:*

Prior to all work of this Section, carefully inspect the installed work of all other trades and verify that all such work is complete to the point where this installation may properly commence. Verify that irrigation system may be installed in strict conformance with all pertinent codes and regulations, the original design, the referenced standards, and the manufacturer's recommendations. In the event of discrepancy, immediately notify the Engineer.

Do not proceed with installation in areas of discrepancy until all discrepancies have been resolved. Before starting work, carefully check all grades to determine that work may safely proceed, keeping within the specified material depths with respect to finish grade.

The Contractor shall request acceptance of and the Engineer will approve final grades before work on this Section will be allowed to begin. Make all necessary measurements in the field to ensure precise fit of items in accordance with the original design. Coordinate the installation of all irrigation materials with all other work.

All scaled dimensions are approximate. Check and verify all size dimensions prior to proceeding with work under this Section. Exercise extreme care in excavating and working near existing utilities. Repair damages to utilities, which are caused by Contractor's operations or neglect, at no additional cost to City. Prior to installation, stake out all pressure supply lines, routing and location of sprinkler heads, valves, and automatic controller. Layout irrigation system and make minor adjustments required due to differences between site and Drawings. Where piping is shown on Drawings under paved areas, but running parallel and adjacent to planted areas, install the piping in the planted areas. Connections to, or the installation of, the water supply shall be at the locations shown on the Drawings. Minor changes caused by actual site conditions shall be made at no additional expense to the City.

Existing irrigation equipment to be replaced including valves, spray heads, and rotors shall be salvaged and delivered to the City.

Verify and be familiar with the locations, size and detail of points of connection provided as the source of water and connection to the irrigation system. Irrigation design is based on the available static water pressure shown on the Drawings. Verify static water pressure on the project prior to the start of construction. Should a discrepancy exist, notify the Engineer's authorized representative prior to beginning construction. Prior to cutting into the soil, locate all cables, conduits, sewer septic tanks, and other utilities as are commonly encountered underground and take proper precautions not to damage or disturb such improvements. If a conflict exists between the obstacles and the proposed work, promptly notify the Engineer who will arrange for relocations. Proceed in the same manner if a rock layer or any other such conditions are encountered. Protect all existing utilities and features to remain on and adjacent to the project site during construction. Repair, at its sole cost, all damage resulting from its operations or negligence.

The Agency Representative shall have, at all times, safe access to the Work. Where the Specifications require work to be tested by the Contractor, it shall not be covered over until accepted by the Engineer. Notify the Engineer, a minimum of 48 hours in advance of where and when the work is ready for testing. Should any work be covered without testing or acceptance, it shall be, if so ordered, uncovered at the Contractor's sole expense. Inspections will be required for the following at a minimum:

- a) System layout
- b) Pressure test irrigation main line (Six hours at 125 PSI) lateral lines (2 hours at 100 psi).

- c) Coverage test of irrigation system
- d) Final inspection prior to start of maintenance period
- e) Final acceptance

Work that fails testing and is not accepted will be re-tested. Hourly rates and expenses of the Engineer for re-inspection or re-testing will be paid by the Contractor at no additional expense to City.

Use all means necessary to protect irrigation system materials before, during, and after installation and to protect the installation work and materials of all other trades. In the event of damage, immediately make all repairs and replacements necessary to the acceptance of the Engineer and at no additional cost to the City. Exercise care in handling, loading, unloading, and storing plastic pipe and fittings under cover until ready to install. Transport plastic pipe only on a vehicle with a bed long enough to allow the pipe to lay flat to avoid undue bending and concentrated external load. Dispose of waste, trash, and debris in accordance with applicable laws and ordinances and as prescribed by authorities having jurisdiction. Do not bury waste material and debris on the site. Burning of trash and debris will not be permitted. Remove and dispose of rubbish and debris generated by his work and workmen at frequent intervals or when ordered to do so by the Engineer. At the time of completion the entire site will be cleared of tools, equipment, rubbish and debris which shall be disposed of off-site in a disposal area that is fully and legally licensed.

Temporary Repairs: The City reserves the right to make temporary repairs as necessary to keep the irrigation system in operating condition. The exercise of this right by the City shall not relieve the Contractor of his responsibilities under the terms of the guarantee as herein specified.

Supply the following items:

- a) Two (2) wrenches for disassembly and adjustment of each type of sprinkler head used in the irrigation system.
- b) Two (2) 30-inch sprinkler keys for manual operation of control valves.
- c) One (1) valve box cover key.
- d) Four (4) extra sprinkler heads of each size and type.
- e) 250 feet of additional drip line and 100 feet blank roll.
- f) 200 drip line staples.

The above equipment shall be turned over to the Engineer at the final inspection.

At the time of the pre-maintenance period inspection, the Engineer and governing agencies will inspect the work and, if not accepted, prepare a list of items to be completed by the Contractor. At the time of the post-maintenance period or final inspection the work

will be re-inspected and final acceptance will be in writing by the Engineer. The City Engineer shall have final authority on all portions of the work.

801-5.3 Irrigation Pipeline Installation.

801-5.3.1 General. *ADD the following after the last paragraph:*

Excavations shall be straight with vertical sides, even grade, and support pipe per City Landscape Standard Plan No. 501. Trenching excavation shall follow layout indicated on Drawings to the depths below finished grade and as noted. Where lines occur under paved areas, these dimensions shall be considered below subgrade. Provide minimum cover of 24 inches on pressure supply lines. Provide minimum cover of 24 inches for control wires. Provide minimum cover of 12 inches for non-pressure lines unless lines are designated as "ON GRADE" per the plans. Backfill material on all lines shall be the same as adjacent soil free of debris, litter, and rocks over 1/2 inch in diameter. Backfill shall be tamped in 4-inch layers under the pipe and uniformly on both sides for the full width of the trench and the full length of the pipe. Backfill materials shall be sufficiently damp to permit thorough compaction, free of voids. Backfill shall be compacted to 90% relative compaction and shall conform to adjacent grades. Flooding in lieu of tamping is not allowed. Under no circumstances shall truck wheels be used to compact backfill. Provide sand backfill a minimum of 6 inches over and under all piping under paved areas.

Piping under existing pavement may be installed by jacking, boring, or hydraulic driving. No hydraulic driving is permitted under asphalt pavement. Cutting or breaking of existing pavement is not permitted. Carefully inspect all pipe and fittings before installation, removing dirt, scale, burrs, and reaming. Install pipe with all markings up for visual inspection and verification.

Remove all dented and damaged pipe sections. All lines shall have a minimum clearance of 6 inches from each other and 12 inches from lines of other trades. Parallel lines shall not be installed directly over each other. In solvent welding, use only the specified primer and solvent cement and make all joints in strict conformance with the manufacturer's recommended methods including wiping all excess solvent from each weld. Allow solvent welds at least 15 minutes setup time before moving or handling and 24 hours curing time before filling. PVC pipe shall be installed in a manner, which will provide for expansion and contraction as recommended by the pipe manufacturer. Center load all plastic pipe prior to pressure testing. All threaded plastic-to-plastic connections shall be assembled using Teflon tape or Teflon paste. For plastic-to-metal connections, work the metal connections first. Use a non-hardening pipe dope on all threaded plastic-to-metal connections, except where noted otherwise. All plastic-to-metal connections shall be made with plastic female adapters.

801-5.4 Installation of Valves, Valve Boxes, and Special Equipment. *ADD the following after the last paragraph:*

Automatic control valves, and gate valves shall be installed in the approximate locations indicated on the Drawings. Valves shall be installed in shrub areas whenever possible.

Install all valves as indicated in the detail Drawings. Valves to be installed in valve boxes shall be installed one valve per box.

801-5.5.1 General. *ADD the following after the last paragraph:*

Irrigation heads shall be installed as indicated on the Drawings. Riser nipples shall be of the same size as the riser opening in the sprinkler body. Install all assemblies specified herein according to the respective detail Drawings or Specifications, using best standard practices.

801-5.6 Automatic Control System Installation. *ADD the following after the last paragraph:*

All Automatic Irrigation valves shall be connected to the existing irrigation controllers.

Three (3) sets of laminated 11"x17" new controller charts and 8.5"x11" data sheets shall be provided for all irrigations systems.

801-5.7.3 Sprinkler Coverage Test. *ADD the following after the last paragraph:*

Coverage testing shall be performed for overhead irrigation.

Adjust valves, align heads, and check the coverage of each system prior to coverage test. If it is determined by the Engineer that additional adjustments or nozzle changes will be required to provide proper coverage, make all necessary changes or adjustments prior to any planting. The entire system shall be operating properly before any planting operations commence.

Do not allow or cause any of the work of this Section to be covered up or enclosed until it has been observed, tested and accepted by the Engineer. Notify the Engineer a minimum of 48 hours in advance where and when the work is ready for testing. When the sprinkler system is completed, perform a coverage test of each system in its entirety to determine if the water coverage for the planted areas is complete and adequate in the presence of the Engineer.

Irrigation drip line to be installed per plans. The contractor shall be responsible for making field adjustments to provide proper drip coverage. Install drip line on finish grade per manufacturer's instructions. Immediately after installing drip line, flush system to the satisfaction of the Engineer. Drip line coverage to be observed, tested, and approved by the Engineer prior to burying with top soil. Notify the Engineer a minimum of 48 hours in advance where and when the work is ready for testing.

801-5.7.4 Operational Test. *ADD the following after the last paragraph:*

Furnish all materials and perform all work required to correct any inadequacies of coverage due to deviations from the Plans, or where the system has been willfully installed as indicated on the Drawings when it is obviously inadequate, without bringing this to the attention of the Engineer. This test shall be accepted by the Engineer and accomplished

before starting any planting. Final inspection will not commence without record Drawings as prepared by the Contractor. During the maintenance period adjust and maintain the irrigation system in a fully operational condition providing complete irrigation coverage to all intended plantings. Clean-up shall be made as each portion of the work progresses. Refuse and excess dirt shall be removed from the site, all walks and paving shall be broomed, and any damage sustained on the work of others shall be repaired to original conditions.

801-6 MAINTENANCE AND PLANT ESTABLISHMENT.

DELETE entire section and SUBSTITUTE with the following:

Landscape maintenance and plant establishment period shall be a minimum of one hundred (100) days after "Date of Acceptance of Installation" of all planting areas. Request in writing from the Engineer, notification of the date of the start of the maintenance and planting establishment period. At the acceptance of all planting areas, request in writing from the Engineer notification of the date of the completion of the maintenance period. The maintenance period shall not officially begin or end without written notification from the Engineer. Construction fencing shall remain until after the maintenance period is complete or as directed by the Engineer. Maintain all planted areas on a continuous basis as they are completed during the progress of the work and during the establishment and maintenance period, and shall continue to maintain them until final acceptance in accordance with the following:

- a) Water, weed, fertilize, edge, prune, spray as necessary to promote a healthy growing condition. Maintain lawn at a mowing height recommended by the city. All planted areas shall be kept free of debris and weeds. Keep project neat and attractive throughout the maintenance period.
- b) Apply organic herbicides for weed control, as needed or directed by City, in accordance with manufacturer's instructions and applicable laws and regulations. Organic pre-emergent herbicide shall be required in all planter, shrub and ground cover areas. Remedy damage resulting from weed control.
- c) Exterminate rodents and insects as required and in accordance with applicable City of Irvine policies, State and Federal laws and regulations. Remedy damage from pest control.
- d) Adjust the irrigation system to sufficiently saturate root zone without rotting trees, shrubs, and ground cover. Do not exceed IRWD allocation.
- e) Repair or replace any damaged item caused by vehicles, vandals, rabbits, rodents, bicycles, or foot traffic during the maintenance period.
- f) Fertilize with "Organic/JTM Complete" at 30 lbs./1,000 s.f. at the beginning and end of the maintenance period (twice) or as indicated by the agronomic soils test.

All inspections herein specified shall be made by the City. Request inspection at least forty-eight (48) hours in advance of the time the inspection is required. Requested

inspections, subsequently canceled without twenty-four (24) hours-notice, will be billed to the Contractor.

Inspection is required for, and not necessarily limited to, the following parts of the work:

- a) Incorporation of soil amendments and fine grading.
- b) Prior to digging plant pits for shrubs.
- c) During backfilling of plant pits with amended backfill.
- d) Final inspection at the end of the maintenance period.
- e) Irrigation Inspection / Coverage Test prior to planting.

801-8 PAYMENT.

DELETE entire section and SUBSTITUTE with the following:

Payment for **Mobilization** shall be made at the contract **lump sum (LS)** price and shall be considered full compensation for furnishing labor, materials, tools, equipment, and incidentals, and for doing all work involved in furnishing and installing, complete in place, as shown on the plans, as specified in the Standard Specifications and these Special Provisions, and as directed by the Engineer, and no additional compensation will be allowed therefor.

Payment for **Clearing and Grubbing** shall be made at the contract **lump sum (LS)** price and shall be considered full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all work involved in furnishing and installing, complete in place, as shown on the plans, as specified in the Standard Specifications and these Special Provisions, and as directed by the Engineer, and no additional compensation will be allowed therefor.

Payment for **Turf Kill Program and Weed Abatement** shall be made at the contract unit price per square foot and shall be considered full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all work involved in furnishing and installing, complete in place, as shown on the plans, as specified in the Standard Specifications and these Special Provisions, and as directed by the Engineer, and no additional compensation will be allowed therefor.

Payment for **Weed Abatement** shall be made at the contract unit price per **square foot (SF)** and shall be considered full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all work involved in furnishing and installing, complete in place, as shown on the plans, as specified in the Standard Specifications and these Special Provisions, and as directed by the Engineer, and no additional compensation will be allowed therefor.

Payment for **Soil Preparation & Fine Grading** shall be made at the contract unit price per **square foot (SF)** and shall be considered full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all work involved in furnishing

and installing, complete in place, as shown on the plans, as specified in the Standard Specifications and these Special Provisions, and as directed by the Engineer, and no additional compensation will be allowed therefor.

Payment for **Shrub – 1 gallon** shall be made at the contract unit price per each and shall be considered full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all work involved in furnishing and installing, complete in place, as shown on the plans, as specified in the Standard Specifications and these Special Provisions, and as directed by the Engineer, and no additional compensation will be allowed therefor.

Payment for **Shrub – 5 gallon** shall be made at the contract unit price per each and shall be considered full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all work involved in furnishing and installing, complete in place, as shown on the plans, as specified in the Standard Specifications and these Special Provisions, and as directed by the Engineer, and no additional compensation will be allowed therefor.

Payment for **24” Box Tree** shall be made at the contract unit price per each and shall be considered full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all work involved in furnishing and installing, complete in place, as shown on the plans, as specified in the Standard Specifications and these Special Provisions, and as directed by the Engineer, and no additional compensation will be allowed therefor.

Payment for **36” Box Tree** shall be made at the contract unit price per each and shall be considered full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all work involved in furnishing and installing, complete in place, as shown on the plans, as specified in the Standard Specifications and these Special Provisions, and as directed by the Engineer, and no additional compensation will be allowed therefor.

Payment for **48” Box Tree** shall be made at the contract unit price per each and shall be considered full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all work involved in furnishing and installing, complete in place, as shown on the plans, as specified in the Standard Specifications and these Special Provisions, and as directed by the Engineer, and no additional compensation will be allowed therefor.

Payment for **Irrigation System** shall be made at the contract lump sum price and shall be considered full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all work involved in furnishing and installing, complete in place, as shown on the plans, as specified in the Standard Specifications and these Special Provisions, and as directed by the Engineer, and no additional compensation will be allowed therefor.

Payment for **Wood Mulch – 2” Depth** shall be made at the contract unit price per square feet and shall be considered full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all work involved in furnishing and installing, complete in place, as shown on the plans, as specified in the Standard Specifications and these Special Provisions, and as directed by the Engineer, and no additional compensation will be allowed therefor.

Payment for **(100) One-Hundred Day Maintenance Period** shall be made at the contract lump sum price and shall be considered full compensation for furnishing all labor, materials, tools, equipment, and incidentals, and for doing all work involved in furnishing and installing, complete in place, as shown on the plans, as specified in the Standard Specifications and these Special Provisions, and as directed by the Engineer, and no additional compensation will be allowed therefor.

801-9 GUARANTEE.

ADD the following Subsection:

The guarantee shall be valid unless existing equipment utilized on the project fails within the guarantee period. Should any problem with the irrigation system be discovered within the guarantee period the Contractor shall correct it within ten (10) calendar days after receipt of written notice from City (and at no additional expense to City). When the nature of the repairs, as determined by the City, constitute an emergency (i.e. broken pressure line) the City may proceed to make repairs at the Contractor's expense. Any and all damages to existing improvement resulting either from faulty materials or workmanship, or from the necessary repairs to correct same, shall be repaired to the satisfaction of the owner by the Contractor, all at no additional cost to the City. Guarantee shall be submitted on Contractors own letterhead as follows:

GUARANTEE FOR SPRINKLER IRRIGATION SYSTEM

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 shall repair or replace any defective material during the period of one year after date of filing of the Notice of Completion and also 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 10 calendar days following written notification by the owner. In the event of our failure to make such repairs or replacements within the time specified after receipt of written notice from 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.

CITY OF IRVINE

WILLIAM WOOLLETT JR. AQUATIC CENTER EXPANSION (PART A) AND
HERITAGE PARK PARKING LOTS (PART B)
HERITAGE PARK, IRVINE, CALIFORNIA
CIP 362604 AND 362605
BID NO. PK-26-0047

APPENDICES

APPENDIX A

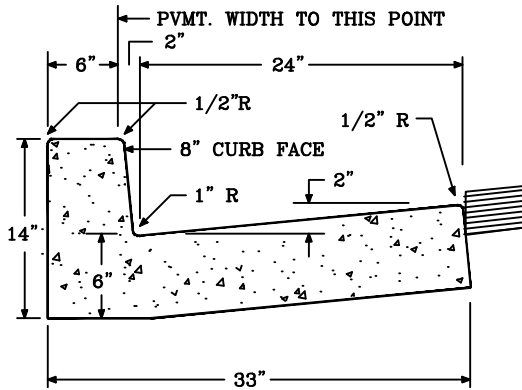
STANDARD PLANS

Copies of the following agency standard plans and/or details referenced by the plans and Specifications are attached hereto and are made a part of these Special Provisions. See Appendix.

AGENCY:	STD. PLAN NO.:	DESCRIPTION:
City of Irvine	200	Concrete Curb and Gutter
City of Irvine	201	Sidewalk Detail
City of Irvine	202	Curb Return Details
City of Irvine	300	Catch Basin Type I
City of Irvine	301	Catch Basin Type II
City of Irvine	302A	Catch Basin Type "D"
City of Irvine	303	Local Depression
City of Irvine	306	Junction Structure No. I
City of Irvine	309B	Junction Structure No. V
City of Irvine	310	Concrete Collar
City of Irvine	411	Off-Street Parking
SPPWC	308-2	Catch Basin Connection

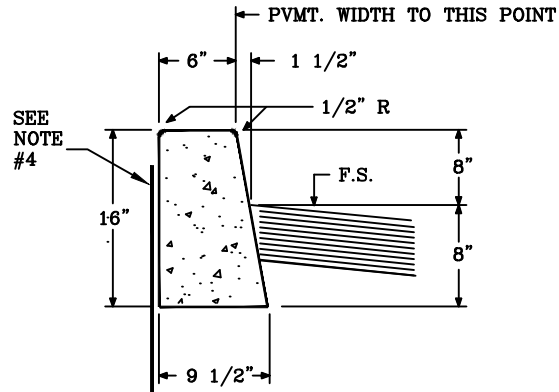


CITY OF IRVINE PUBLIC WORKS



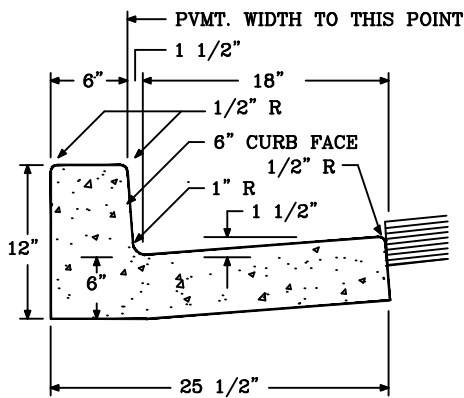
CONC. PER L.F. = .0645 CU. YDS.
1 CU. YD. = 15.5 L.F.

TYPE "A-2"



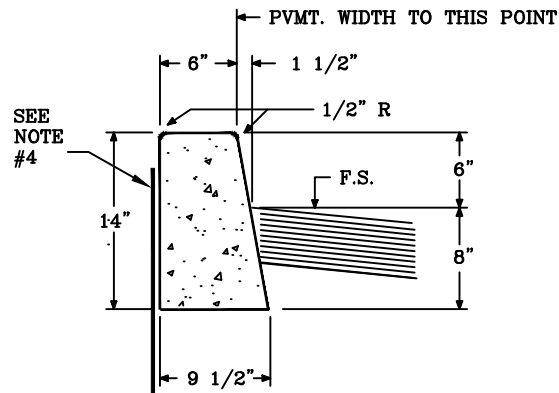
CONC. PER L.F. = .0319 CU. YDS.
1 CU. YD. = 31.3 L.F.

TYPE "B-8"



CONC. PER L.F. = .0505 CU. YDS.
1 CU. YD. = 19.8 L.F.

TYPE "D"



CONC. PER L.F. = .0279 CU. YDS.
1 CU. YD. = 35.8 L.F.

TYPE "B-6"

CONCRETE CURBS AND GUTTERS

Mark Carroll
MARK CARROLL, R.C.E. 31515
CITY OF IRVINE - CITY ENGINEER

AUGUST 2013
DATE

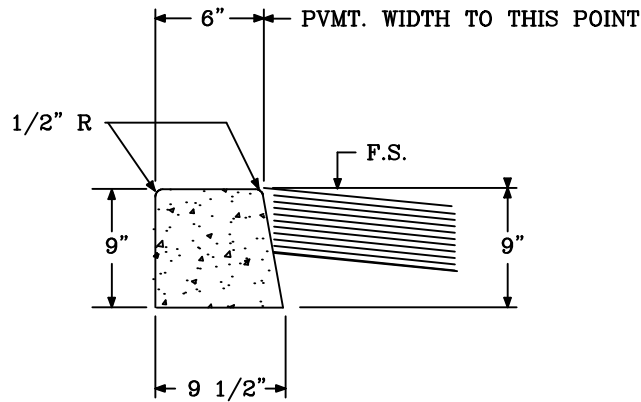
STD. PLAN

200

SHEET 1 OF 2



CITY OF IRVINE PUBLIC WORKS



CONC. PER L.F. = .0161 CU. YDS.
1 CU. YD. = 62.1 L.F.


TYPE "C-6"

NOT TO BE USED ON PUBLIC STREET R/W

NOTES :

1. ALL CURBS AND GUTTERS SHALL BE PORTLAND CEMENT CONCRETE. CONTROL
2. WEAKENED PLANE JOINTS PURSUANT TO SECTION 303-5.4.3 OF THE GREENBOOK (EXCEPTION: MAX. 10 FOOT INTERVALS)
3. PAVEMENT SHALL BE 3/8 INCH HIGHER THAN EDGE OF GUTTER ON TYPE "A-2" AND TYPE "D".
4. MOISTURE BARRIERS SHALL BE REQUIRED IN ACCORDANCE WITH STD. PLAN No. 222.

CONCRETE CURBS AND GUTTERS


MARK CARROLL, R.C.E. 31515
CITY OF IRVINE - CITY ENGINEER

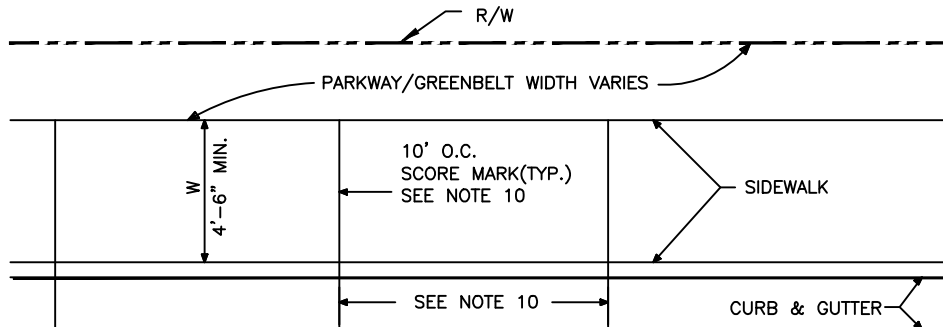
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DATE

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SHEET 2 OF 2

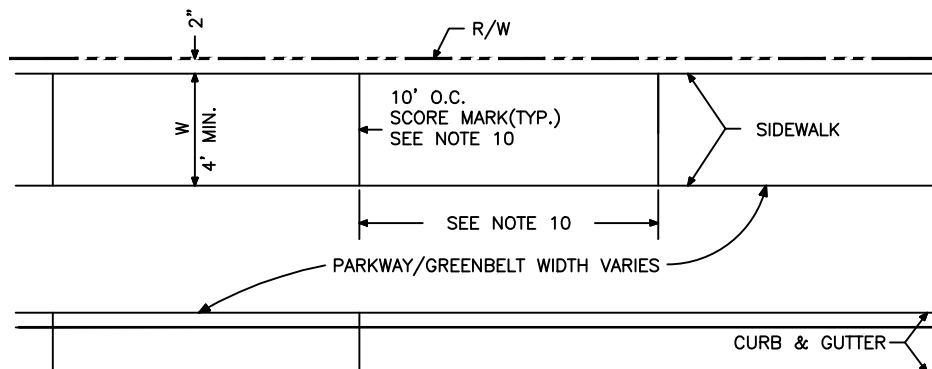


CITY OF IRVINE PUBLIC WORKS



Notes:

1. Thickness of sidewalk shall be 4-inches except in driveway aprons (See City Standard Plan 204, 205 and/or 206). For sidewalk locations with the need for maintenance vehicle use, a recommended pavement structural section shall be submitted and approved by the City Engineer.
2. Curb and gutter should have 2" deep weakened plane joints at the ends of curb returns and score marks at intervals shown hereon pursuant to Section 303-5.4.3 of the Greenbook. Plastic control joints are not allowed. Joints shall have edges with 1/8-inch radii.
3. See curb return (Standard Plan 202) and driveway standards (Standard Plan 204, 205, and 206) for additional control joint requirements.
4. Sidewalk shall be Portland Cement Concrete in accordance with Standard Plan 405.
5. All soils shall be brought to maximum saturation as required in the approved soils report. The soils engineers shall provide certification on the form provided by the City stating the moisture content has been maintained as required prior to and during the placement of concrete. In hillside areas, soil shall be saturated as recommended by the soils engineer and approved by the City Engineer.
6. Sidewalks are required on the side of streets where parking is allowed. Where no parking is allowed, pedestrian circulation shall be provided with a sidewalk or a parkway/greenbelt.
7. Pre-emergent weed killer must be applied prior to construction of sidewalk.
8. See Standard Plan 222 for moisture barrier requirements.
9. Curing compound is required in accordance with the Standard Specifications for Public Works Construction, latest edition.
10. For sidewalks greater than 8-feet wide, additional score marks, aggregate base material, and/or re-bar may be required based upon Geotechnical Engineer recommendation and approval by the City Engineer.
11. 1-1/2-inch deep weakened plane joints on exposed aggregate finishes are allowed.



SIDEWALK DETAIL


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CITY OF IRVINE - CITY ENGINEER

AUGUST 2013
DATE

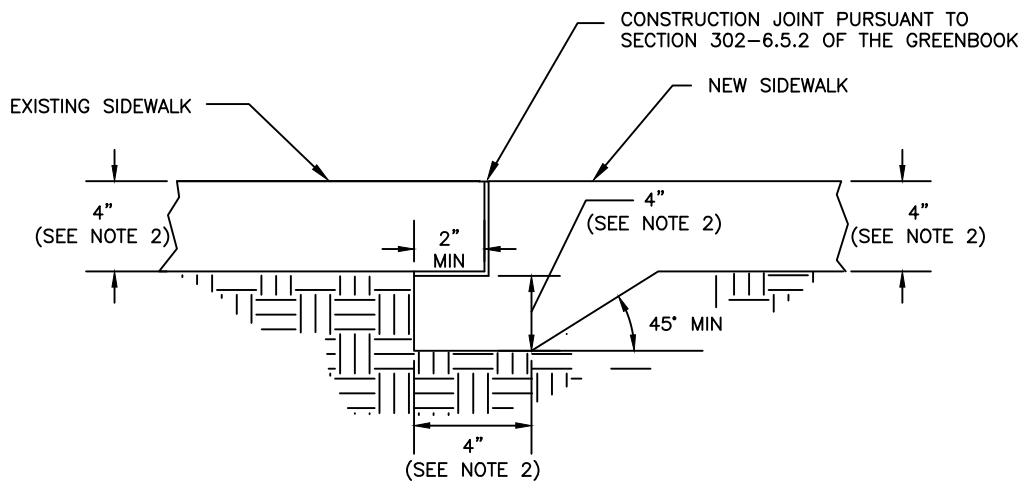
STD. PLAN
201

SHEET 1 OF 2



CITY OF IRVINE PUBLIC WORKS

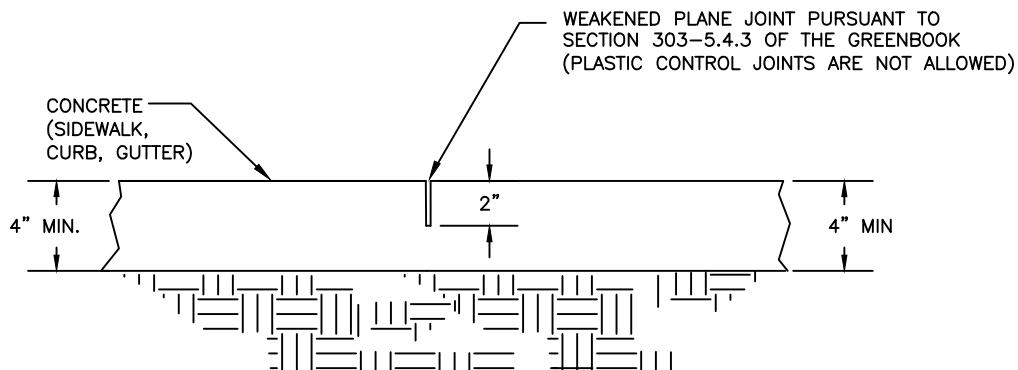
SIDEWALK CONSTRUCTION JOINT DETAIL




NOTES:

1. All applicable notes from sheet 1 shall apply.
2. New sidewalk section shall be keyed under existing sidewalk. Match existing sidewalk thickness for key dimensions.

WEAKENED PLANE JOINT DETAIL



SIDEWALK DETAIL


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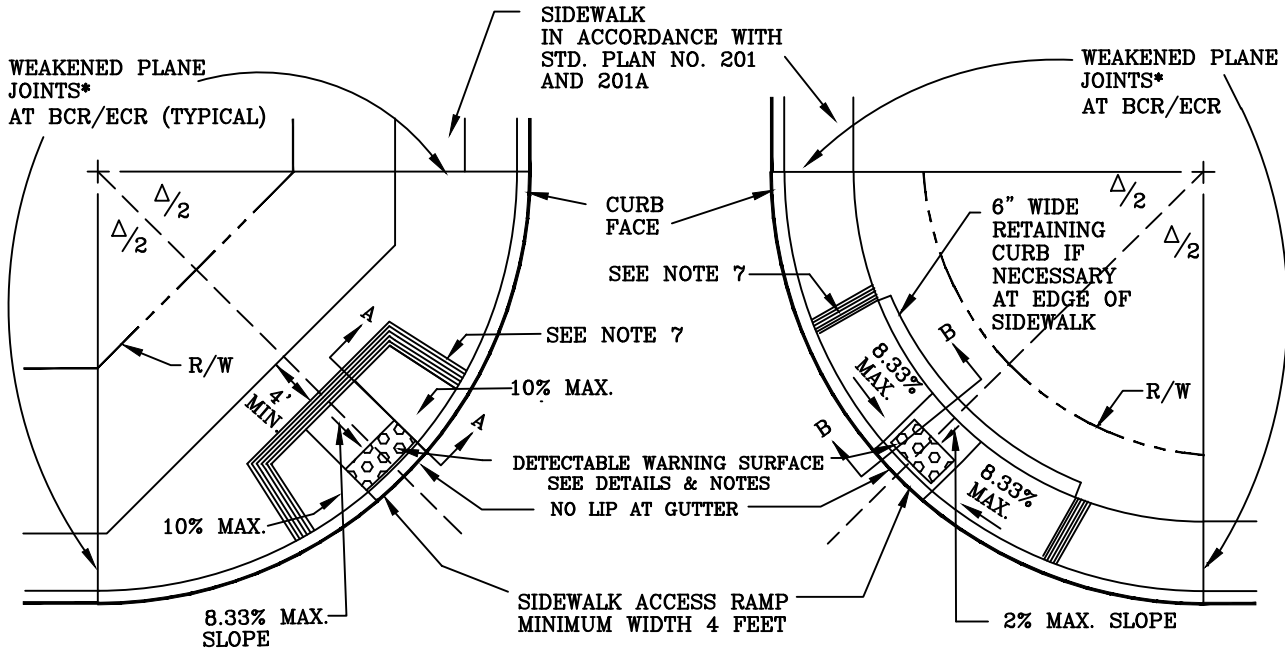
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201

SHEET 2 OF 2

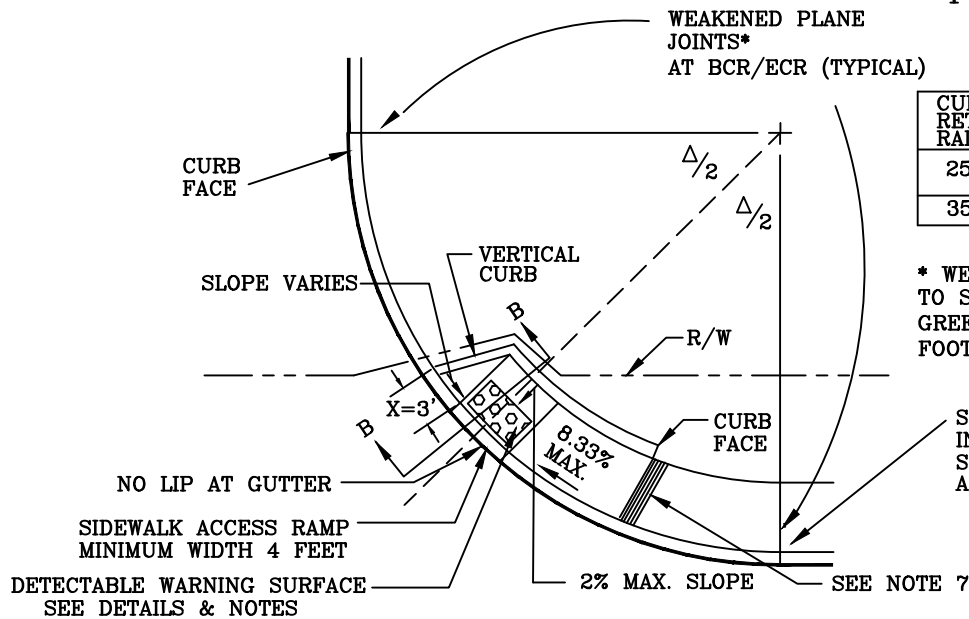


CITY OF IRVINE PUBLIC WORKS



STRAIGHT CORNER CUT-OFF

RADIUS CORNER CUT-OFF
TYPE I-A



RADIUS CORNER CUT-OFF
TYPE I-B

CURB RET. RAD.	APPLICATION
25'	LOCAL STREET INTERSECTING ANOTHER LOCAL STREET
35'	ALL OTHER INTERSECTIONS

* WEAKENED PLANE JOINTS PURSUANT
TO SECTION 303-5.4.3 OF THE
GREENBOOK (EXCEPTION: MAX. 10
FOOT INTERVALS)

SIDEWALK
IN ACCORDANCE WITH
STD. PLAN NO. 201
AND 201A.

CURB RETURN DETAILS

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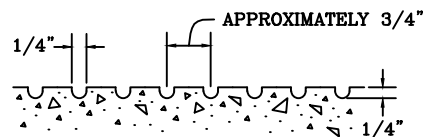
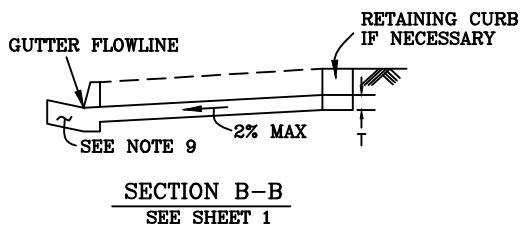
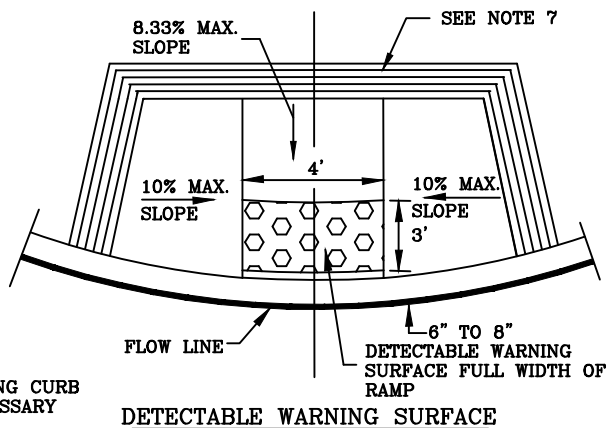
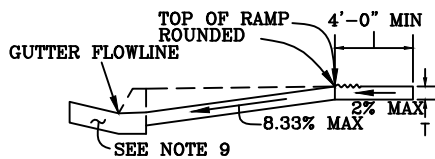
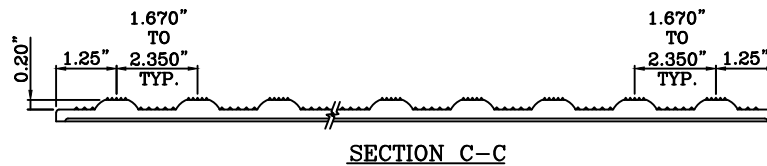
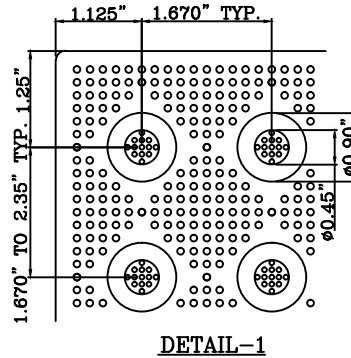
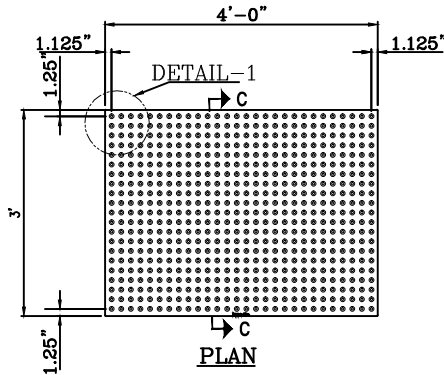
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STD. PLAN
202

SHEET 1 OF 3



CITY OF IRVINE PUBLIC WORKS



CURB RETURN DETAILS

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STD. PLAN
202

SHEET 2 OF 3

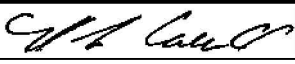


CITY OF IRVINE PUBLIC WORKS

NOTES:

1. STRAIGHT CORNER CUT-OFF CURB RETURN TYPE SHALL BE USED AT ANY ARTERIAL INTERSECTION OR STREET/DRIVEWAY INTERSECTION WITH AN ARTERIAL HIGHWAY OR ANY INTERSECTION THAT IS SIGNALIZED.
2. STRAIGHT OR RADIUS CORNER CUT-OFF MAY BE USED AT LOCAL TO LOCAL STREET INTERSECTIONS.
3. ALTERNATIVE DESIGNS FOR SIDEWALK RETURN RAMPS MAY BE CONSIDERED FOR APPROVAL BY THE CITY ENGINEER.
4. SEE STANDARD NO. 201 AND 201A FOR SIDEWALK DETAIL.
5. APPROVED DETECTABLE WARNING SURFACE IS AS FOLLOWS:
 - A) NEW INSTALLATIONS:
CAST IN PLACE DETECTABLE WARNING SURFACE – MANUFACTURED BY ACCESS TILE (562) 842-9934, www.accesstile.com (Part #: ACC-R3x4-BK),
OR MANUFACTURED BY ADA SOLUTIONS (800) 372-0519, www.adatale.com (Part #: 3648REP "BLACK")
OR MANUFACTURED BY ARMORCAST PRODUCTS COMPANY (818) 982-3600, www.armorcastprod.com (Part #: A6003660RADA-BLACK)
OR APPROVED EQUAL.
 - B) RETROFIT INSTALLATIONS
FLEXIBLE DETECTABLE WARNING SURFACE – MANUFACTURED BY DETECTABLE WARNING SYSTEMS INC., (866) 999-7452, www.detectable-warning.com,
OR APPROVED EQUAL.
 - C) COLOR SHALL BE BLACK OR APPROVED EQUAL.
 - D) DETECTABLE WARNING SURFACE SHALL BE FULL WIDTH OF RAMP AND 3 FOOT IN DEPTH.
 - E) THE DETECTABLE WARNING SURFACE SHALL BE INSTALLED IN ACCORDANCE WITH THE MANUFACTURERS' RECOMMENDATIONS AND INSTRUCTIONS.
 - F) THE MANUFACTURER SHALL PROVIDE A MINIMUM 5-YEAR WARRANTY, GUARANTEEING REPLACEMENT WHEN THERE IS A DEFECT IN THE DOME SHAPE, COLOR FASTNESS, SOUND ON CANE ACOUSTIC QUALITY, OR DETERIORATION OF THE DETECTABLE WARNING SURFACE. THE WARRANTY SHALL COMMENCE ON THE DATE OF ACCEPTANCE BY CITY OF IRVINE.
6. THE EDGE OF THE DETECTABLE WARNING SURFACE NEAREST THE STREET SHALL BE BETWEEN 6" AND 8" FROM THE GUTTER FLOWLINE.
7. THE CURB RAMP SHALL BE OUTLINED, AS SHOWN, WITH A 1'-0" WIDE BORDER WITH 1/4" GROOVES APPROXIMATELY 3/4" ON CENTERS. SEE GROOVE DETAIL.
8. UTILITY PULL BOXES, MANHOLES, VAULTS AND ALL OTHER UTILITY FACILITIES WITHIN THE BOUNDARIES OF THE CURB RAMP SHALL BE RELOCATED OR ADJUSTED TO GRADE PRIOR TO, OR IN CONJUNCTION WITH, CURB RAMP CONSTRUCTION. UTILITY PULL BOXES, MANHOLES, VAULTS AND ALL OTHER FACILITIES SHALL NOT BE LOCATED WITHIN THE ACCESS RAMP.
9. MAXIMUM SLOPES OF ADJOINING GUTTERS, THE ROAD SURFACE IMMEDIATELY ADJACENT TO THE CURB RAMP OR ACCESSIBLE ROUTE SHALL NOT EXCEED 5 PERCENT GRADE WITHIN 4'-0" OF THE TOP AND BOTTOM OF THE CURB RAMP.
10. THERE SHALL BE NO LIP FROM RAMP TO GUTTER OR STREET.
11. WEAKENED PLANE JOINTS SHALL BE PURSUANT TO SECTION 303-5.4.3 OF THE GREENBOOK. PLASTIC CONTROL JOINTS ARE NOT ALLOWED.

CURB RETURN DETAILS


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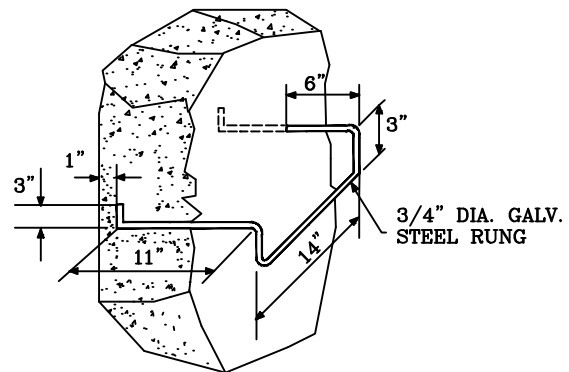
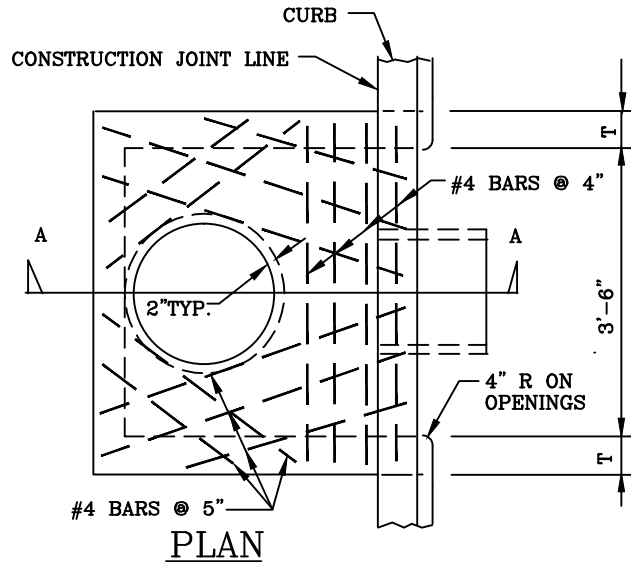
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DATE

STD. PLAN
202

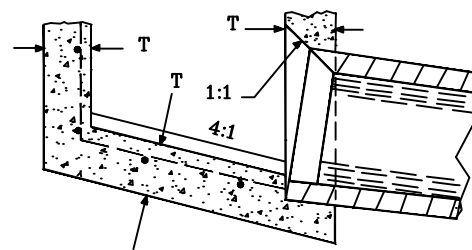
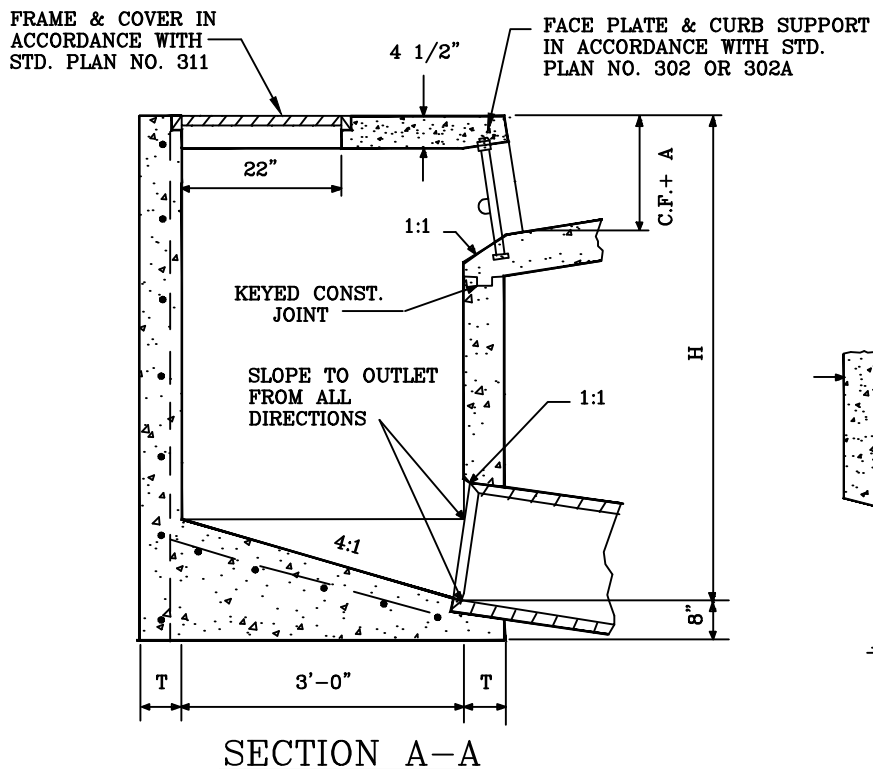
SHEET 3 OF 3



CITY OF IRVINE PUBLIC WORKS



STEP DETAIL



ALTERNATE FLOOR

CATCH BASIN TYPE I

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CITY OF IRVINE - CITY ENGINEER

AUGUST 2013
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STD. PLAN
300
SHEET 1 OF 2




CITY OF IRVINE PUBLIC WORKS

NOTES:

1. CURB OPENING SHALL CONFORM TO ADJACENT CURB ALIGNMENT.
2. REINFORCING STEEL FOR WALLS AND FLOOR SHALL BE #4 BARS @ 18 INCHES O.C. BOTH WAYS, PLACED 1-1/2 INCHES CLEAR TO INSIDE OF CATCH BASIN.
3. STEPS:
 - a. 'H' IS 3 FEET- 6 INCHES OR LESS.
NO STEPS REQUIRED
 - b. 'H' IS GREATER THAN 3 FEET- 6 INCHES.
INSTALL LOWEST STEP 24 INCHES ABOVE FLOOR AND OTHER STEP(S) AT 16 INCH INTERVALS TO WITHIN 18 INCHES OF THE TOP OF THE BOX.
 - c. PLACE STEPS IN A WALL THAT DOES NOT CONTAIN THE PIPE PENETRATION.
4. PIPES MAY BE PLACED IN ANY WALL.
5. CATCH BASIN FLOORS SHALL BE SLOPED FROM ALL DIRECTIONS TOWARDS OUTLET PIPE AND SHALL HAVE A WOOD TROWEL FINISH
6. DIMENSIONS:
H = 4 FEET- 0 INCHES UNLESS OTHERWISE SHOWN.
T = 6 INCHES FOR H = 8 FEET- 0 INCHES OR LESS.
T = 8 INCHES FOR H = 8 FEET - 1 INCH TO 20 FEET - 0 INCHES.
7. CURB FACE AT CATCH BASIN OPENING SHALL BE EQUAL TO EXISTING C.V. + DEPTH OF LOCAL DEPRESSION (A). SEE STD. PLAN No. 303.
8. CONCRETE: $f'_c = 3250$ psi AT 28 DAYS.
9. TREMIES OR OTHER SUITABLE CONVEYANCE FOR CONCRETE SHALL BE REQUIRED WHEN CONCRETE FALLS MORE THAN 6- FEET.

CATCH BASIN TYPE I


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CITY OF IRVINE - CITY ENGINEER

AUGUST 2013
DATE

STD. PLAN
300

SHEET 2 OF 2



CITY OF IRVINE PUBLIC WORKS

NOTES:

1. CURB OPENING SHALL CONFORM TO ADJACENT CURB ALIGNMENT.
2. REINFORCING STEEL FOR WALLS AND FLOOR SHALL BE #4 BARS @ 18 INCHES O.C. BOTH WAYS, PLACED 1-1/2 INCHES CLEAR TO INSIDE OF CATCH BASIN.
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8. CONCRETE: $f'_c = 3250$ psi AT 28 DAYS.
9. TREMIES OR OTHER SUITABLE CONVEYANCE FOR CONCRETE SHALL BE REQUIRED WHEN CONCRETE FALLS MORE THAN 6- FEET.

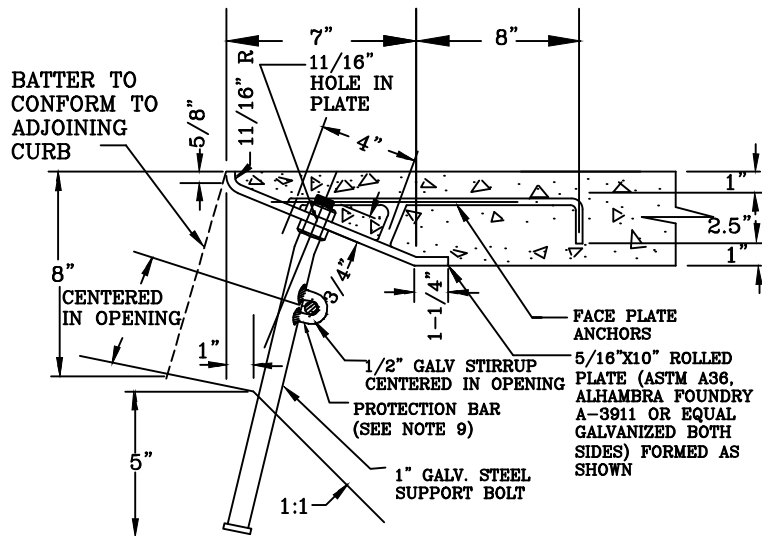
CATCH BASIN TYPE II


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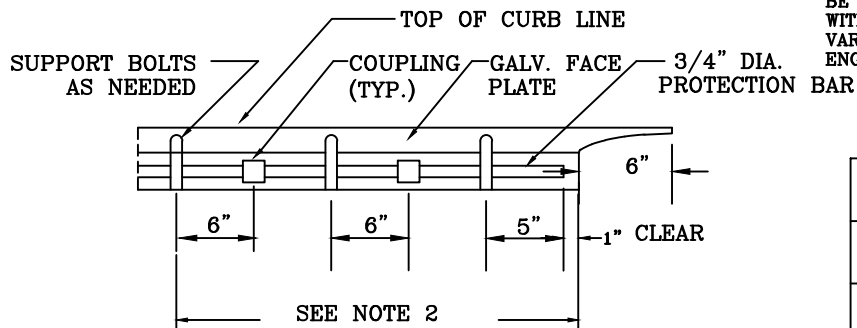
AUGUST 2013
DATE

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301
SHEET 2 OF 2

**CITY OF IRVINE
PUBLIC WORKS**



BOLT AND ANCHOR
DETAIL FOR FACE PLATE



PROTECTION BAR DETAIL

NOTES:

1. ONE SUPPORT BOLT SHALL BE PLACED 12 INCHES FROM EACH END OF FACE PLATE.
2. SUPPORT BOLTS SHALL BE SYMMETRICALLY SPACED IN THE CURB OPENING SO THAT THE UNSUPPORTED SPAN IS NOT MORE THAN 4 FEET.
3. ONE COUPLING SHALL BE PLACED 6 INCHES TO THE RIGHT OR LEFT OF EACH SUPPORT BOLT WITH THE EXCEPTION OF THE LAST SUPPORT BOLT. COUPLINGS SHALL BE THREADED TO FACILITATE REMOVAL OF PROTECTION BAR.
4. SUPPORT BOLTS SHALL BE INSTALLED IN ALL CATCH BASINS AND SPACED AS SHOWN IN THE PROTECTION BAR DETAIL.
5. FACE PLATE ANCHORS SHALL BE UNIFORMLY SPACED NOT TO EXCEED 4 FEET- 0 INCHES O.C. AND SHALL BE PLACED 4 1/2 INCHES FROM EACH END OF THE FACE PLATE.
6. A COUPLING MAY BE OMITTED PROVIDED THE PROTECTION BAR IS REMOVABLE AFTER INSTALLATION.
7. ALL METAL SHALL BE GALVANIZED AFTER FABRICATION.
8. SUPPORT BOLTS AND ANCHORS MAY BE ATTACHED BY A FULL PENETRATION BUTT WELD AS AN ALTERNATE SOLUTION.
9. PLACE 3/4 INCH DIAMETER PROTECTION BAR (ALHAMBRA FOUNDRY A-1564 OR EQUAL) HORIZONTALLY ACROSS THE ENTIRE LENGTH OF THE CURB OPENING. ONE PROTECTION BAR REQUIRED FOR 9 INCHES OR LESS OPENING AND TWO BARS FOR OPENINGS IN EXCESS OF 9 INCHES.
10. HEIGHT OF OPENING WILL VARY AS SHOWN ON STANDARD PLAN NO. 303.
11. THE WORDS "NO DUMPING, DRAINS TO OCEAN" SHALL BE STENCILED ON TOP OF THE CATCH BASIN INLET WITH 2 INCH LETTERS USING BLACK EPOXY PAINT. ANY VARIATIONS MUST BE APPROVED BY THE CITY ENGINEER.

LENGTH OF CURB OPENING	# OF ANCHORS
3'-6"	2
7'-0"	3
10'-0"	4
14'-0"	5
21'-0"	7

CATCH BASIN DETAILS (FOR TYPE "D" CURB & GUTTER)


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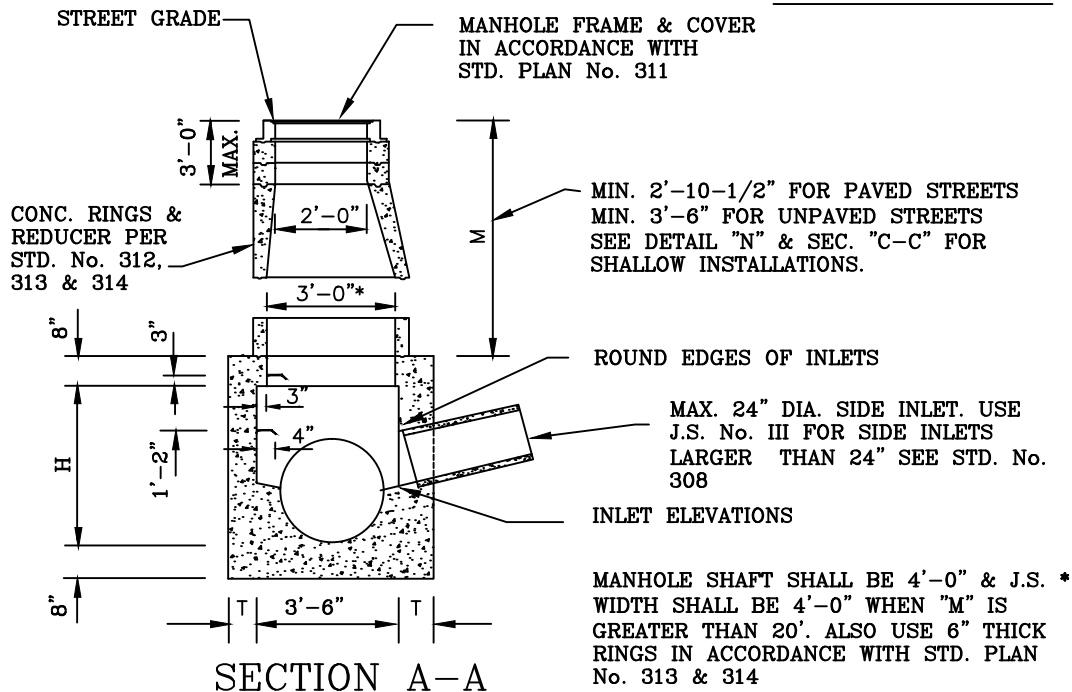
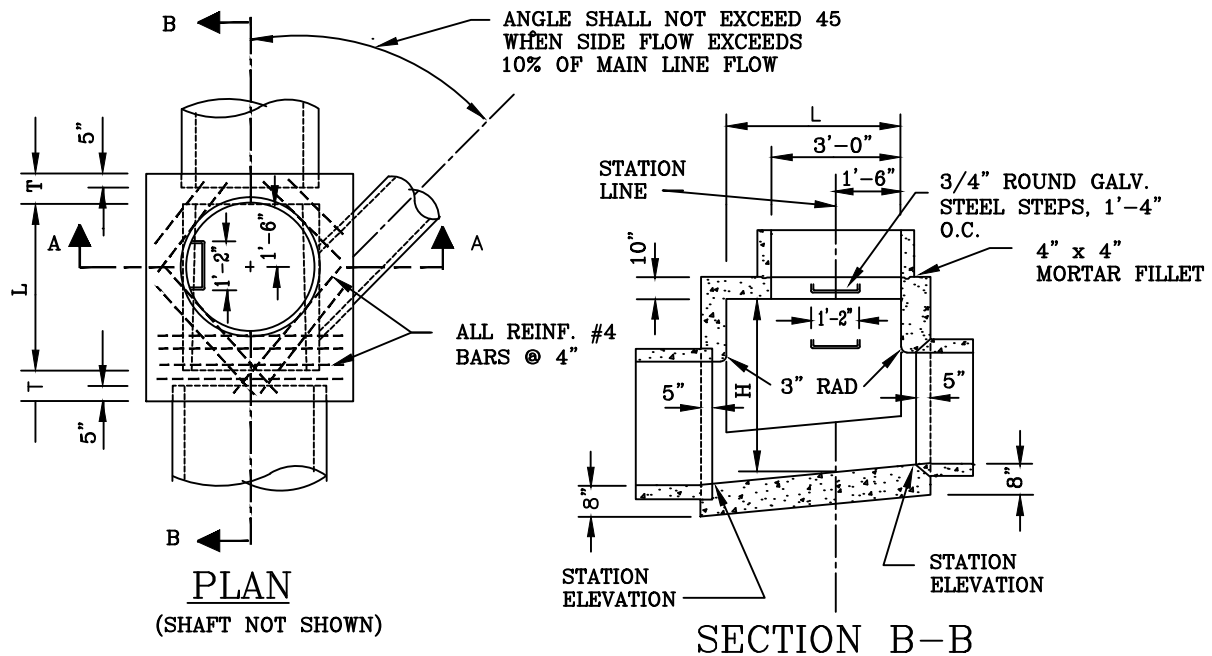
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STD. PLAN 302A

SHEET 1 OF 1



CITY OF IRVINE PUBLIC WORKS



NOTES:

1. USE JUNCTION STRUCTURE No. 1 FOR MAINLINE PIPES 39 INCH DIA. OR LESS.
2. SEE STD. No. 306A FOR NOTES AND OTHER DETAILS.

JUNCTION STRUCTURE No. 1

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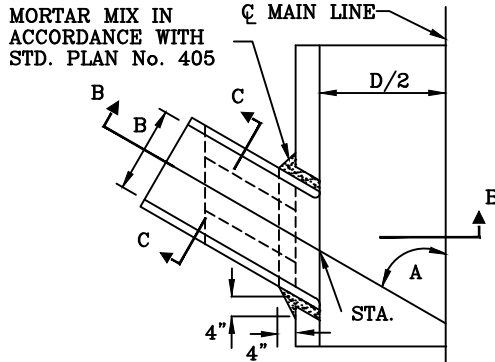
STD. PLAN
306

SHEET 1 OF 1

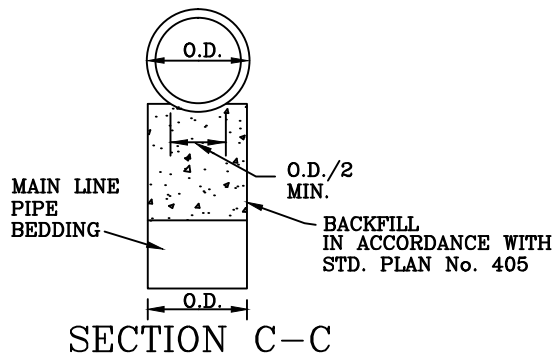
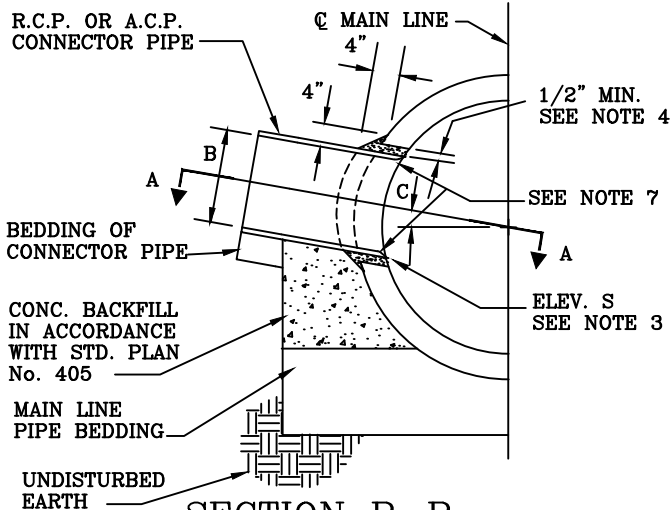


CITY OF IRVINE PUBLIC WORKS

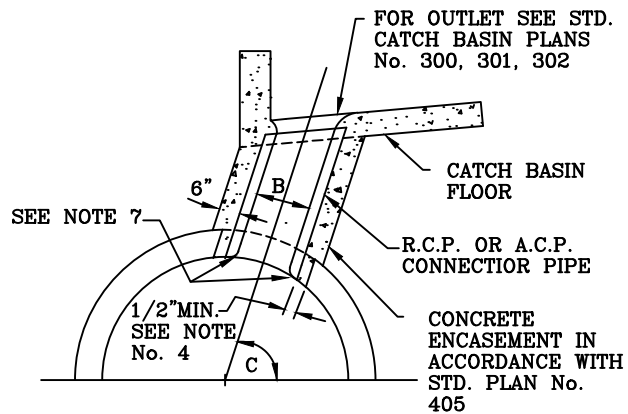
CASE I



SECTION A-A



CASE II



NOTES:

1. ANGLE A SHALL BE BETWEEN 45° & 90° AND B SHALL BE 24" OR LESS.
2. IN NO CASE SHALL THE O.D. OF INLET PIPE EXCEED 1/2 THE I.D. OF THE MAIN LINE.
3. CENTER LINE OF INLET SHALL BE ON RADIUS OF MAIN LINE EXCEPT WHERE ELEV. S IS SHOWN ON PROJECT DRAWINGS.
4. THE OPENING INTO THE MAIN LINE SHALL BE THE O.D. OF INLET PIPE PLUS 1 INCH MINIMUM TO 3 INCHES MAXIMUM.
5. IF ANGLE C IS 45° OR LESS, USE CASE I. IF ANGLE C IS GREATER THAN 45, USE CASE II.
6. ALL CONNECTOR PIPES WITHIN THE ANGLES SPECIFIED FOR CASE II, SHALL BE ENCASED WITH CONCRETE MIX IN ACCORDANCE WITH STD. PLAN No. 405.
7. BURN OR CHIP END OF CONNECTOR PIPE FLUSH WITH THE INNER SURFACE OF MAIN LINE PIPE. ROUND EDGE OF R.C.P.
8. STATION SPECIFIED ON PLANS APPLIES AT THE INTERSECTION OF THE INSIDE WALL OF MAIN LINE PIPE AND THE CENTER LINE OF CONNECTOR PIPE.
9. MANHOLE MUST BE LOCATED WITHIN 50 FEET, TO USE THIS TYPE OF JUNCTION.

JUNCTION STRUCTURE No. V

STD. PLAN
309B

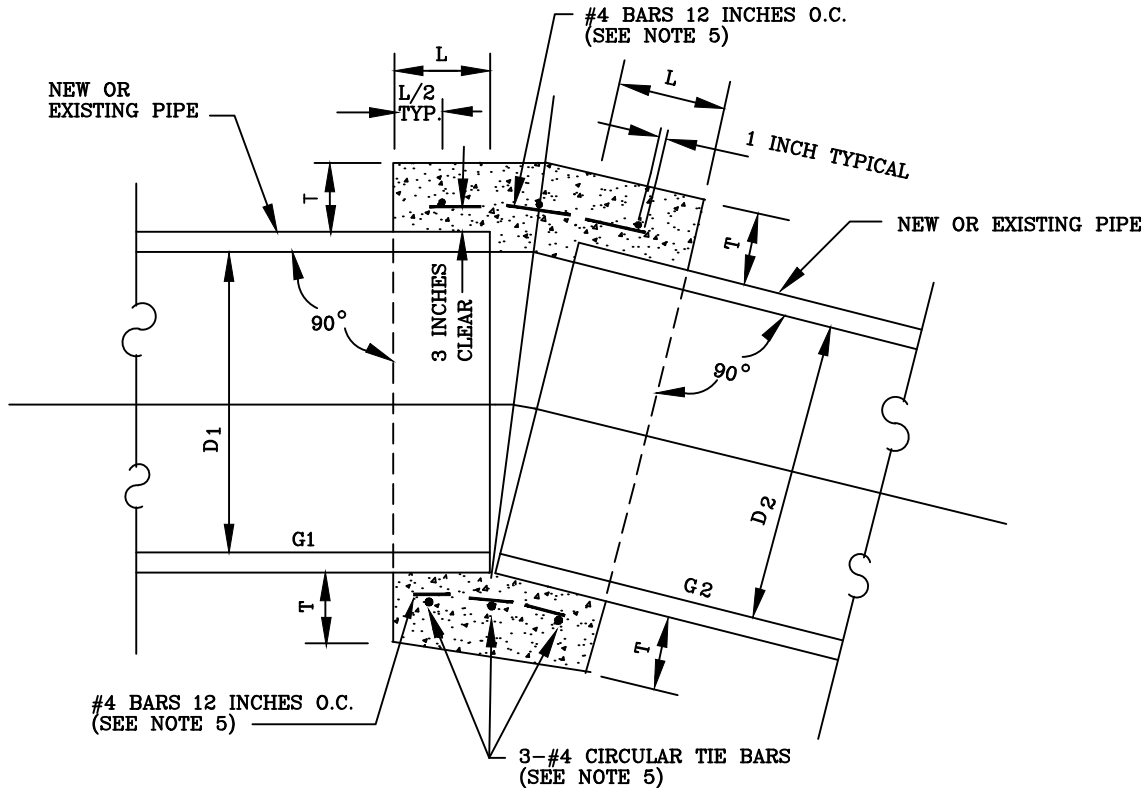
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SHEET 1 OF 1



CITY OF IRVINE PUBLIC WORKS



D	12"	18"	24"	30"	36"	42"	48"	54"	60"	66"
L	1.0'	1.0'	1.0'	1.25'	1.5'	1.5'	1.5'	1.75'	1.75'	1.75'
T	4"	5"	6"	7"	8"	9"	10"	10"	11"	11"
A	.08	.067	.052	.042	.036	.040	.036	.032	.028	.026

G = SLOPE OF PIPE
FT./FT.

NOTES:

1. A CONCRETE COLLAR IS REQUIRED WHERE $G_2 - G_1 > A$
2. WHERE PIPES OF DIFFERENT DIAMETERS ARE JOINED WITH A CONCRETE COLLAR, L AND T SHALL BE THOSE OF THE LARGER PIPE $D = D_1$ OR D_2 , WHICHEVER IS GREATER.
3. FOR PIPE LARGER THAN 66 INCHES A SPECIAL COLLAR DETAIL IS REQUIRED.
4. FOR PIPE SIZE NOT LISTED USE NEXT SIZE LARGER.
5. OMIT REINFORCING ON PIPES 24 INCHES AND LESS IN DIAMETER AND ON ALL PIPES WHERE $G_2 - G_1 < 3 \times A$.
6. WHERE REINFORCING IS REQUIRED THE DIAMETER OF THE CIRCULAR TIES SHALL BE $D + (2 \times \text{WALL THICKNESS}) + T$.
7. WHEN D_2 IS EQUAL TO OR LESS THAN D_1 , JOIN INVERTS AND WHEN D IS GREATER THAN D , JOIN SOFFITS.
8. BEVELED PIPE MAY BE USED IN LIEU OF CONCRETE COLLAR.
9. THIS CONCRETE COLLAR DETAIL SHALL NOT BE USED WHEN $G_2 - G_1 > 10\%$.

CONCRETE COLLAR

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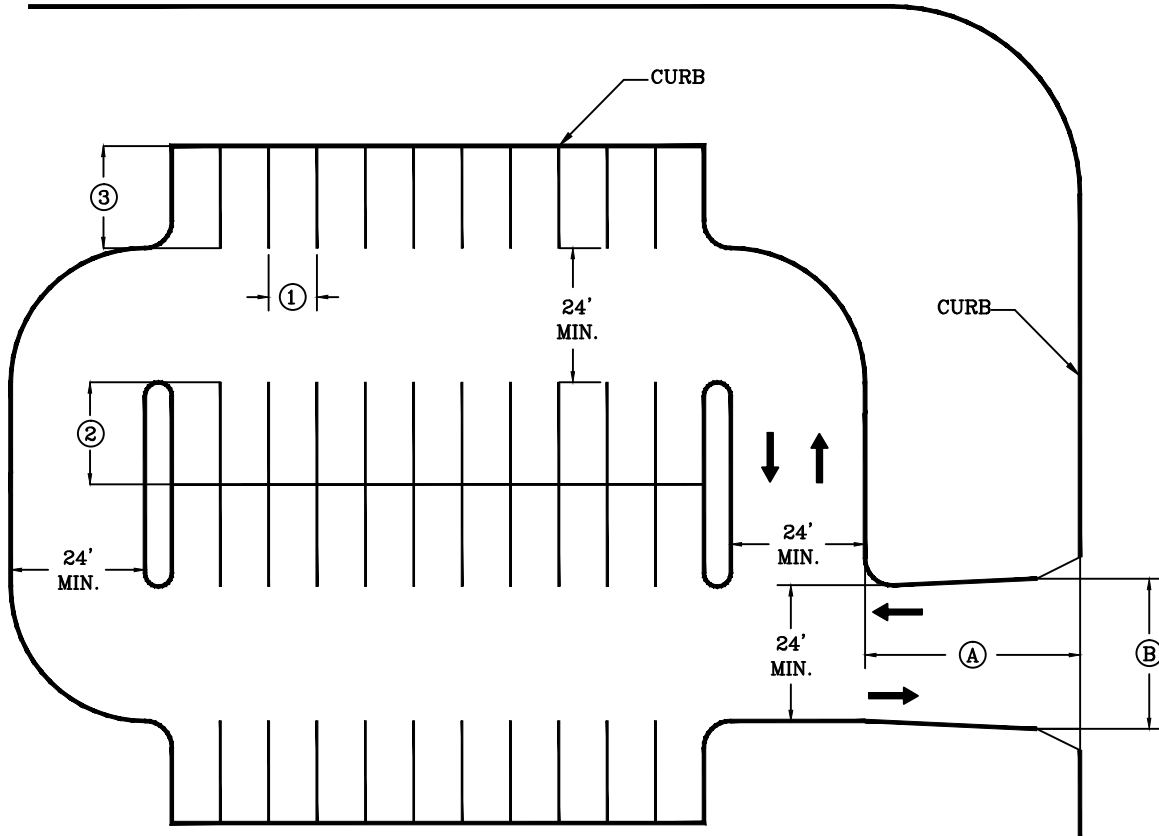
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310

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CITY OF IRVINE PUBLIC WORKS

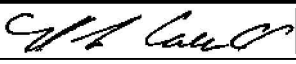


PARKING STALL DIMENSIONS			
TYPE	STALL WIDTH	STALL DEPTH	STALL DEPTH **
FULL-SIZED SPACE	① 9.0' *	② 19.0' *	③ 17' w/2' O.H.
LONG-TERM SPACE	① 8.5' *	② 19.0' *	③ 17' w/2' O.H.
① SETBACK PER CITY POLICY			
② PER CITY STANDARD PLANS 204, 205, & 206.			

- * PARKING STALL DIMENSIONS SHALL BE IN ACCORDANCE WITH ZONING ORDINANCE SECTION 4-4-1.
** PARKING STALL OVERHANG (OVER A CURB) SHALL HAVE LOW-COVER LANDSCAPING OR A MINIMUM 6 FOOT WIDE SIDEWALK. SEE STANDARD PLAN 201 FOR SIDEWALK DETAILS.
*** PARKING STRUCTURE STALL DIMENSIONS VARY FROM STANDARD PLAN 411. REFER TO ZONING ORDINANCE SECTION 4-4-1B.

90° PARKING LAYOUT DOUBLE-LOADED AISLES

OFF-STREET PARKING


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DATE

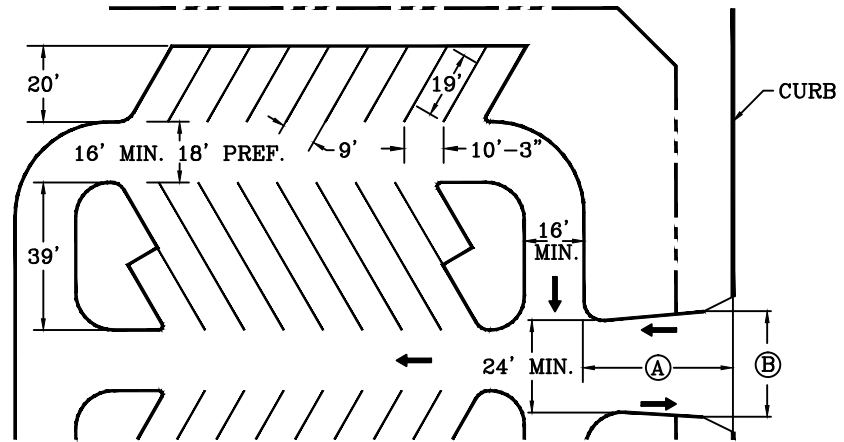
STD. PLAN 411

SHEET 1 OF 5

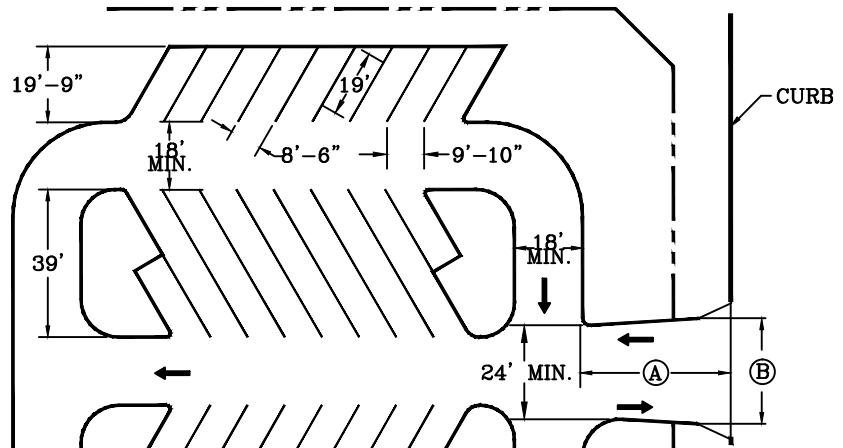


CITY OF IRVINE PUBLIC WORKS

FULL SIZE SPACES



LONG TERM SPACES



NOTES:

- Ⓐ SETBACK PER CITY POLICY.
- Ⓑ PER CITY STANDARD PLANS 204, 205, & 206.

- * PARKING STALL DIMENSIONS SHALL BE IN ACCORDANCE WITH ZONING ORDINANCE SECTION 4-4-1.
- ** PARKING STRUCTURE STALL DIMENSIONS VARIES FROM STANDARD PLAN 411. REFER TO ZONING ORDINANCE SECTION 4-4-1B.
- *** FOR PARKING STALL DEPTHS OF 17' WITH 2' OVERHANG (OVER A CURB), THE PARKING STALL OVERHANG SHALL HAVE LOW-COVER LANDSCAPING OR A MINIMUM 6 FOOT WIDE SIDEWALK. SEE STANDARD PLAN 201 FOR SIDEWALK DETAILS.

60° ANGLE PARKING LAYOUT ONE WAY DIRECTION

OFF-STREET PARKING


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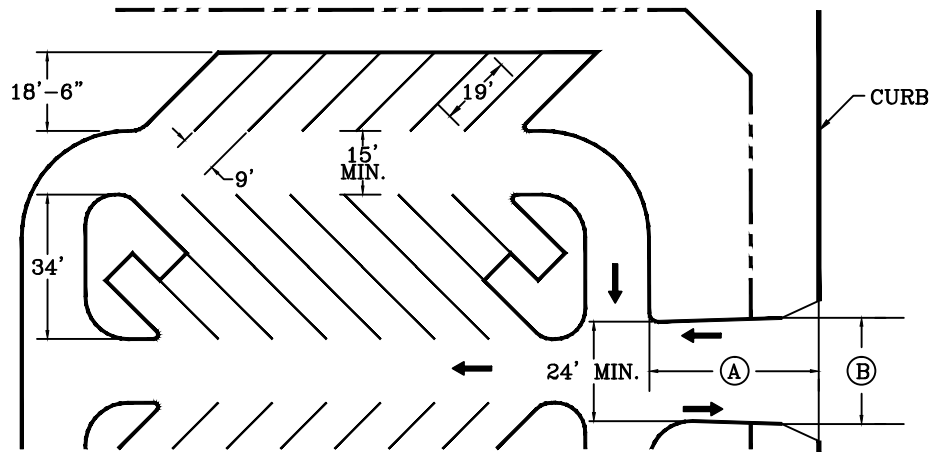
STD. PLAN 411

SHEET 2 OF 5

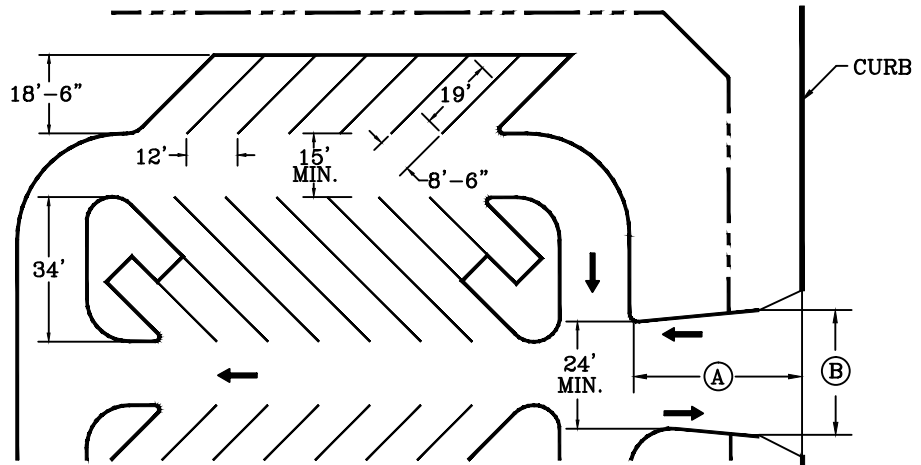


CITY OF IRVINE PUBLIC WORKS

LONG TERM SPACES



LONG TERM SPACES



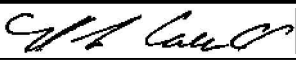
NOTES:

- (A) SETBACK PER CITY POLICY.
- (B) PER CITY STANDARD PLANS 204, 205, & 206.

- * PARKING STALL DIMENSIONS SHALL BE IN ACCORDANCE WITH ZONING ORDINANCE SECTION 4-4-1.
- ** PARKING STRUCTURE STALL DIMENSIONS VARIES FROM STANDARD PLAN 411. REFER TO ZONING ORDINANCE SECTION 4-4-1B.
- *** FOR PARKING STALL DEPTHS OF 17' WITH 2' OVERHANG (OVER A CURB), THE PARKING STALL OVERHANG SHALL HAVE LOW-COVER LANDSCAPING OR A MINIMUM 6 FOOT WIDE SIDEWALK. SEE STANDARD PLAN 201 FOR SIDEWALK DETAILS.

45° ANGLE PARKING LAYOUT ONE WAY DIRECTION

OFF-STREET PARKING


MARK CARROLL, R.C.E. 31515
CITY OF IRVINE - CITY ENGINEER

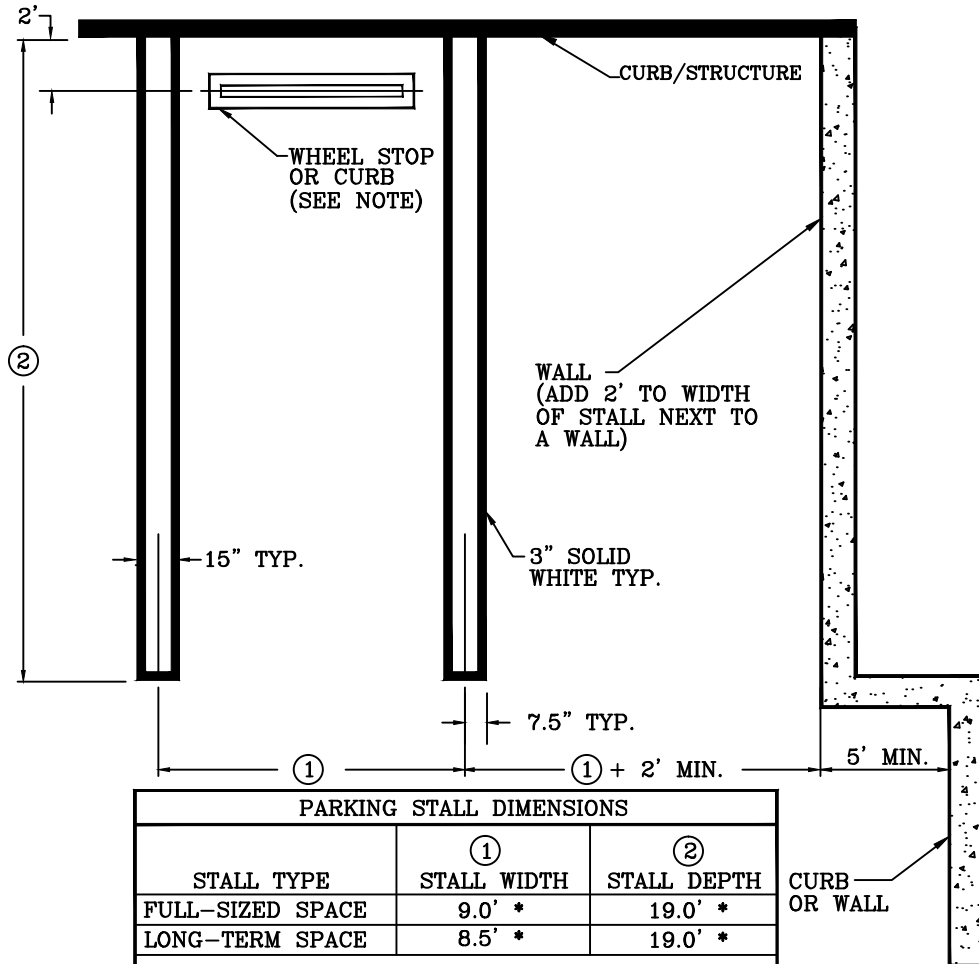
AUGUST 2013
DATE

STD. PLAN 411

SHEET 3 OF 5



CITY OF IRVINE PUBLIC WORKS



PARKING STALL DIMENSIONS		
STALL TYPE	① STALL WIDTH	② STALL DEPTH
FULL-SIZED SPACE	9.0' *	19.0' *
LONG-TERM SPACE	8.5' *	19.0' *

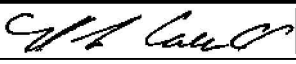
WHEEL STOPS:

AUTOMOBILE AND HANDICAPPED SPACES SHALL HAVE WHEEL STOPS NOT LESS THAN 6 INCHES IN HEIGHT IN SITUATIONS WHERE THE DIRECTOR OF COMMUNITY DEVELOPMENT DETERMINES WHEEL STOPS ARE NECESSARY TO PREVENT ENCROACHMENT INTO STRUCTURES, LANDSCAPED OR PEDESTRIAN AREAS.

- * PARKING STALL DIMENSIONS SHALL BE IN ACCORDANCE WITH ZONING ORDINANCE SECTION 4-4-1.
** PARKING STRUCTURE STALL DIMENSIONS VARY FROM STANDARD PLAN 411. REFER TO ZONING ORDINANCE SECTION 4-4-1B.

STRIPING DETAIL FOR
SURFACE PARKING LOTS

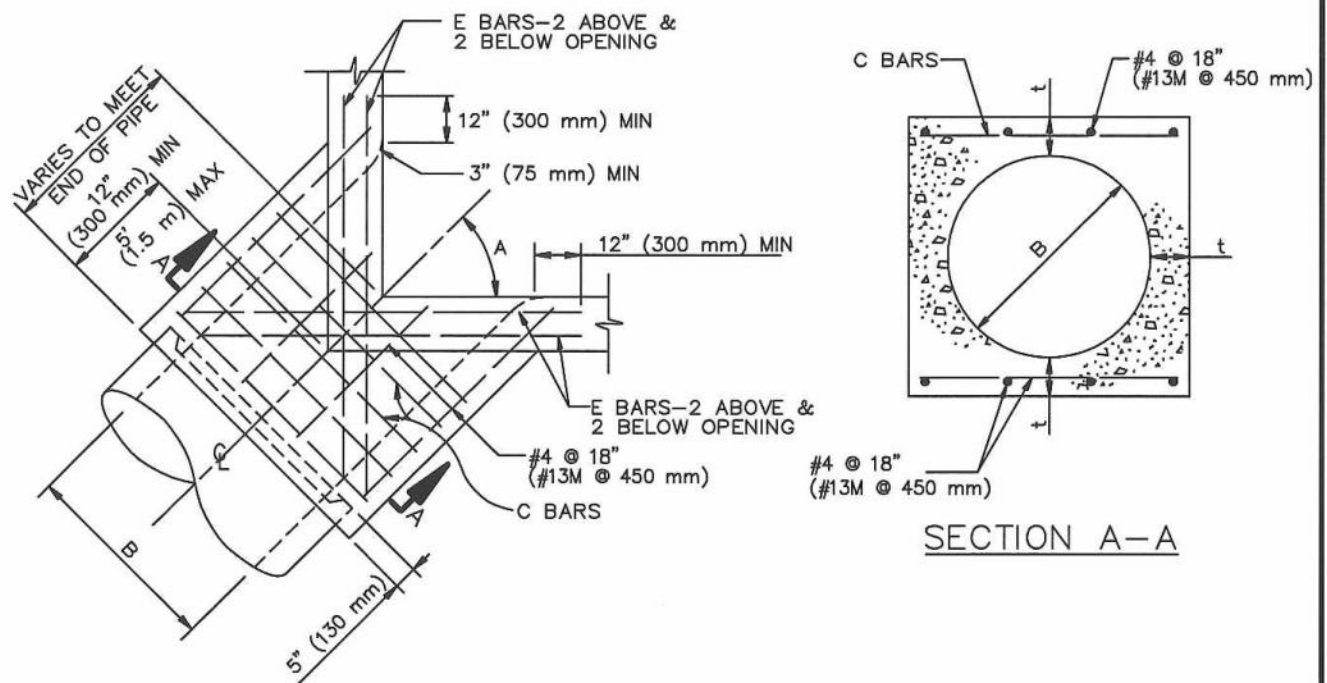
OFF-STREET PARKING


MARK CARROLL, R.C.E. 31515
CITY OF IRVINE - CITY ENGINEER

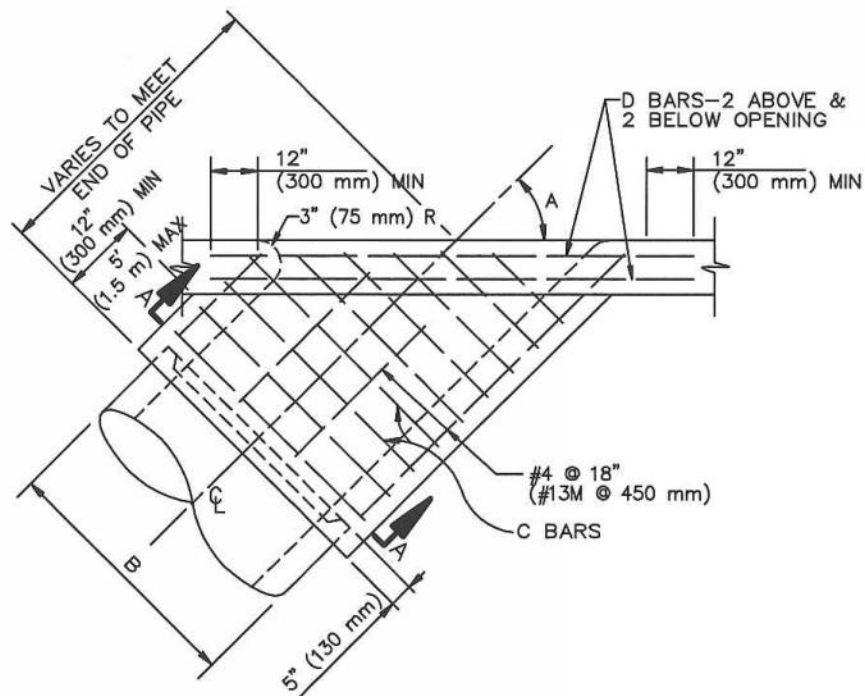
AUGUST 2013
DATE

STD. PLAN
411

SHEET 5 OF 5



PLAN
CORNER CONNECTION



PLAN
SIDE CONNECTION

STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION

PROMULGATED BY THE
PUBLIC WORKS STANDARDS, INC.,
GREENBOOK COMMITTEE
1984
REV. 1996, 2009

MONOLITHIC CATCH BASIN CONNECTION

USE WITH STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION

STANDARD PLAN

308-2

SHEET 1 OF 2

STRUCTURAL DATA							
B	t	C BARS	D&E BARS	B	t	C BARS	D&E BARS
12" (300 mm)	4" (115 mm)	#4 @ 6" (#13M @ 150 mm)	#5 (#16M)	42" (1050 mm)	7 1/2" (190 mm)	#5 @ 6" (#16M @ 150 mm)	#6 (#19M)
15" (375 mm)	4-1/4" (115 mm)			45" (1125 mm)	7 3/4" (190 mm)		
18" (450 mm)	4-1/2" (115 mm)			48" (1200 mm)	8" (215 mm)		
21" (525 mm)	5" (140 mm)			51" (1275 mm)	8 1/2" (215 mm)		
24" (600 mm)	5 1/4" (140 mm)			54" (1350 mm)	9" (240 mm)		
27" (675 mm)	5 1/2" (140 mm)			57" (1425 mm)	9 1/4" (240 mm)		
30" (750 mm)	6" (165 mm)			60" (1500 mm)	9 1/2" (240 mm)		
33" (825 mm)	6 1/4" (165 mm)			63" (1575 mm)	10" (260 mm)		
36" (900 mm)	6 1/2" (165 mm)			66" (1650 mm)	10 1/4" (260 mm)		
39" (975 mm)	7" (190 mm)			69" (1725 mm)	10 3/4" (280 mm)		
				72" (1800 mm)	11" (280 mm)		
FOR B GREATER THAN 72" (1800 mm) SEE PLANS							

NOTES

1. REINFORCING STEEL SHALL BE 1-1/2" (40 mm) CLEAR FROM FACE OF CONCRETE UNLESS OTHERWISE SHOWN.
2. REINFORCING STEEL FOR INSIDE FACE OF CATCH BASIN SHALL BE CUT AT CENTER OF OPENING AND BENT INTO WALLS OF MONOLITHIC CATCH BASIN CONNECTION. REINFORCING STEEL FOR OUTSIDE FACE OF CATCH BASIN SHALL BE CUT 2" (50 mm) CLEAR OF OPENING.
3. CONNECTION SHALL BE PLACED MONOLITHIC WITH CATCH BASIN. THE ROUNDED EDGE OF OUTLET SHALL BE CONSTRUCTED BY PLACING CONCRETE WITH THE SAME CLASS OF CONCRETE AS THE CATCH BASIN AGAINST A CURVED FORM WITH A RADIUS OF 3" (75 mm).
4. CONNECTIONS SHALL BE CONSTRUCTED WHEN:
 - (A) PIPES INLET OR OUTLET THROUGH CORNER OF CATCH BASIN
 - (B) ANGLE A FOR PIPES THROUGH 30" (750 mm) IN DIAMETER IS LESS THAN 70° OR GREATER THAN 110°.

STANDARD PLANS FOR PUBLIC WORKS CONSTRUCTION

MONOLITHIC CATCH BASIN CONNECTION

STANDARD PLAN

308-2

SHEET 2 OF 2

APPENDIX B

PERMITS

APPENDIX C

PROJECT MANUAL



Project Manual

For

City of Irvine William Woollett Jr. Aquatics Center

4601 Walnut Ave, Irvine, CA 92604

VOLUME 1

Specifications

for the

City of Irvine
1 Civic Center Plaza, Irvine, CA 92606

Date: 01/21/2026

PBK Project No.: 230538

Package



Project Manual

for:

William Woollett Jr.

Aquatics Center Addition

for the

City of Irvine

Date: 01/21/2026

PBK Project No.: 230538

Package

Consultants:

Architect:

PBK
2400 E. Katella Ave.
Suite 950
Anaheim, CA 92806
Phone: (949) 548-5000



Structural:

Kubala Engineers
2400 E. Katella Ave.
Suite 950
Anaheim, CA 92806
Phone: (949) 548-5000



Civil:

FPL and Associates, Inc.
30 Corporate Park
Suite 40
Irvine, CA 92606
Phone: (949) 252-1688



Electrical:

LEAF Engineers
8163 Rochester Avenue
Suite 100
Rancho Cucamonga, CA 91730
Phone: (909) 987-0909



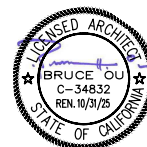
Mechanical:

LEAF Engineers
8163 Rochester Avenue
Suite 100
Rancho Cucamonga, CA 91730
Phone: (909) 987-0909



Landscape:

EDGELAND
4250 Executive Square
Suite 101
La Jolla, CA 92037
Phone: (713) 460-0988



Aquatics:

Counsillman-Hunsaker
1959 Palomar Oaks Way
Suite 160
Carlsbad, CA 92011
Phone: (310) 734-2282



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SECTION 01 10 00 SUMMARY

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes requirements including but not limited to:
 - 1. Project information.
 - 2. Work covered by Contract Documents.
 - 3. Phased construction.
 - 4. Work by Owner.
 - 5. Work under separate contracts.
 - 6. Future Work.
 - 7. Purchase contracts.
 - 8. Owner furnished products.
 - 9. Owner furnished, Contractor installed products.
 - 10. Access to site.
 - 11. Coordination with occupants.
 - 12. Work restrictions.
 - 13. Specification and Drawing conventions.
 - 14. Miscellaneous provisions.

1.3 PROJECT INFORMATION

- A. Project Identification:
 - 1. Project Location: **William Woollett Jr. Aquatics Center**
4601 Walnut Ave
Irvine, CA 92604
- B. Owner: **City of Irvine**
- C. Architect: **PBK Architects**
2400 E Katella Ave.
Suite 950
Anaheim, CA 92831
- D. Consultants: Additional design professionals have been retained who have prepared designated portions of the Contract Documents. Refer to "stamp" page this project manual.

1.4 WORK COVERED BY CONTRACT DOCUMENTS

- A. The Work of Project is defined by the Contract Documents and consists of the following: Construction of new aquatics center for the City of Irvine in Joint-Use with Irvine Unified School District. Aquatics center includes new pool, training and locker room building, pool equipment building, and bleachers.
- B. Type of Contract: Project will be constructed under a design-bid-build delivery method.

1.5 WORKSEQUENCE

- A. The Work shall be completed according to the Project schedule set forth below.
- B. Occupancy: The Project may be occupied by District staff as shown below. If so, the premises will be occupied whether or not the Work is completed, regardless of time extensions (if any).
- C. Any Work performed after this date will need to be fully coordinated with District and will be limited to after school hours or on weekends.
- D. Project Schedule:

The following schedule summarizes the major activity dates:

Activity	Dates and Time (As Applicable)
Add Date #1	
Add Date #2	
Mandatory Pre-Bid Job Walk	
Bids RFI's Due to District	
Addendum Issued	
Bid Opening Date	
Board Award of Contract	
Construction to Begin	
Dry-in Substantial Completion	
Final Completion Date	

1.6 WORK BY OWNER AND UNDER SEPARATE CONTRACTS

- A. The Owner reserves the right to let separate contract for work outside of the scope of this Contract. Cooperate fully with separate contractors so work on those contracts may be carried out smoothly, without interfering with or delaying Work under this Contract or other contracts. Coordinate the Work of this Contract with work performed under separate contracts.
- B. Owner Furnished Products (OFCI):
 - 1. The Owner will furnish products indicated. The Work includes receiving, unloading, handling, storing, protecting, and installing Owner furnished products and making building services connections when applicable:
 - a. Owner Furnished Products: Coordinate with Owner.

1.7 ACCESS TO SITE

- A. Use of Site:
 - 1. Limit use of Project site to Work in areas and areas within the Contract limits indicated. Do not disturb portions of site beyond areas in which the Work is indicated:
 - a. Limits: The Drawings indicate the limits of the construction operations.
 - b. Driveways, Walkways, and Entrances:
 - 1) Keep driveways, parking areas, student drop off and pick up points, loading areas, and entrances serving premises clear and available to Owner, Owner's employees, the students, and emergency vehicles at all times. Do not use these areas for parking or storage of materials:
 - a) Schedule deliveries to minimize use of driveways and entrances by construction operations.
 - b) Schedule deliveries to minimize space and time requirements for storage of materials and equipment onsite.

- B. Condition of Existing Building: Maintain portions of existing building affected by construction operations in weathertight condition throughout construction period. Repair damage caused by construction operations.
- C. COVID-19 Conditions: Contractors must conform, and ensure that all subcontractors and other Project personnel, including but not limited to; workers and site visitors, conform to all regulations, limitations, and requirements as put forth and recommended by Associated General Contractors of California (AGC), State of California Guidance on Outbreak of 2019 Novel Coronavirus (2019-nCoV) in Wuhan, China, and local Health Department agencies.

1.8 COORDINATION WITH OCCUPANTS

- A. Owner Limited Occupancy of Completed Areas of Construction:
 - 1. Owner reserves the right to occupy and to place and install equipment in completed portions of the Work, prior to Substantial Completion of the Work, provided occupancy does not interfere with completion of the Work. Such placement of equipment and limited occupancy shall not constitute acceptance of the total Work:
 - a. Architect will prepare a Certificate of Substantial Completion for each specific portion of the Work to be occupied prior to Owner acceptance of the completed Work.
 - b. Obtain a Certificate of Occupancy from authorities having jurisdiction before limited Owner occupancy.
 - c. Before limited Owner occupancy, ensure mechanical and electrical systems are fully operational, and required tests and inspections and start up procedures are successfully completed. On occupancy, Owner will operate and maintain mechanical and electrical systems serving occupied portions of Work.
 - d. Upon occupancy, Owner will assume responsibility for maintenance and custodial service for occupied portions of Work.

1.9 WORK RESTRICTIONS

- A. Work Restrictions: Comply with restrictions on construction operations. Comply with limitations on use of public streets and with other requirements of authorities having jurisdiction.
- B. On Site Work Hours: Limit Work in the existing building to normal working hours, Monday through Friday, unless otherwise indicated. Coordinate with Owner when it is necessary to extend working hours or Work on weekends.
- C. Existing Utility Interruptions:
 - 1. Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and after providing temporary utility services according to requirements indicated:
 - a. Notify Owner not less than two (2) weeks in advance of proposed utility interruptions.
 - b. Obtain Owner's written permission before proceeding with utility interruptions.
- D. Noise, Vibration, and Odors:
 - 1. Coordinate operations that result in high levels of noise and vibration, odors, or other disruption to Owner occupancy with Owner:
 - a. Notify Owner not less than two (2) weeks in advance of proposed disruptive operations.
 - b. Obtain Owner's written permission before proceeding with disruptive operations.
- E. Controlled Substances, Firearms, and Explosive Devices: Use of tobacco products,

controlled substances, firearms, and explosive devices on the site is not permitted.

- F. Employee Identification: Provide identification tags for Contractor personnel working on site. Require personnel to use identification tags at all times.
- G. Employee Screening:
 - 1. Comply with Owner's requirements for drug and background screening of Contractor personnel working on site:
 - a. Maintain list of approved screened personnel with Owner's representative.

1.10 SPECIFICATION AND DRAWING CONVENTIONS

- A. Specification Content:
 - 1. The Specifications use certain conventions for the style of language and the intended meaning of certain terms, words, and phrases when used in particular situations. These conventions are as follows:
 - a. Imperative mood and streamlined language are generally used in the Specifications. The words "shall," "shall be," or "shall comply with," depending on the context, are implied where a colon (:) is used within a sentence or phrase.
 - b. Specification requirements are to be performed by Contractor unless specifically stated otherwise.
- B. Drawing Coordination:
 - 1. Requirements for materials and products identified on Drawings are described in detail in the Specifications. One or more of the following are used on Drawings to identify materials and products:
 - a. Terminology: Materials and products are identified by the typical generic terms used in the individual Specifications Sections.
 - b. Abbreviations: Materials and products are identified by abbreviations.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.1 CONSTRUCTION SCHEDULE

- A. The Owner has a critical need for the Work to begin upon Notice to Proceed and shall be Substantially Complete by the date specified on the Project Schedule. **There will be No Extensions of Time due to weather.**

END OF SECTION 01 10 00

SECTION 01 25 13 PRODUCT SUBSTITUTION PROCEDURES

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Specified product compliance, and product quality assurance.
 - 2. Specific administrative and procedural requirements for handling requests for substitutions made prior to award of Contract.
 - 3. Requirements for product delivery, storage, and handling.
- B. Related Requirements:
 - 1. Instructions to Offerors:
 - a. Product options and procedures for submittal of requests for substitutions during the Proposal period.

1.3 DEFINITIONS

- A. Definitions used in this Section are not intended to negate the meaning of other terms used in the Contract Documents, including such terms as "specialties," "systems," "structure," "finishes," "accessories," "furnishings," "special construction," and similar terms. Such terms are self-explanatory and have recognized meanings in the construction industry:
 - 1. Equipment: Product with operational parts, regardless of whether motorized or manually operated, and in particular, a product that requires service connections such as wiring or piping.
 - 2. Materials: Products that must be substantially cut, shaped, worked, mixed, finished, refined, or otherwise fabricated, processed, or installed to form units of work.
 - 3. Products:
 - a. Items purchased for incorporation in the Work, regardless of whether they were specifically purchased for the Project or taken from Contractor's previously purchased stock. The term "product" as used herein includes the terms "material", "equipment", "system", and other terms of similar intent:
 - 1) Named products: Identified by the use of the manufacturer's name for a product, including such items as a make or model designation as recorded in published product literature of the latest issue as of the date of the Contract Documents.
 - 2) Specified products: Same as Named Products.

1.4 QUALITY ASSURANCE

- A. Source Limitations:
 - 1. To the fullest extent possible, provide products of the same generic kind from a single source for each unit of work:
 - a. When it is discovered that specific products are available only from sources that do not or cannot produce an adequate quantity to complete Project requirements in a timely manner, consult with the Architect/Engineer for a determination of what product quantities are most important before proceeding. The Architect/Engineer will designate those qualities, such as visual, structural, durability, or compatibility

that are most important. When the Architect/Engineer's determination has been made, select products from those sources that produce products that possess the most important qualities to the fullest extent possible.

- B. Compatibility of Options:
 - 1. Compatibility of products is a basic requirement of product selection. When Contractor is given the option of selecting between two (2) or more products for use on the Project, the product selected must be compatible with other products previously selected, even if the products previously selected were also Contractor options. The complete compatibility between the various choices available to Contractor is not assured by the various requirements of the Contract Documents but must be provided by Contractor.
- C. Or Equal:
 - 1. Where the phrase "or equal," "or equivalent," "or Architects approved equal," or similar phrasing occurs in the Proposal Documents, do not assume that materials, equipment, or methods of construction will be approved by the Architect unless the item has been specifically approved for this Work by the Architect.
 - 2. The decision of the Architect shall be final.
- D. Where a proposed substitution involves the work of more than one (1) contractor, each contractor involved shall cooperate and coordinate the work with all other contractors involved, so as to provide uniformity and consistency and to assure the compatibility of products.
- E. Foreign Product Limitations:
 - 1. "Foreign products" as distinguished from "domestic products" are defined as products that are either manufactured substantially (50 percent or more of value) outside of the United States and its possessions, or produced or supplied by entities known to be substantially owned (more than 50 percent) by persons who are not citizens of, nor living within the United States and its possessions.
 - 2. Except under one (1) of the following conditions, select and provide domestic, not foreign, products for inclusion in the Work:
 - a. There is no domestic product available that complies with the requirements of the Contract Documents.
 - b. Available domestic products that comply with the requirements of the Contract Documents are available only at prices or other procurement terms that are substantially higher (25 percent or more) than for available foreign products that comply with the requirements of the Contract Documents.
 - c. At the discretion of Architect or Owner.
 - 3. Final determination and acceptance will be the responsibility of Architect.

1.5 SUBSTITUTIONS OF PRODUCTS

- A. The products described in the Proposal Documents establish a standard of required function, dimension, appearance, and quality to be met by any proposed substitution. The materials and equipment named in, and the procedures covered by these Specifications have been selected as a standard because of quality, particular suitability, or record of satisfactory performance. It is not intended to preclude the use of equal or better materials or equipment, provided that same meets the requirements of the particular Project and is approved in an Addendum as a substitution prior to the submission of proposals.
- B. No substitution will be considered prior to receipt of proposals unless written request for approval has been received by the Architect at least seven (7) days prior to the date for receipt of proposals. Each such request shall include the name of the material or equipment for which it is to be substituted and a complete description of the proposed substitute

including Drawings, cuts, performance and test data, and any other information necessary for an evaluation. The Architect's decision of approval or disapproval of a proposed substitution shall be final.

- C. If the Architect approves any proposed substitution prior to receipt of proposals, such approval will be set forth in an Addendum. Offerors shall not rely upon approvals made in any other manner.
- D. The Architect and Owner reserve the right to disapprove the use of any manufacturer who in their judgment is unsuitable for use on the Project and that decision will be final.
- E. The following are not considered as substitutions:
 - 1. Revisions to the Contract Documents, when requested by Owner, Architect, or any of their consultants are considered as changes, not substitutions.
 - 2. Specified Contractor options on products and construction methods included in Contract Documents are choices made available to Contractor and are not subject to the requirements specified in this Section for substitutions.
 - 3. Except as otherwise provided in the Contract Documents, Contractor's determination of and compliance with governing authorities does not constitute substitutions, nor does it constitute a basis for change orders.
- F. The following may be considered as a reason for a request for substitution:
 - 1. The request is directly related to an "or approved equal" clause or similar language in the Contract Documents.
 - 2. The specified product or method of construction cannot be provided within the Contract Time in accordance with the paragraph below concerning availability of specified items.
 - 3. The specified product or method of construction cannot receive necessary approval by a governing authority, but the requested substitution can be approved.
 - 4. A substantial advantage is offered to Owner, in terms of cost, time, energy conservation, or other consideration of merit, after deducting offsetting responsibilities Owner may be required to bear. These additional responsibilities may include such considerations as additional compensation to Architect/Engineer for redesign and evaluation services, the increased cost of other work by Owner or separate contractors, and similar considerations.
 - 5. The specified product or method of construction cannot be provided in a manner that is compatible with other materials, but Contractor certifies that the substitution will overcome the incompatibility.
 - 6. The specified product or method of construction cannot be coordinated with other materials, but Contractor certifies that the proposed substitution can be coordinated with them.
 - 7. The specified product or method of construction cannot provide a warranty required by the Contract Documents, but Contractor certifies that the proposed substitution provides the required warranty.
- G. Availability of Specified Items:
 - 1. Verify prior to submittal of Proposal that all specified items will be available in time for installation during orderly and timely progress of the Work:
 - a. In the event specified items will not be so available, notify the Architect prior to receipt of Proposals. Submit Request for Substitutions in accordance with this Section.
 - b. The request will not be considered if the product or method cannot be provided as a result of Contractor's failure to pursue the Work promptly or coordinate activities properly.
 - 2. Costs of delays because of non-availability of specified items, when such delays could have been avoided by Contractor, will be back-charged as necessary and shall not be borne by Owner.

- H. A request constitutes a representation that Offeror:
 - 1. Has investigated proposed product and determined that it meets or exceeds quality level of specified product.
 - 2. Will provide same warranty for substitution as for specified product, except when inability to provide specified warranty is reason for request for substitution as described above.
 - 3. Will coordinate installation and make changes to other work that may be required for the Work to be complete with no additional cost to Owner.
 - 4. Waives claims for additional costs or time extension that may subsequently become apparent.
 - 5. Will reimburse Owner and pay for all costs, including Architect/Engineer's redesign and evaluation costs resulting from the use of the proposed substitution, or for review or redesign of services associated with re-approval by authorities having jurisdiction.
- I. No substitutions will be considered after the Award of Contract.

1.6 SUBSTITUTION REQUEST SUBMITTAL

- A. Requests for Substitutions:
 - 1. Submit three (3) copies of each request for substitution. In each request, identify the product or fabrication or installation method to be replaced by the substitution. Include related Specifications Section and Drawing numbers, and complete documentation showing compliance with the requirements for substitutions. Include, as appropriate, with each request, the following information:
 - a. Product data, drawings, and descriptions of products, fabrication, and installation procedures.
 - b. Samples, where applicable or requested.
 - c. A detailed comparison of the significant qualities of the proposed substitution with those of the Work originally specified. Significant qualities may include elements such as size, weight, durability, performance, and visual effect, where applicable.
 - d. Coordination information, including a list of changes or modifications needed by other parts of the Work and to construction performed by Owner and separate contractors that will become necessary to accommodate the proposed substitution.
 - e. A statement indicating the effect the substitution will have on the Contractor's Construction Schedule compared to the schedule without approval of the substitution. Indicate the effect of the proposed substitution on overall Contract Time.
 - f. Cost information, including a proposal of the net change, if any, in the Contract Sum.
 - g. Certification by Contractor to the effect that, in Contractor's opinion, after thorough evaluation, the proposed substitution will result in work that in every significant respect is equal to, or better than, the Work required by the Contract Documents, and that it will perform adequately in the application indicated. Include Contractor's waiver of rights to additional payment or time that may subsequently become necessary because of the failure of the substitution to perform adequately.
 - h. A statement indicating that Contractor will reimburse Owner and pay for all costs, including Architect/Engineer's re-design and evaluation costs resulting from the use of the proposed substitution.
- B. Work-Related Submittals: Contractor's submittal of, and Architect/Engineer's acceptance of, shop drawings, product data, or samples related to work not complying with the Contract Documents, does not constitute an acceptance or valid request for a substitution, nor approval thereof.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. General:
1. Deliver, store, and handle products in accordance with manufacturer's recommendations, using means and methods that will prevent damage, deterioration, and loss, including theft. Control to prevent overcrowding of construction spaces or overloading of structure. In particular, coordinate delivery and installation to ensure minimum holding or storage times for items known or recognized to be flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other sources of loss:
 - a. Deliver products to the site in the manufacturer's sealed containers or other packaging system, complete with labels intact, and instructions for handling, storage, unpacking, installing, cleaning, and protecting.
 - b. Cover products subject to deterioration with impervious sheet covering. Provide ventilation to avoid condensation or potential degradation of product.
 - c. Store loose granular materials on solid flat surfaces in a well-drained area. Prevent mixing with foreign matter.
 - d. Store products at the site or in a bonded and insured off-site storage facility or warehouse in a manner that will facilitate inspection and measurement of quantity or counting of units. Periodically inspect to verify products are undamaged and are maintained in acceptable condition.
 - e. Store heavy materials away from the Project structure or in a manner that will not endanger the supporting construction.

PART 2 PRODUCTS

2.1 GENERAL PRODUCT COMPLIANCE

- A. General:
1. Requirements for individual products are indicated in the Contract Documents; compliance with these requirements is in itself a Contract requirement. These requirements may be specified in any one (1) of several different specifying methods, or in any combination of these methods. These methods include the following:
 - a. Proprietary.
 - b. Descriptive.
 - c. Performance.
 - d. Compliance with Reference Standards.
 2. Compliance with codes, compliance with graphic details, allowances, and similar provisions of the Contract Documents also have a bearing on the selection process.
- B. Procedures for Selecting Products:
1. Contractor's options in selecting products are limited by requirements of the Contract Documents and governing regulations. They are not controlled by industry traditions or procedures experienced by Contractor on previous construction projects. Required procedures include, but are not limited to, the following for the various indicated methods of specifying:
 - a. Proprietary and semi-proprietary Specification requirements:
 - 1) Single product name: Where only a single product or manufacturer is named, provide the product indicated, unless the Specification indicates the possible consideration of other products. Advise Architect/Engineer before proceeding, when it is discovered that the named product is not a reasonable or feasible solution.
 - 2) Two (2) or more product names: Where two (2) or more products or manufacturers are named, provide one (1) of the products named, at Contractor's option. Exclude products that do not comply with Specification requirements. Do not provide or offer to provide an unnamed product, unless the Specification indicates the possible consideration of other products.

Advise Architect/Engineer before proceeding where none of the named products comply with Specification requirements or are not feasible for use. Where products or manufacturers are specified by name, accompanied by the term "or approved equal" or similar language, comply with this Section regarding substitutions to obtain approval from Architect/Engineer for the use of an unnamed product.

- b. Nonproprietary Specification requirements: Where the Specifications name products or manufacturers that are available and may be incorporated in the Work, but do not restrict Contractor to the use of these products only, Contractor may, at his option, use any available product that complies with the Contract requirements.
 - c. Descriptive Specification requirements: Where the Specifications describe a product or assembly generically, in detail, listing the exact characteristics required, but without use of a brand name, provide products or assemblies that provide the characteristics indicated and otherwise comply with Contract requirements.
 - d. Performance Specification requirements: Where the Specifications require compliance with indicated performance requirements, provide products that comply with the specific performance requirements indicated, and that are recommended by the manufacturer for the application indicated. The manufacturer's recommendations may be contained in published product literature, or by the manufacturer's individual certification of performance. General overall performance of a product is implied where the product is specified for specific performances.
 - e. Compliance with standards, codes, and regulations: Where the Specifications require only compliance with an imposed standard, code, or regulation, Contractor has the option of selecting a product that complies with Specification requirements, including standards, codes, and regulations.
 - f. Visual matching: Where matching an established sample is required, the final judgement of whether a product proposed by Contractor matches the sample satisfactorily will be determined by Architect. Where there is no product available within the specified product category that matches the sample satisfactorily and also complies with other specified requirements, comply with the provisions of this Section regarding substitutions and other Contract Documents for change orders for the selection of a matching product in another product category, or for noncompliance with specified requirements.
 - g. Visual selection: Except as otherwise indicated, where specified product requirements include the phrase "...as selected from the manufacturer's standard colors, patterns, textures..." or similar phrases, Contractor has the option of selecting the product and manufacturer, provided the selection complies with other specified requirements. Architect is subsequently responsible for selecting the color, pattern, and texture from the product line selected by Contractor.
 - h. Allowances: Refer to individual Sections of the Specifications for an indication of product selections that are controlled by established allowances, and for the procedures required for processing such selections.
- C. Producer's Statement of Applicability: Where individual Specification Sections indicate products that require a "Statement of Applicability" from the manufacturer or other producer, submit a written certified statement from the producer stating that the producer has reviewed the proposed application of the product on the Project. This statement shall affirm that the producer agrees with, or does not object to, Architect/Engineer's Specification, and that Contractor's selection of the product on the Project is suitable and proper.

2.2 SUBSTITUTIONS

- A. Condition: Contractor's request for substitution will be received and considered when extensive revisions to Contract Documents are not required, when the proposed changes are in keeping with the general intent of the Contract Documents, when the request is timely, fully documented and properly submitted, and when one (1) or more of the above

conditions are satisfied, all as judged and determined by Architect/Engineer; otherwise, the requests will be returned without action except to record noncompliance with these requirements.

PART 3 EXECUTION

3.1 INSTALLATION OF PRODUCTS

- A. General: Except as otherwise indicated in individual Sections of these Specifications, comply with the manufacturer's instructions and recommendations for installation of the products in the applications indicated.
- B. Anchor each product securely in place, accurately located, and aligned with other work.
- C. Clean exposed surfaces and protect surfaces as necessary to ensure freedom from damage and deterioration at time of acceptance.
- D. Products and assemblies shall be installed complete, in-place, watertight, and structurally sound.

3.2 INSTALLATION OF APPROVED SUBSTITUTIONS

- A. Coordinate all approved substitutions with adjacent work.
- B. Comply with the manufacturer's and/or supplier's instructions and recommendations for installation of the products in the applications indicated.
- C. Provide all items required by manufacturer and/or supplier regarding installation, i.e. supplemental supports, anchors, fasteners, painting, etc., whether or not indicated or specified.

END OF SECTION 01 25 13

SECTION 01 29 00 PAYMENT PROCEDURES

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes administrative and procedural requirements necessary to prepare and process Applications for Payment.

1.3 DEFINITIONS

- A. Pencil Copy: A copy submitted prior to a final/official.
- B. 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.

1.4 SCHEDULE OF VALUES

- A. Coordination:
 - 1. Coordinate preparation of the schedule of values with preparation of Contractor's Construction Schedule:
 - a. Coordinate line items in the schedule of values with administrative forms and schedules, including the following:
 - 1) Application for Payment forms with continuation sheets.
 - 2) Updated submittal schedule.
 - 3) Items required to be indicated as separate activities in updated Contractor's Construction Schedule.
 - b. Submit the schedule of values to Architect at earliest possible date, but no later than seven (7) days before the date scheduled for submittal of initial Applications for Payment. Contractor's standard form or electronic media printout will be considered but must be approved by Owner.
- B. Format and Content:
 - 1. Use Project manual table of contents as a guide to establish line items for the schedule of values. Provide at least one (1) line item for each Specification Section:
 - a. Identification:
 - 1) Include the following Project identification on the schedule of values:
 - a) Project name and location.
 - b) Name of Architect.
 - c) Architect's Project number.
 - d) Contractor's name and address.
 - e) Date of submittal.
 - 2. Arrange schedule of values consistent with format of AIA Documents G702/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 (.01%), adjusted to total 100 percent:
 - 1) Labor.
 - 2) Materials.
 - 3) Equipment rentals.
 - 4) General Conditions:
 - a) Supervisor.
 - b) Submittals.
 - c) Closeout.
 - d) Field Engineering.
 - e) Daily Clean-up.
 - f) Final Clean-up.
- 4. Round amounts to nearest whole dollar; total shall equal the Contract Sum.
- 5. Provide 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. Include evidence of insurance.
- 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. 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:
 - a. Temporary facilities and other major cost items that are not direct cost of actual Work in place may be shown either as separate line items in the schedule of values or distributed as general overhead expense.
- 8. Schedule updating: Update and resubmit the schedule of values before the next Applications for Payment when Change Orders or Construction Change Directives result in a change in the Contract Sum.

1.5 APPLICATION FOR PAYMENT

- A. Submit preliminary (pencil) copy of proposed values to PBK Construction Field Representative and Owner for review by the 20th of the month. Allow four (4) days for comments. Schedule review of the pencil copy during bi-monthly site visits.
- B. Once preliminary (pencil) approved, submit four (4) notarized originals of each application on AIA Form G702 - Application and Certificate for Payment and AIA G703 - Continuation Sheet for G702 or other similar form approved by Owner.
- C. Content and Format: Utilize schedule of values for listing items in Application for Payment.
- D. Submit updated construction or recovery schedule with each Application for Payment.
- E. Payment Period: Submit at intervals stipulated in Owner/Contractor Agreement. Include Supplementary Conditions of the Contract.
- F. Only materials stored on the Project site shall be paid for unless the materials are stored in a bonded warehouse agreed upon by Owner. Periodic review of stored item will be required by the inspector of record.
- G. Substantiating Data:

1. When Architect/Engineer requires substantiating information, submit data justifying dollar amounts in question. Items that may be requested by Architect or Owner to substantiate costs include, but are not limited to the following:
 - a. Current Record Documents as specified in Section 01 77 00: Closeout Procedures.
 - b. Labor time sheets, purchase orders, or similar documentation.
 - c. Affidavits attesting to products stored off-site.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION 01 29 00

SECTION 01 31 00 PROJECT MANAGEMENT AND COORDINATION

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Administrative provisions for coordinating construction operations on Project including, but not limited to, the following:
 - a. General coordination procedures.
 - b. Coordination drawings.
 - c. Pre-installation meetings.
- B. Contractor (s) shall make a reasonable attempt to interpret the Contract Documents before asking the Architect for assistance in interpretation. Requests for Information (RFI) will not be allowed from Contractor. Contractor shall arrange the necessary meeting in the field with appropriate Architect's field representative(s) to obtain clarification as needed on items that may need interpretation.

1.3 SUBMITTALS

- A. Subcontract List:
 - 1. 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:
 - a. Name, address, and telephone number of entity performing subcontract or supplying products.
 - b. Number and title of related Specification Section(s) covered by subcontract.
 - c. Drawing number and detail references, as appropriate, covered by subcontract.
- B. Key Personnel Names:
 - 1. Within 15 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 the duties and responsibilities; list address, telephone numbers (home, office, and cellular), and email addresses. Provide names, addresses, and telephone numbers of individuals assigned as alternates in the absence of individuals assigned to Project:
 - a. Post copies of list in Project meeting room, in temporary field office, and by each temporary telephone. Keep list current at all times.

1.4 COORDINATION PROCEDURES

- A. Coordinate construction operations to ensure efficient and orderly installation of each part of the Work. Coordinate construction operations 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. Prepare memoranda for distribution to each party involved, outlining special procedures required for coordination. Include items as required notices, reports, and list of attendees at meetings:
 - 1. Prepare similar memoranda for Owner and separate contractors if coordination of the Work is required.
- C. Administrative Procedures:
 - 1. Coordinate scheduling and timing of required administrative procedures with other construction activities to avoid conflicts and to ensure orderly progress of the Work. Administrative activities include, but are not limited to, the following:
 - a. Preparation of Contractor's Construction Schedule.
 - b. Preparation of the schedule of values.
 - c. Installation and removal of temporary facilities and controls.
 - d. Delivery and processing of submittals.
 - e. Progress meetings.
 - f. Pre-installation conferences.
 - g. Project closeout activities.
 - h. Startup and adjustment of systems.
 - i. Coordinating inspections and other jurisdictional requirements.
 - j. Coordinate OFCI equipment.
 - k. Action items and issue logs.
- D. Conservation:
 - 1. Coordinate construction activities to ensure that operations are carried out with consideration given to conservation of energy, water, and materials. Coordinate use of temporary utilities to minimize waste:
 - a. Salvage materials and equipment involved in performance of, but not actually incorporated into, the Work. Refer to the Specifications Sections for disposition of salvaged materials that are designated as Owner's property.

1.5 COORDINATION DRAWINGS

- A. Coordination Drawings, General:
 - 1. Prepare coordination drawings according to requirements in individual Sections, and additionally where installation is not completely shown 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:
 - a. Content:
 - 1) 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 the coordination drawings by multiple contractors in 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 the Drawings. Specifically note dimensions that appear to be in conflict with submitted equipment and minimum clearance requirements. Provide alternate 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:

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 ceiling plenum to accommodate layout of light fixtures indicated on Drawings. Indicate areas of conflict between light fixtures, ductwork, piping, 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 (32 mm) in diameter and larger.
 - b. Light fixture, exit light, emergency battery pack, smoke detector, and other fire alarm locations.
 - c. Panel board, switch board, switchgear, transformer, busway, generator, and motor control center locations.
 - d. Location of pull boxes and junction boxes, dimensioned from column center lines.
 - e. Floor boxes.
8. Fire protection system - Show the following:
 - a. Locations of standpipes, mains piping, branch lines, pipe drops, sprinkler heads, and inspector test locations.
9. IDF/MDF rooms: Communications and low voltage (security, data, phone, etc.) audio.
10. Review: Architect will review coordination drawings to confirm that 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 changes as directed and resubmit.
11. Coordination drawing prints: Prepare coordination drawing prints according to requirements in Section 01 33 00: Submittal Procedures.

C. Coordination Digital Data Files:

1. Prepare coordination digital data files according to the following requirements:
 - a. File preparation format: Same digital data software program, version, and

- operating system as original Drawings.
- b. File submittal format: Submit or post coordination drawing files using same format as file preparation.
 - c. BIM file incorporation:
 - 1) Develop and incorporate coordination drawing files into Building Information Model 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.
 - d. Architect will furnish Contractor one set of digital data files of Drawings for use in preparing coordination digital data files:
 - 1) Architect makes no representations as to the accuracy or completeness of digital data files as they relate to Drawings.
 - 2) Digital data software program: Drawings are available in Revit.
 - 3) Contractor shall execute a data licensing agreement in the form of AIA Document C106.

1.6 PROJECT MEETINGS

- A. Schedule and conduct meetings and conferences at Project site unless otherwise indicated:
 - 1. Attendees: Inform participants and others involved, and individuals whose presence is required, of date and time of each meeting. Notify Owner and Architect of scheduled meeting dates and times.
 - 2. Agenda: Architect to prepare the meeting agenda and distribute the agenda to all invited attendees.
 - 3. Minutes: Entity responsible for conducting meeting will record significant discussions and agreements achieved. Distribute the meeting minutes to everyone concerned, including Owner and Architect, within three days of the meeting.
 - 4. Action items: An element of work, design, research, or other task to be completed before a specific date or time, such as before a subsequent meeting of involved parties.
 - 5. Issue logs: Documentation element of software project management and contains a list of ongoing and closed issues of the Project.
- B. Kick-off and Preconstruction Conference:
 - 1. Architect will schedule and conduct a preconstruction conference before starting construction, at a time convenient to Owner and Architect:
 - a. Conduct the conference to review responsibilities and personnel assignments.
 - b. Attendees: Authorized representatives of Owner, 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 the Project and authorized to conclude matters relating to the Work.
 - c. Agenda: Discuss items of significance that affect progress.
 - d. Minutes: Entity responsible for conducting meeting will record and distribute meeting minutes.
 - e. Action items: An element of work, design, research, or other task to be completed before a specific date or time, such as before a subsequent meeting of involved parties.
- C. Pre-Installation Conferences:
 - 1. Conduct a pre-installation trade conference at site before each construction activity that requires coordination with other construction trades:
 - a. 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 and Engineer of Record of scheduled meeting dates.

- b. Agenda: Contractor to review progress of other construction activities and preparations for the particular activity under consideration.
- c. Contractor to record significant conference discussions, agreements, and disagreements, including required corrective measures and actions.
- d. Reporting: Contractor to distribute minutes of the meeting to each party present and to other parties requiring information.
- e. 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.
- f. Action items: An element of work, design, research, or other task to be completed before a specific date or time, such as before a subsequent meeting of involved parties.

D. Project Closeout Conference:

- 1. Schedule and conduct a Project closeout conference, at a time convenient to Owner and Architect, but no later than 90 days prior to the scheduled date of Substantial Completion:
 - a. Conduct the conference to review requirements and responsibilities related to Substantial Completion.
 - b. Attendees: Authorized representatives of Owner, 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 the Project and authorized to conclude matters relating to the Work.
 - c. Agenda: Discuss items of significance that could affect or delay Project closeout.
 - d. Minutes: Entity conducting meeting will record and distribute meeting minutes.
 - e. Action items: An element of work, design, research, or other task to be completed before a specific date or time, such as before a subsequent meeting of involved parties.

E. Progress Meetings:

- 1. Conduct progress meetings at weekly intervals:
 - a. Coordinate dates of meetings with preparation of payment requests.
 - b. Attendees: In addition to representatives of Owner 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 the Project and authorized to conclude matters relating to the Work.
 - c. Agenda:
 - 1) 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 the 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.
 - d. Minutes:
 - 1) 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.
 - b) Six (6) week look-ahead schedules. This may be altered to three (3) week look-ahead as part of an action item when Architect/District request:
 - i. Action items: An element of work, design, research, or other task to be completed before a specific date or time, such as before a subsequent meeting of involved parties.
- F. Coordination Meetings:
- 1. Conduct coordination meetings at weekly intervals. Project coordination meetings are in addition to specific meetings held for other purposes, such as progress meetings and pre-installation conferences:
 - a. Attendees: In addition to representatives of Owner 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 the Project and authorized to conclude matters relating to the Work.
 - b. Agenda:
 - 1) 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 the 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.
 - c. Reporting: Record meeting results and distribute copies to everyone in attendance and to others affected by decisions or actions resulting from each meeting.
 - d. Action items: An element of work, design, research, or other task to be completed before a specific date or time, such as before a subsequent meeting of involved parties.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION 01 31 00

SECTION 01 33 00 SUBMITTAL PROCEDURES

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Related submittals.
- B. Architect's digital data files.
- C. Proposed products list.
- D. Processing time.
- E. Submittal review.
- F. Submittal procedures - electronic submittals.
- G. Shop drawings - electronic submittals.
- H. Product data.
- I. Samples.
- J. Manufacturers' instructions.
- K. Manufacturers' certificates.
- L. Deferred approval requirements.

1.2 RELATED SUBMITTALS

- A. Progress Payments: Section 01 20 00 - Price and Payment Procedures.
- B. Schedule of Values: Section 01 20 00 - Price and Payment Procedures.
- C. Substitutions: Section 01 25 13 – Product Substitution Procedures.
- D. Coordination Drawings: Section 01 31 00 - Project Management and Coordination.
- E. Tests and Inspections: Section 01 45 29 – Testing Laboratory Services.
- F. Certified Final Property Survey: Section 01 73 00 – Execution Requirements.
- G. Waste Reduction Progress Reports: Section 01 74 19 - Construction Waste Management and Disposal.
- H. Closeout Procedures: Section 01 77 00 – Closeout Procedures.

1.3 ARCHITECT'S DIGITAL DATA FILES

Upon written request, and if asked nicely, the Architect's electronic CAD files will be provided for use in connection with preparation of shop drawings subject to the acceptance of the Architect's standard terms and conditions for electronic file transfer.

A. PROPOSED PRODUCTS LIST

Within fourteen days after date of Notice to Proceed, submit complete list of major products proposed for use, with name of manufacturer, trade name, model number, and designated specification section of each product.

For products specified only by reference standards, give manufacturer, trade name, model or catalog designation, and reference standards.

1.4 PROCESSING TIME

- A. Time period for review of submittals will commence upon receipt of submittal by Architect.
- B. Initial Review: Allow ten working days for each submittal.
- C. Resubmittal Review: Allow ten working days for each resubmittal.
- D. Sequential Review: Allow fifteen working days for initial and resubmittal review of each submittal where review is required by Architect's consultant's, Owner or other parties indicated.
- E. [Deferred Approval Review: Allow a minimum of ninety calendar days for each submittal and any subsequent resubmittal review by the Division of The State Architect.]

1.5 SUBMITTAL REVIEW

- A. The Architect's review is only for general conformance with design concept and Contract requirements. Contractor is responsible for compliance with Contract Documents, dimensions, quantities, fit and coordination with other Work. Review does not authorize substitutions, exclusions and limitations to Contract requirements unless specifically requested by Contractor and acknowledged by Architect.
- B. Definitions for submittal review:
- C. Review Completed - Do Not Resubmit: The Work covered by the submittal has been reviewed by the Architect and may proceed provided it complies with the Contract Documents. Final acceptance will depend on that compliance.
- D. Revise as Noted - Do Not Resubmit: The Work covered by the submittal has been reviewed by the Architect and may proceed provided it complies both with Architect's notations and corrections on the submittal and the Contract Documents. Final acceptance will depend on that compliance.
- E. Revise as Noted - Resubmit for Record: The Work covered by the submittal has been reviewed by the Architect and the submittal is to be revised according to the Architect's notations and corrections and a new submittal is to be made. Do not proceed with the Work covered by the submittal. Once the revised submittal is received it will be reviewed again by

SUBMITTAL PROCEDURES

the Architect and retained as the record submittal. Once reviewed, the Work may proceed provided it complies with the Contract Documents. Final acceptance will depend on that compliance.

- F. Not Acceptable - Make New Submittal: Do not proceed with the Work covered by the submittal. Prepare a new submittal that complies with the Contract Documents. Once the revised submittal is received it will be reviewed again by the Architect. Once reviewed, the Work may proceed provided it complies with the Contract Documents. Final acceptance will depend on that compliance.
- G. Comment Box / Line: This line is for the Architect to take other action as may be appropriate for the actual submittal made. Notations may include a request for additional items or a statement regarding the submittal. This area can also be used in conjunction with other boxes that have been marked.

1.6 SUBMITTAL PROCEDURES - ELECTRONIC SUBMITTALS

- A. Transmit each electronic submittal in conformance with requirements of this section.
- B. Submittals for all items requiring color selections will not be accepted as an electronic submittal.
- C. Assemble complete submittal package into a single indexed Portable Document Format (PDF) file. File format licensed by Adobe Systems.
- D. Transmit electronic submittals as PDF files via Architect's Project Collaboration Site address.
- E. Transmittal form for submittals shall be an electronic form acceptable to the Architect which identifies the Project, the Architect's project number, the Contractor, the Subcontractor or material supplier; pertinent Drawing and detail number(s), and specification Sections, as appropriate.
- F. Provide links enabling navigation to each item of submittal package.
- G. Name electronic submittal file with consistent project identifier composed of Architect's project number, Architect's alpha numeric file designation, and specification section number followed by sequential number. (e.g., 1930700-56-SUB - 064116-01.pdf)
- H. Resubmittals shall include an alphabetic suffix after initial point number. (e.g., 1930700-56-SUB – 064116-01-A.pdf)
- I. Resubmittals shall identify all changes made since previous submittal.
- J. Insert Contractor's review stamp to permanently record Contractor's action.
- K. Contractor's stamp shall be signed or initialed certifying that review, verification of Products required, field dimensions, adjacent work, and coordination of information is in accordance with the requirements of the Work and Contract Documents.

- L. Submittals without Contractor's stamp and signature will be returned without review.
- M. Provide space for Architect's electronic review stamp.
- N. Architect reserves the right to withhold action on a submittal requiring coordination with other submittals until all related submittals are received.
- O. Make submittals in advance of scheduled dates for installation to allow specified time for review, revisions, and resubmission prior to final review and subsequent placement of orders.
- P. No extension of Contract Time will be authorized because of failure to transmit submittals to the Architect sufficiently in advance of the Work to permit proper processing.
- Q. Identify variations from Contract Documents and Product or system limitations which may be detrimental to successful performance of the completed Work.
- R. Contractor shall reproduce and distribute copies of reviewed submittals to concerned parties. Instruct parties to promptly report any inability to comply with provisions.
- S. Partial submittals will be considered non responsive and will be returned without review.
- T. Submittals not requested will not be recognized or processed. Submittals not requested will be returned without review.
- U. Architect will not review submittals that contain material data safety sheets (MSDS) and will return them for resubmittal.
- V. Substitutions will not be considered when they are indicated or implied on submittals without separate written request as required by provisions of Section 01 25 13 - Product Substitution Procedures.

1.7 SHOP DRAWINGS - ELECTRONIC SUBMITTALS

- A. Submit electronic copy of shop drawings in PDF format as specified in this section.
- B. Review comments will be indicated on reviewed document.
- C. After review, distribute in accordance with article on procedures stated above and provide copies for Record Documents described in Section 01 77 00 - Closeout Procedures.
- D. Do not reproduce Contract Documents or copy standard information and submit as shop drawings.
- E. Standard information prepared without specific reference to project requirements will not be considered a shop drawing.
- F. Do not use or allow others to use shop drawings which have been submitted and have been rejected.

1.8 PRODUCT DATA

- A. When specified in individual specification sections, submit copies of data for each product which Contractor requires.
- B. Submit six copies of product data made in paper format. Four copies will be retained by Architect.
- C. Electronic submittals for product data will comply with Article for electronic submittal procedures stated in this section.
- D. Mark each copy to identify applicable products, models, options, and other data. Supplement manufacturer's standard data to provide information unique to this Project.
- E. Manufacturer's standard product data or catalogs that do not indicate materials or products that are specific to project will be returned without review.
- F. After review, distribute in accordance with article on procedures stated above and provide copies for Record Documents described in Section 01 77 00 - Closeout Procedures.

1.9 SAMPLES

- A. Submit samples to illustrate functional and aesthetic characteristics of the Product, with integral parts and attachment devices. Coordinate sample submittals for interfacing work.
- B. Include identification on each sample, with full Project information.
- C. Submit the number of samples which Contractor requires, plus two which will be retained by Architect.
- D. Reviewed samples which may be used in the Work are indicated in individual specification Sections.
- E. Submittals for all items requiring color selection must be received before any will be selected.
- F. If a variation in color, pattern, texture or other characteristic is inherent within the material or product submitted, sample shall approximate limits of variation.

1.10 MANUFACTURER'S INSTRUCTIONS

- A. When specified in individual specification Sections, submit manufacturer's printed instructions for delivery, storage, assembly, installation, start-up, adjusting, and finishing, in quantities specified for Product Data.
- B. Identify conflicts between manufacturer's instructions and Contract Documents.

1.11 MANUFACTURER'S CERTIFICATES

- A. When specified in individual specification Sections, submit manufacturer's certificate to Architect for review, in quantities specified for Product Data.
- B. Indicate material or Product conforms to or exceeds specified requirements. Submit supporting reference data, affidavits, and certifications as appropriate.
- C. Certificates may be recent or previous test results on material or Product, but must be acceptable to Architect.

1.12 DEFERRED APPROVAL REQUIREMENTS

- A. Installation of deferred approval items shall not be started until detailed plans, specifications, and engineering calculations have been accepted and signed by the Architect or Engineer in general responsible charge of design and signed by a California registered Architect or professional engineer who has been delegated responsibility covering the work shown on a particular plan or specification and approved by the Division of the State Architect.
- B. Deferred approval drawings and specifications become part of the approved documents for the project when they are submitted to and approved by the Division of the State Architect.
- C. Deferred approval items shall be submitted no later than 60 days after Notice to Proceed.
- D. Submit four prints of each drawing.
- E. Submit four copies of calculations, product data and test reports.
- F. Identify and specify all supports, fasteners, spacing, penetrations, etc., for each of the deferred approval items, including calculations for each and all fasteners.
- G. Submit documents to Architect for review.
- H. Documents shall bear the stamp and signature of the Structural, Mechanical, or Electrical Engineer licensed in the State of California who is responsible for the work shown on the documents.
- I. Architect will forward submittal to project Structural, Mechanical, and Electrical Engineer.
- J. Review of project Architect, Structural, Mechanical, and Electrical Engineer is only for conformance with design concept shown on the documents.
- K. After review by Architect/Engineer, Architect will forward two copies of submittal to the Division of the State Architect for approval.
- L. Respond to review comments made by the Division of the State Architect and revise and resubmit submittal for final approval.
- M. Architect will forward two copies of final revised submittal to the Division of the State Architect for approval.
- N. The Division of the State Architect will return one copy of final submittal to the Architect.

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William Woollett Jr. Aquatics Center
City of Irvine

- O. Architect will forward one copy of evidence of submittal approval by the Division of the State Architect for final distribution by the Contractor.

PART 2 PRODUCTS
Not Used

PART 3 EXECUTION
Not Used

END OF SECTION 01 33 00

SECTION 01 35 16 ALTERATION PROJECT PROCEDURES

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes: Special procedures for alteration Work.

1.3 DEFINITIONS

- A. Alteration Work: This term includes remodeling, renovation, repair, and maintenance work performed within existing spaces or on existing surfaces as part of the Project.
- B. Consolidate: To strengthen loose or deteriorated materials in place.
- C. Design Reference Sample: A sample that represents the Architect's pre-bid selection of Work to be matched; it may be existing work or work specially produced for the Project.
- D. Dismantle: To remove by disassembling or detaching an item from a surface, using gentle methods and equipment to prevent damage to the item and surfaces; disposing of items unless indicated to be salvaged or reinstalled.
- E. Match: To blend with adjacent construction and manifest no apparent difference in material type, species, cut, form, detail, color, grain, texture, or finish, as approved by Architect.
- F. Refinish: To remove existing finishes to base material and apply new finish to match original, or as otherwise indicated.
- G. Repair: To correct damage and defects, retaining existing materials, features, and finishes. This includes patching, piecing-in, splicing, consolidating, or otherwise reinforcing or upgrading materials.
- H. Replace: To remove, duplicate, and reinstall entire item with new material. The original item is the pattern for creating duplicates unless otherwise indicated.
- I. Replicate: To reproduce in exact detail, materials, and finish unless otherwise indicated.
- J. Reproduce: To fabricate a new item, accurate in detail to the original, and from either the same or a similar material as the original, unless otherwise indicated.
- K. Retain: To keep existing items that are not to be removed or dismantled.
- L. Strip: To remove existing finish down to base material unless otherwise indicated.

1.4 QUALITY ASSURANCE

- A. Coordination:
 - 1. Alteration Work sub-schedule:
 - a. A construction schedule coordinating the sequencing and scheduling of alteration

Work for the entire Project, including each activity to be performed, and based on Contractor's Construction Schedule. Secure time commitments for performing critical construction activities from separate entities responsible for alteration Work:

- 1) Schedule construction operations in sequence required to obtain best Work results.
 - 2) Coordinate sequence of alteration Work activities to accommodate the following:
 - a) Owner's continuing occupancy of portions of existing building.
 - b) Owner's partial occupancy of completed Work.
 - c) Other known work in progress.
 - d) Tests and inspections.
 - 3) Detail sequence of alteration Work, with start and end dates.
 - 4) Utility services: Indicate how long utility services will be interrupted. Coordinate shutoff, capping, and continuation of utility services.
 - 5) Use of elevator and stairs.
 - 6) Equipment data: List gross loaded weight, axle-load distribution, and wheelbase dimension data for mobile and heavy equipment proposed for use in existing structure. Do not use such equipment without certification from Contractor's professional Engineer that the structure can support the imposed loadings without damage.
2. Pedestrian and vehicular circulation: Coordinate alteration Work with circulation patterns within Project building(s) and site. Some Work is near circulation patterns and adjacent to restricted areas. Circulation patterns cannot be closed off entirely and in places can be only temporarily redirected around small areas of Work. Access to restricted areas may not be obstructed. Plan and execute the Work accordingly.
- B. Project Meetings for Alteration Work:
1. Preliminary conference for alteration Work: Before commencing alteration Work, conduct conference at site.
 2. Coordination meetings:
 - a. Conduct coordination meetings specifically for alteration Work at regular intervals. Coordination meetings are in addition to specific meetings held for other purposes, such as progress meetings and pre-installation conferences:
 - 1) Review items of significance that affect progress of alteration Work:
 - a) Interface requirements of alteration Work with other Project Work.
 - b) Status of submittals for alteration Work.
 - c) Access to alteration Work locations.
 - d) Effectiveness of fire prevention plan.
 - e) Quality and work standards of alteration Work.
 - f) Change Orders for alteration Work.
 - 2) Reporting: Record meeting results and distribute copies to everyone in attendance and to others affected by decisions or actions resulting from each meeting.
- C. Materials Ownership:
1. Historic items, relics, and similar objects including, but not limited to, cornerstones and their contents, commemorative plaques and tablets, antiques, and other items of interest or value to Owner that may be encountered or uncovered during the Work, regardless of whether they were previously documented, remain Owner's property:
 - a. Carefully dismantle and salvage each item or object in a manner to prevent damage and protect it from damage, then promptly deliver it to Owner where directed.
 2. Alteration Work sub-schedule: Submit alteration Work sub-schedule within seven (7) days of date established for commencement of alteration Work.
 3. Pre-construction documentation: Show preexisting conditions of adjoining construction and site improvements that are to remain, including finish surfaces, that might be

- misconstrued as damage caused by Contractor's alteration Work operations.
4. Alteration Work program: Submit 30 days before Work begins.
 5. Fire prevention plan: Submit 30 days before Work begins.
- D. Regulatory Requirements:
1. Building code: Comply with the CBC and the IEBC for alteration Work.
 2. Fire prevention plan: Prepare a written plan for preventing fires during the Work, including placement of fire extinguishers, fire blankets, rag buckets, and other fire control devices during each phase or process. Coordinate plan with Owner's fire protection equipment and requirements. Include fire watch personnel's training, duties, and authority to enforce fire safety.
 3. Safety and health standard: Comply with ANSI A10.6.
 4. Title X requirement: Each firm conducting activities that disturb painted surfaces shall be a *Lead-Safe Certified Firm* according to 40 CFR 745, Subpart E, and use only workers that are trained in lead-safe Work practices.
 5. Accessibility requirements:
 - a. Comply with applicable requirements:
 - 1) U.S. Architectural and Transportation Barriers Compliance Board Americans with Disabilities Act Accessibility Guidelines for Buildings and Facilities (ADAAG).
 - 2) ICC/ANSI A117.1 Accessible and Useable Building and Facilities.
 - 3) Local Authorities.
 - 4) 2022 California Building Code (CBC) and the Division of the State Architect.
- E. Specialist Qualifications:
1. An experienced firm having a minimum of ten (10) years' documented experience that is regularly engaged in specialty work similar in nature, materials, design, and extent to alteration Work specified:
 - a. Field supervisor qualifications:
 - 1) Full time supervisors experienced in specialty work similar in nature, material, design, and extent to that indicated for this Project. Supervisors shall be on site when specialty work begins and during its progress. Supervisors shall not be changed during the Project except for causes beyond the control of the specialist firm:
 - a) Construct new mockups of required Work whenever a supervisor is replaced.
- F. Alteration Work Program:
1. Prepare a written plan for alteration Work for the whole Project, including each phase or process and protection of surrounding materials during operations. Show compliance with indicated methods and procedures specified in this and other Sections. Coordinate this whole Project alteration Work program with specific requirements of programs required in other alteration Work Sections:
 - a. Dust and noise control:
 - 1) Include locations of proposed temporary dust and noise control partitions and means of egress from occupied areas coordinated with continuing onsite operations and other known Work in progress:
 - a) Debris hauling: Include plans clearly marked to show debris hauling routes, turning radii, and locations and details of temporary protective barriers.

1.5 STORAGE AND HANDLING OF SALVAGED MATERIALS

- A. Salvaged Materials:
1. Clean loose dirt and debris from salvaged items unless more extensive cleaning is indicated.

2. Pack or crate items after cleaning; cushion against damage during handling. Label contents of containers.
 3. Store items in a secure area until delivery to Owner.
 4. Transport items to Owner's storage area designated by Owner.
 5. Protect items from damage during transport and storage.
- B. Salvaged Materials for Reinstallation:
1. Repair and clean items for reuse as indicated.
 2. Pack or crate items after cleaning and repairing; cushion against damage during handling. Label contents of containers.
 3. Protect items from damage during transport and storage.
 4. Reinstall items in locations indicated. Comply with installation requirements for new materials and equipment unless otherwise indicated. Provide connections, supports, and miscellaneous materials to make items functional for use indicated.
- C. Existing Materials to Remain: Protect construction indicated to remain against damage and soiling from construction work. Where permitted by Architect, items may be dismantled and taken to a suitable, protected storage location during construction work and reinstalled in their original locations after alteration and other construction work in the vicinity is complete.
- D. Storage:
1. Catalog and store items within a weathertight enclosure where they are protected from moisture, weather, condensation, and freezing temperatures:
 - a. Identify each item for reinstallation with a nonpermanent mark to document its original location. Indicate original locations on Plans, elevations, sections, or photographs by annotating the identifying marks.
 - b. Secure stored materials to protect from theft.
 - c. Control humidity so that it does not exceed 85 percent. Maintain temperatures five (5) degrees F (three [3] degrees C) or more above the dew point.
- E. Storage Space:
1. Owner will arrange for limited onsite location(s) for free storage of salvaged material. Storage space does not include security and climate control for stored material.
 2. Arrange for off-site locations for storage, protection, and insurance coverage of salvaged material that cannot be stored and protected onsite.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.1 FIELD CONDITIONS

- A. Survey of Existing Conditions:
1. Record existing conditions that affect the Work by use of pre-construction photographs.
- B. Discrepancies: Notify Architect of discrepancies between existing conditions and Drawings before proceeding with removal and dismantling work.
- C. Size Limitations in Existing Spaces: Materials, products, and equipment used for performing the Work and for transporting debris, materials, and products shall be of sizes that clear surfaces within existing spaces, areas, rooms, and openings, including temporary protection, by 12 inches (300 mm) or more.

3.2 PROTECTION

- A. Protect persons, motor vehicles, surrounding surfaces of building, building site, plants, and surrounding buildings from harm resulting from alteration Work:
 - 1. Use proven protection methods, appropriate to each area and surface being protected.
 - 2. Provide temporary barricades, barriers, and directional signage to exclude the public from areas where alteration Work is being performed.
 - 3. Erect temporary barriers to form and maintain fire egress routes.
 - 4. Erect temporary protective covers over walkways and at points of pedestrian and vehicular entrance and exit that must remain in service during alteration Work.
 - 5. Contain dust and debris generated by alteration Work and prevent it from reaching the public or adjacent surfaces.
 - 6. Provide shoring, bracing, and supports as necessary. Do not overload structural elements.
 - 7. Protect floors and other surfaces along hauling routes from damage, wear, and staining.
 - 8. Provide supplemental sound control treatment to isolate demolition work from other areas of the building.
- B. Temporary Protection of Materials to Remain:
 - 1. Protect existing materials with temporary protections and construction. Do not remove existing materials unless otherwise indicated.
 - 2. Do not attach temporary protection to existing surfaces except as indicated as part of the alteration Work program.
- C. Comply with each product manufacturer's written instructions for protections and precautions. Protect against adverse effects of products and procedures on people and adjacent materials, components, and vegetation.
- D. Utility and Communications Services:
 - 1. Notify Owner, Architect, authorities having jurisdiction, and entities owning or controlling wires, conduits, pipes, and other services affected by alteration Work before commencing operations.
 - 2. Disconnect and cap pipes and services as required by authorities having jurisdiction, as required for alteration Work.
 - 3. Maintain existing services unless otherwise indicated; keep in service and protect against damage during operations. Provide temporary services during interruptions to existing utilities.
- E. Existing Drains:
 - 1. Prior to the start of Work in an area, test drainage system to ensure that it is functioning properly. Notify Architect immediately of inadequate drainage or blockage. Do not begin Work in an area until the drainage system is functioning properly:
 - a. Prevent solids such as adhesive or mortar residue or other debris from entering the drainage system. Clean out drains and drain lines that become sluggish or blocked by sand or other materials resulting from alteration Work.
 - b. Protect drains from pollutants. Block drains or filter out sediments allowing only clean water to pass.
- F. Existing Roofing: Prior to the start of Work in an area, install roofing protection.

3.3 PROTECTION FROM FIRE

- A. Follow Fire Prevention Plan and the Following:
 - 1. Comply with NFPA 241 requirements unless otherwise indicated.
 - 2. Remove and keep area free of combustibles, including rubbish, paper, waste, and chemicals, unless necessary for the immediate Work:
 - a. If combustible material cannot be removed, provide fire blankets to cover materials.

- B. Heat Generating Equipment and Combustible Materials:
 - 1. Comply with procedures while performing Work with heat generating equipment or combustible materials, including welding, torch cutting, soldering, brazing, removing paint with heat, or other operations where open flames or implements using high heat or combustible solvents and chemicals are anticipated:
 - a. Obtain Owner's approval for operations involving use of open flame welding or other high heat equipment. Notify Owner at least 48 hours before each occurrence, indicating location of such work.
 - b. As far as practicable, restrict heat generating equipment to shop areas or outside the building.
 - c. Do not perform work with heat generating equipment in or near rooms or in areas where flammable liquids or explosive vapors are present or thought to be present. Use a combustible gas indicator test to ensure that the area is safe.
 - d. Use fireproof baffles to prevent flames, sparks, hot gases, or other high-temperature material from reaching surrounding combustible material.
 - e. Prevent the spread of sparks and particles of hot metal through open windows, doors, holes, and cracks in floors, walls, ceilings, roofs, and other openings.
 - f. Fire watch:
 - 1) Before working with heat generating equipment or combustible materials, station personnel to serve as a fire watch at each location where work is performed. Fire watch personnel shall have the authority to enforce fire safety. Station fire watch according to NFPA 51B, NFPA 241, and as follows:
 - a) Train each fire watch in the proper operation of fire control equipment and alarms.
 - b) Prohibit fire watch personnel from other work that would be a distraction from fire watch duties.
 - c) Cease work with heat generating equipment whenever fire watch personnel are not present.
 - d) Have fire watch personnel perform final fire safety inspection each day beginning no sooner than 30 minutes after conclusion of Work to detect hidden or smoldering fires and to ensure that proper fire prevention is maintained.
 - e) Maintain fire watch personnel at site until 60 minutes after conclusion of daily work.
- C. Fire Control Devices: Provide and maintain fire extinguishers, fire blankets, and rag buckets for disposal of rags with combustible liquids. Maintain each as suitable for the type of fire risk in each work area. Ensure that nearby personnel and the fire watch personnel are trained in fire extinguisher and blanket use.
- D. Sprinklers:
 - 1. Where sprinkler protection exists and is functional, maintain it without interruption while operations are being performed. If operations are performed close to sprinklers, shield them temporarily with guards:
 - a. Remove temporary guards at the end of work shifts, whenever operations are paused, and when nearby work is complete.

3.4 PROTECTION DURING APPLICATION OF CHEMICALS

- A. Protect motor vehicles, surrounding surfaces of building, building site, plants, and surrounding buildings from harm or spillage resulting from applications of chemicals and adhesives.
- B. Cover adjacent surfaces with protective materials that are proven to resist chemicals selected for the Project unless chemicals being used will not damage adjacent surfaces as indicated in alteration Work program. Use covering materials and masking agents that are

waterproof and UV resistant and that will not stain or leave residue on surfaces to which they are applied. Apply protective materials according to manufacturer's written instructions. Do not apply liquid masking agents or adhesives to painted or porous surfaces. When no longer needed, promptly remove protective materials.

- C. Do not apply chemicals during winds of sufficient force to spread them to unprotected surfaces.
- D. Neutralize alkaline and acid wastes and legally dispose of off Owner's property.
- E. Collect and dispose of runoff from chemical operations by legal means and in a manner that prevents soil contamination, soil erosion, undermining of paving and foundations, damage to landscaping, or water penetration into building interior.

3.5 ALTERATION WORK

- A. Have specialty work performed only by qualified specialists.
- B. Ensure that supervisory personnel are present when Work begins and during its progress.
- C. Record existing work before each procedure (pre-construction), and record progress during the Work. Use digital pre-construction documentation photographs or video recordings.
- D. Perform surveys of site as the Work progresses to detect hazards resulting from alterations.
- E. Notify Architect of visible changes in the integrity of material or components whether from environmental causes including biological attack, UV degradation, freezing, or thawing or from structural defects including cracks, movement, or distortion:
 - 1. Do not proceed with the Work in question until directed by Architect.

END OF SECTION 01 35 16

SECTION 01 40 00 QUALITY REQUIREMENTS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for quality assurance and quality control.
- B. Testing and inspecting services are required to verify compliance with requirements specified or indicated and paid by the District. These services do not relieve Contractor of responsibility for compliance with the Contract Document requirements:
 - 1. Specific quality assurance and quality control requirements for individual construction activities are specified in the Sections that specify those activities. Requirements in those Sections may also cover production of standard products.
 - 2. Specified tests, inspections, and related actions do not limit Contractor's other quality assurance and quality control procedures that facilitate compliance with Contract Document requirements.
 - 3. Requirements for Contractor to provide quality assurance and quality control services required by Architect, Owner, or authorities having jurisdiction are not limited by provisions.
 - 4. Specific test and inspection requirements are not specified in this Section.

1.3 DEFINITIONS

- A. Experienced: When used with an entity or individual, experienced means having successfully completed a minimum of five (5) years' documented experience with projects similar in nature, size, and extent; being familiar with special requirements indicated; and having complied with requirements of authorities having jurisdiction.
- B. Field Quality Control Testing: Tests and inspections performed onsite for installation of the Work and for completed Work.
- C. Installer/Applicator/Erector:
 - 1. Contractor or another entity engaged by Contractor as an employee, Subcontractor, or Sub-subcontractor, to perform particular construction operations, including installation, erection, application, and similar operations:
 - a. Use of trade specific terminology in referring to a trade or entity does not require that certain construction activities be performed by accredited or unionized individuals, or that requirements specified apply exclusively to specific trade(s).
- D. Mockups:
 - 1. Full size physical assemblies that are constructed onsite. Mockups are constructed to verify selections made under sample submittals; to demonstrate aesthetic effects and, where indicated, qualities of materials and execution; to review coordination, testing, or operation; to show interface between dissimilar materials; and to demonstrate compliance with specified installation tolerances. Mockups are not samples. Unless otherwise indicated, approved mockups establish the standard by which the Work will be judged:

- a. Laboratory mockups: Full size physical assemblies constructed at testing facility to verify performance characteristics.
 - b. Integrated exterior mockups: Mockups of exterior envelope erected separately from the building but on the Project site, consisting of multiple products, assemblies, and subassemblies.
 - c. Room mockups: Mockups of typical interior spaces complete with wall, floor, and ceiling finishes, doors, windows, millwork, casework, specialties, furnishings and equipment, and lighting.
- E. Pre-Construction Testing: Tests and inspections performed specifically for the Project before products and materials are incorporated into the Work, to verify performance or compliance with specified criteria.
- F. Product Testing: Tests and inspections that are performed by an NRTL, an NVLAP, or a testing agency qualified to conduct product testing and acceptable to authorities having jurisdiction, to establish product performance and compliance with specified requirements.
- G. Quality Assurance Services: Activities, actions, and procedures performed before and during execution of the Work to guard against defects and deficiencies and substantiate that proposed construction will comply with requirements.
- H. Quality Control Services: Tests, inspections, procedures, and related actions during and after execution of the Work to evaluate that actual products incorporated into the Work and completed construction comply with requirements. Services do not include Contract enforcement activities performed by Architect.
- I. Source Quality Control Testing: Tests and inspections that are performed at the source, e.g., plant, mill, factory, or shop.
- J. Testing Agency: An entity engaged to perform specific tests, inspections, or both. Testing laboratory shall mean the same as testing agency.

1.4 CONFLICTING REQUIREMENTS

- A. Referenced Standards: If compliance with two (2) or more standards is specified and the standards establish different or conflicting requirements for minimum quantities or quality levels, comply with the most stringent requirement. Refer conflicting requirements that are different, but apparently equal, to Architect for a decision before proceeding.
- B. Minimum Quantity or Quality Levels: The quantity or quality level shown or specified shall be the minimum provided or performed. The actual installation may comply exactly with the minimum quantity or quality specified, or it may exceed the minimum within reasonable limits. To comply with these requirements, indicated numeric values are minimum or maximum, as appropriate, for the context of requirements. Refer uncertainties to Architect for a decision before proceeding.

1.5 SUBMITTALS

- A. Shop Drawings:
- 1. Submit Plans, Sections, and elevations, indicating materials and size of mockup construction:
 - a. Indicate manufacturer and model number of individual components.
 - b. Provide axonometric drawings for conditions difficult to illustrate in two dimensions.
- B. Contractor's Statement of Responsibility:

1. When required by authorities having jurisdiction, submit copy of written statement of responsibility sent to authorities having jurisdiction before starting work on the following systems:
 - a. Seismic force resisting system, designated seismic system, or component listed in the designated seismic system quality assurance plan prepared by Architect.
 - b. Main wind force resisting system or wind resisting component listed in the wind force resisting system quality assurance plan prepared by Architect.
- C. Schedule of Tests and Inspections:
 1. Prepare in tabular form and include the following:
 - a. Specification Section number and title.
 - b. Entity responsible for performing tests and inspections.
 - c. Description of test and inspection.
 - d. Identification of applicable standards.
 - e. Identification of test and inspection methods.
 - f. Number of tests and inspections required.
 - g. Time schedule or time span for tests and inspections.
 - h. Requirements for obtaining samples.
 - i. Unique characteristics of each quality control service.

1.6 REPORTS AND DOCUMENTS

- A. Test and Inspection Reports:
 1. Prepare and submit certified written reports specified. Include the following:
 - a. Date of issue.
 - b. Project title and number.
 - c. Name, address, and telephone number of testing agency.
 - d. Dates and locations of samples and tests or inspections.
 - e. Names of individuals making tests and inspections.
 - f. Description of the Work and test and inspection method.
 - g. Identification of product and Specification Section.
 - h. Complete test or inspection data.
 - i. Test and inspection results and an interpretation of test results.
 - j. Record of temperature and weather conditions at time of sample taking and testing and inspecting.
 - k. Comments or professional opinion on whether tested or inspected Work complies with the Contract Document requirements.
 - l. Name and signature of laboratory inspector.
 - m. Recommendations on retesting and reinspecting.
- B. Manufacturer's Technical Representative's Field Reports:
 1. Prepare written information documenting manufacturer's technical representative's tests and inspections specified in other Sections. Include the following:
 - a. Name, address, and telephone number of technical representative making report.
 - b. Statement on condition of substrates and their acceptability for installation of product.
 - c. Statement that products at site comply with requirements.
 - d. Summary of installation procedures being followed, whether they comply with requirements and, if not, what corrective action was taken.
 - e. Results of operational and other tests and a statement of whether observed performance complies with requirements.
 - f. Statement whether conditions, products, and installation will affect warranty.
 - g. Other required items indicated in individual Specification Sections.
- C. Factory Authorized Service Representative's Reports:
 1. Prepare written information documenting manufacturer's factory authorized service

- representative's tests and inspections specified in other Sections. Include the following:
- a. Name, address, and telephone number of factory authorized service representative making report.
 - b. Statement that equipment complies with requirements.
 - c. Results of operational and other tests and a statement of whether observed performance complies with requirements.
 - d. Statement whether conditions, products, and installation will affect warranty.
 - e. Other required items indicated in individual Specification Sections.
- D. Permits, Licenses, and Certificates: For Owner's records, submit copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, correspondence, records, and similar documents, established for compliance with standards and regulations bearing on performance of the Work.
- E. Trade Pre-Installation Conferences: Meeting minutes to be Contractor provided.

1.7 QUALITY ASSURANCE

- A. Qualifications establish the minimum qualification levels required; refer to individual Specification Sections for additional requirements.
- B. Manufacturer Qualifications: A firm experienced in manufacturing products or systems similar to those indicated and sufficient production capacity to produce required units.
- C. Fabricator Qualifications: A firm experienced in producing products similar to those indicated and with record of successful in-service performance, as well as sufficient production capacity to produce required units.
- D. Installer Qualifications: A firm or individual experienced in installing, erecting, or assembling work similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful in-service performance.
- E. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in the State of California and is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of the system, assembly, or product that are similar in material, design, and extent to those indicated.
- F. Specialists:
1. Certain Specification Sections require that specific construction activities shall be performed by entities who are recognized experts in those operations. Specialists shall satisfy qualification requirements indicated and shall be engaged for the activities indicated:
 - a. Requirements of authorities having jurisdiction supersede requirements for specialists.
- G. Testing Agency Qualifications:
1. A NRTL, a NVLAP, or an independent agency with the experience and capability to conduct testing and inspecting indicated, documented according to ASTM E329; with additional qualifications specified in individual Sections; and, where required by authorities having jurisdiction, that is acceptable to authorities:
 - a. NRTL: A nationally recognized testing laboratory according to 29 CFR 1910.7.
 - b. NVLAP: A testing agency accredited according to NIST's National Voluntary Laboratory Accreditation Program.

- H. Manufacturer's Technical Representative Qualifications: An authorized representative of the manufacturer who is trained and approved by the manufacturer to observe and inspect installation of the manufacturer's products.
- I. Factory Authorized Service Representative Qualifications: An authorized representative of the manufacturer who is trained and approved by the manufacturer to inspect installation of the manufacturer's products.
- J. Pre-Construction Testing:
 - 1. Where testing agency is indicated to perform pre-construction testing for compliance with specified requirements for performance and test methods, comply with the following:
 - a. Contractor responsibilities include the following:
 - 1) Provide test specimens representative of proposed products and construction.
 - 2) Submit specimens with sufficient time for testing and analyzing results to prevent delaying the Work.
 - 3) Provide sizes and configurations of test assemblies, mockups, and laboratory mockups to adequately demonstrate capability of products to comply with performance requirements.
 - 4) Build site assembled test assemblies and mockups using installers who will perform same tasks for the Project.
 - 5) Build laboratory mockups at testing facility using personnel, products, and methods of construction indicated for the completed Work.
 - 6) When testing is complete, remove test specimens, assemblies, mockups, and laboratory mockups; do not reuse products on the Project.
 - 2. Testing agency responsibilities: Submit certified written report of each test, inspection, and similar quality assurance service to Architect, with copy to Contractor. Interpret tests and inspections and state in each report whether tested and inspected Work complies with or deviates from the Contract Documents.
- K. Mockups:
 - 1. Before installing portions of the Work requiring mockups, build mockups for each form of construction and finish required to comply with the following requirements, using materials indicated for the completed Work:
 - a. Build mockups in location and of size indicated, or if not indicated, as directed by Architect.
 - b. Notify Architect a minimum of seven (7) days in advance of dates and times when mockups will be constructed.
 - c. Employ supervisory personnel who will oversee mockup construction. Employ workers that will be employed during the construction.
 - d. Demonstrate the proposed range of aesthetic effects and workmanship.
 - e. Obtain Architect's approval of mockups before starting Work, fabrication, or construction. Allow seven (7) days for initial review and each re-review of each mockup.
 - f. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
 - g. Demolish and remove mockups when directed unless otherwise indicated.
- L. Integrated Exterior Mockups: Mockup of the exterior envelope erected separately from the building but on the Project site, consisting of multiple products, assemblies, and subassemblies. Mockup, if not specifically shown on the Drawings, shall be minimum eight feet by eight feet (8'x8'). Mockup shall include all major façade elements and at least one (1) window a minimum of two feet by two feet (2'x2') in size. Prior to constructing mockup, verify requirements with Architect. Pre-installation conferences for trades involved in integrated exterior mockup shall be held after mockup is completed.

- M. Laboratory Mockups: Comply with requirements of pre-construction testing and those specified in individual Specification Sections.
- N. Trade Pre-Installation Conferences: Meeting minutes to be Contractor provided.

1.8 QUALITY CONTROL

- A. Owner Responsibilities:
 - 1. Where quality control services are indicated as Owner's responsibility, Owner will engage a qualified testing agency to perform the services:
 - a. Owner will furnish Contractor with names, addresses, and telephone numbers of testing agencies engaged and a description of types of testing and inspecting they are engaged to perform.
 - b. Costs for retesting and re-inspecting construction that replaces or is necessitated by Work that failed to comply with the Contract Documents will be charged to Contractor, and the Contract Sum will be adjusted by Change Order.
- B. Contractor Responsibilities:
 - 1. Tests and inspections not explicitly assigned to Owner are Contractor's responsibility. Perform additional quality control activities required to verify that the Work complies with requirements, whether specified or not:
 - a. Unless otherwise indicated, provide quality control services specified and those required by authorities having jurisdiction. Perform quality control services required of Contractor by authorities having jurisdiction, whether specified or not.
 - b. Where services are indicated as Contractor's responsibility, engage a qualified testing agency to perform the quality control services. Contractor shall not employ same entity engaged by Owner, unless agreed to in writing by Owner.
 - c. Notify testing agencies at least 24 hours in advance of time when Work that requires testing or inspecting will be performed.
 - d. Where quality control services are indicated as Contractor's responsibility, submit a certified written report, in duplicate, of each quality control service.
 - e. Testing and inspecting requested by Contractor and not required by the Contract Documents are Contractor's responsibility.
 - f. Submit additional copies of each written report directly to authorities having jurisdiction when they so direct.
 - g. Provide documentation for construction safety as required by CBC Chapter 33 and CFC Chapter 33. Show representation for construction safeguards through the life of the Project.
- C. Manufacturer's Field Services: Where indicated, engage a factory authorized service representative to inspect field assembled components and equipment installation, including service connections. Report results in writing as specified in Section 01 33 00: Submittal Procedures.
- D. Manufacturer's Technical Services: Where indicated, engage a manufacturer's technical representative to observe and inspect the Work. Manufacturer's technical representative's services include participation in pre-installation conferences, examination of substrates and conditions, verification of materials, observation of installer activities, inspection of completed portions of the Work, and submittal of written reports.
- E. Retesting/Re-Inspecting: Regardless of whether original tests or inspections were Contractor's responsibility, provide quality control services, including retesting and re-inspecting, for construction that replaced Work that failed to comply with the Contract Documents.
- F. Testing Agency Responsibilities:

1. Cooperate with Architect and Contractor in performance of duties. Provide qualified personnel to perform required tests and inspections:
 - a. Notify Architect and Contractor promptly of irregularities or deficiencies observed in the Work during performance of its services.
 - b. Determine the location from which test samples will be taken and in which in-situ tests are conducted.
 - c. Conduct and interpret tests and inspections and state in each report whether tested and inspected Work complies with or deviates from requirements.
 - d. Submit a certified written report, in duplicate, of each test, inspection, and similar quality control service through Contractor.
 - e. Do not release, revoke, alter, or increase the Contract Document requirements or approve or accept any portion of the Work.
 - f. Do not perform any duties of Contractor.
- G. Associated Services:
 1. Cooperate with agencies performing required tests, inspections, and similar quality control services, and provide reasonable auxiliary services as requested. Notify agency sufficiently in advance of operations to permit assignment of personnel. Provide the following:
 - a. Access to the Work.
 - b. Incidental labor and facilities necessary to facilitate tests and inspections.
 - c. Adequate quantities of representative samples of materials that require testing and inspecting. Assist agency in obtaining samples.
 - d. Facilities for storage and field curing of test samples.
 - e. Delivery of samples to testing agencies.
 - f. Preliminary design mix proposed for use for material mixes that require control by testing agency.
 - g. Security and protection for samples and for testing and inspecting equipment at the Project site.
- H. Coordination:
 1. Coordinate sequence of activities to accommodate required quality assurance and quality control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspecting:
 - a. Schedule times for tests, inspections, obtaining samples, and similar activities.
- I. Schedule of Tests and Inspections:
 1. Prepare a schedule of tests, inspections, and similar quality control services required by the Contract Documents. Coordinate and submit concurrently with Contractor's Construction Schedule. Update as the Work progresses:
 - a. Distribution: Distribute schedule to Owner, Architect, testing agencies, and each party involved in performance of portions of the Work where tests and inspections are required.

1.9 SPECIAL TESTS AND INSPECTIONS

- A. Special Tests and Inspections:
 1. Owner will engage a qualified testing agency or special inspector to conduct special tests and inspections, as required by authorities having jurisdiction, as the responsibility of Owner, and as indicated in individual Specification Sections:
 - a. Verifying that manufacturer maintains detailed fabrication and quality control procedures, and reviews the completeness and adequacy of those procedures to perform the Work.
 - b. Notifying Architect and Contractor promptly of irregularities and deficiencies observed in the Work during performance of its services.
 - c. Submitting a certified written report of each test, inspection, and similar quality

control service to Architect with copy to Contractor and to authorities having jurisdiction.

- d. Submitting a final report of special tests and inspections at Substantial Completion, which includes a list of unresolved deficiencies.
- e. Interpreting tests and inspections and stating in each report whether tested and inspected Work complies with or deviates from the Contract Documents.
- f. Retesting and re-inspecting corrected Work.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.1 TEST AND INSPECTION LOG

- A. Test and Inspection Log:
 - 1. Prepare a record of tests and inspections. Include the following:
 - a. Date test or inspection was conducted.
 - b. Description of the Work tested or inspected.
 - c. Date test or inspection results were transmitted to Architect.
 - d. Identification of testing agency or special inspector conducting test or inspection.
- B. Maintain log at site. Post changes and revisions as they occur. Provide access to test and inspection log for Architect's reference during normal working hours.

3.2 REPAIR AND PROTECTION

- A. On completion of testing, inspecting, sample taking, and similar services, repair damaged construction and restore substrates and finishes:
 - 1. Provide materials and comply with installation requirements specified in other Specification Sections or matching existing substrates and finishes. Restore patched areas and extend restoration into adjoining areas with durable seams that are as invisible as possible. Comply with the Contract Document requirements for cutting and patching in Section 01 73 29: Cutting and Patching.
- B. Protect construction exposed by or for quality control service activities.
- C. Repair and protection are Contractor's responsibility, regardless of the assignment of responsibility for quality control services.

END OF SECTION 01 40 00

SECTION 01 41 32 IMPORT MATERIALS TESTING

PART 1 – GENERAL

This Section specifies the requirements for the sampling, testing, transportation and certification of imported fill materials (i.e., earth materials, such as, soil, rock, crushed base, sand, compost, planter mix) to school sites.

1.01 SUMMARY

- A. This Section defines:
 - 1. CONTRACTOR submittal requirements.
 - 2. CONTRACTOR requirements for use of existing or imported materials on school sites.
 - 3. Testing requirements for all materials imported for use on a school site.
 - 4. CONTRACTOR requirements for stockpiling materials for use on school sites.

1.02 OBJECTIVES

- A. Ensure that fill materials imported to school sites are free of known and expected environmental contaminants for students, staff, and visitors.
- B. Ensure that materials imported to school sites comply with any and all applicable California Code of Regulations (CCR), Code of Federal Regulations (CFR), California Environmental Protection Agency (Cal EPA), and Department of Toxic Substances Control (DTSC) requirements for school site use.
- C. Ensure that representative data be collected so that analytical determinations can be made in regards to the first two objectives.

1.03 SUBMITTALS

CONTRACTOR shall submit to OWNER's Authorized Representative (OAR):

- A. Within ten (10) calendar days of receipt of Notice to Proceed, the contractor shall submit a spreadsheet listing all required import material types including but not limited to backfill soil, sand, gravel, and crushed material. The list shall include estimated volumes required by each subcontractor and the intended borrow site locations each contractor intends to utilize. See 2.01B for pre-evaluated sites. If this ten (10) day timeframe is not met, the CONTRACTOR takes responsibility for possible delays associated with import testing.
- B. Prior to the import of material from a District pre-evaluated site, the CONTRACTOR must provide a "Imported Materials Certification" form a minimum of ten calendar (10) days prior to needing material on site. The "Imported Materials Certification" form can be found at the end of this specification. Contractor shall be solely responsible for any schedule delay(s) and/or associated cost arising from pre-evaluated sites if this ten calendar (10) days timeframe is not met.
- C. For a non-pre-evaluated site, CONTRACTOR must provide the same form a minimum of ten calendar (10) days prior to needing material on site. **Contractor shall be solely responsible for any schedule delay(s) and/or associated cost arising from import from non-pre-evaluated facilities.**
- D. Written documentation, in the form of a memo or e-mail from the CONTRACTOR to the OAR, is required prior to import, verifying that the hauling contract specifies "clean" trucks and that the actual haul trucks utilized for import activities will be clean of visible contamination or deleterious materials.
- E. Written documentation that the trucks went directly from the source location to the recipient location with no detours or stops at other locations and that short loads were not

augmented by other materials that were not tested as part of the final import. It is the CONTRACTOR's responsibility to document that no other trips or short-load augmentation occurred and submit documentation within five (5) business days of the completion of the import activities. All import transportation activities shall be conducted in accordance with all applicable (local, State, Federal) rules and regulations.

- F. Certification, in the form of haul tickets or bill of lading, documenting the volume and recipient of all import materials and activities. This documentation shall be coordinated through the OAR. CONTRACTOR shall provide, track, and maintain a log of all imported materials
1. For approved import to school project sites, haul tickets will be utilized, and shall contain the following minimum information:
 - Date(s) of haul activity.
 - Address of source site.
 - Address of recipient.
 - Load volume.
 - Day of departure from source.
 - Day of arrival at recipient site.
 - Signature of recipient or recipient's agent.

1.04 APPROVALS

Import of soil, granular base, or geotechnical grading or filling materials at CITY OF IRVINE sites will occur ONLY with PRIOR approval of the Owners Representative for environmental considerations and the geotechnical professional assigned to the project CM team for geotechnical considerations.

PART 2 – PRODUCTS

2.01 MATERIALS

- A. Imported:
1. Soils: Soils proposed for import shall be tested pursuant to the requirements as outlined in Part 3 of this Section.
 2. Gravels / CAB: Clean gravel, consisting of native rock from a commercial source, shall be tested pursuant to the requirements of this Section. Refer to part 2.01.B, of this Section, for the list of CITY OF IRVINE pre-evaluated sites.
 3. Sands: Clean sand from a commercial source shall be tested pursuant to the requirements of this Section. Refer to part 2.01.B, of this Section, for the list of CITY OF IRVINE pre-evaluated sites. Plaster sand is included in this classification and must be tested per the requirements in this section.
 4. Crushed Miscellaneous Base (CMB) per Section 200-2.4, fine sieve, of the Standard Specifications for Public Works Construction (Green Book). Prior to import, submit written certification to OAR that crushed Miscellaneous Base (CMB) does not contain Polychlorinated biphenyls (PCB) above laboratory detection limits when tested in accordance with EPA Method 8082.
- B. Pre-Evaluated Sites:

Vulcan Materials Company
Vulcan Corona
1709 Sherbon Street
Corona, CA 92879

Materials Tested: SE-30 Sand, CAB, 3/4 " Rock

Vulcan Materials Company
Reliance Plant
16005 E Foothill Blvd.
Irwindale, CA 91702

**Materials Tested: SE-30 Sand, CAB and 3/4" Crushed Rock,
3/4" Class II Permeable Base, Washed Concrete Sand**

Vulcan Materials Company
Durbin Sand and Gravel
13000 East Los Angeles Street
Irwindale, CA 91706

**Materials Tested: Washed Plaster Sand, SE-30, 3/4" Class II
Permeable Base**

All American Asphalt
1776 All American Way
Corona, Ca 92879

Materials Tested: CAB

Hanson Aggregates Irwindale
13550 Live Oak Lane
Irwindale, CA 91706

**Tested Materials: CAB, Washed Plaster Sand, SE-30 Sand,
3/4" Rock, and 3/4" Class II Permeable Base**

Materials at these facilities have been previously tested and approved.

PART 3 – EXECUTION

3.01 SAMPLING AND TESTING

- A. CONTRACTOR must coordinate with the District per Item 1.03, of this Section, to request testing for a non-pre-evaluated site. **CONTRACTOR shall be solely responsible for any schedule delay(s) and/or associated cost arising from import from non-pre-evaluated facilities.** Please note, any request for turn-around time (TAT) less than 72-hours (business hours) will be rejected. District will make an attempt to honor faster TAT request; however, it is subject to availability of laboratory capacity, analytical method procedures, and field sampling personnel. CONTRACTOR's submission of a request for a faster TAT (for analytical results) should not be construed as District's approval for such requests. District shall not be liable in any way if such request could not be approved and/or honored.
- B. The Contractor's Environmental Consultant shall perform testing of imported and site generated fill materials prior to importing and report results of all tests and shall furnish copies to the OAR, CONTRACTOR, Project Inspector, Architect, Contractor, DTSC, and/or others as required. **CONTRACTOR shall be solely responsible for the costs associated with the Environmental Consultant testing services.** Report shall state tests were conducted under the responsible charge of a licensed environmental professional (licensed State of California Professional Engineer [PE Civil], Professional Geologist [PG] or familiar with environmental site assessment and the material was tested in accordance with applicable provisions of the Contract Documents, CCR, CFR, DTSC, and DSA.

- C. All fill/grading material must be tested at the site of origin. Owner (i.e., the District) retains the right to refuse import of fill material(s) from any particular site (even if it is pre-evaluated).
- D. Import fill material may be deemed defective for use by CITY OF IRVINE at a school site if any of the following results are obtained:
 - 1. Total petroleum hydrocarbons (TPH) are present at concentrations exceeding 10 milligrams per kilogram (mg/kg) for gasoline range organics, and/or 100 mg/kg for diesel range organics, and/or 500 mg/kg for oil range organics.
 - 2. Solvents and other volatile organic compounds (VOCs) are present at concentrations exceeding the human health risk levels for unrestricted land use and/or hazardous waste characterization criteria whichever is lower.
 - 3. Polychlorinated Biphenyl (PCBs) are present at concentrations exceeding the human health risk levels for unrestricted land use and/or hazardous waste characterization criteria whichever is lower.
 - 4. Semi volatile organic compounds (SVOCs) are present at concentrations exceeding the human health risk levels for unrestricted land use and/or hazardous waste characterization criteria whichever is lower.
 - 5. Organochlorine Pesticides (OCPs) are present at concentrations exceeding the human health risk levels for unrestricted land use and/or hazardous waste characterization criteria whichever is lower.
 - 6. Chlorinated herbicides are present at concentrations exceeding the human health risk levels for unrestricted land use and/or hazardous waste characterization criteria whichever is lower.
 - 7. California Code of Regulations Title 22 (CAM 17) Metals at concentrations exceeding human health risk levels for unrestricted land use or typical background levels expected in California and/or hazardous waste characterization criteria whichever is lower.
 - 8. Hexavalent chromium is present at concentrations exceeding 15 mg/kg or failing hazardous waste STLC leachate criteria.
- E. Specification test results and CITY OF IRVINE approvals shall be valid for a period of 90 days from the date of the subject testing. Previously approved materials shall not be utilized after the 90 day limit without prior review and approval by the CITY OF IRVINE.
- F. Import fill materials shall be stockpiled by CONTRACTOR (or the facility) at the site from where material is proposed to be imported, and are deemed acceptable for import only when it is demonstrated to the satisfaction of CITY OF IRVINE that the subject materials meet the requirements of this Section.
- G. Apply appropriate dust control measures to prevent dust generation from import stockpiles/materials; and be compliant with appropriate rules and regulations prescribed by the South Coast Air Quality Management District. Maintain dust control measures at all times and under all environmental conditions. Contractor generating stockpile shall be held fully responsible for any violation(s) arising out of non-compliance related to air quality issues associated with the stockpile.
- H. Apply appropriate storm water pollution prevention best management practices (BMPs) on and around the imported stockpiles. Contractor generating stockpile shall be held fully responsible for any violation(s) arising out of non-compliance related to storm water pollution issues associated with the stockpile.

3.02 TRANSPORTATION

- A. Details of the samples and testing must be approved by CITY OF IRVINE before the materials from which the samples were collected undergo transportation.
- B. Haul Routes and Regulations/Restrictions: Contractor must comply with requirements of project environmental disclosure documents (i.e., CEQA EIR) and authorities having jurisdiction over the project area and the proposed activities (e.g. Regional Water Quality Control Board, DTSC, etc.).

3.03 COSTS

- A. Contractor will incur the costs of testing for pre-evaluated sites identified in 2.01B.
- B. **CONTRACTOR shall pay all fees for testing any non-pre-approved site. CONTRACTOR shall be solely responsible for any schedule delay(s) associated with testing any non-pre-approved site.**
- C. CONTRACTOR shall pay all fees for loading, hauling, and importing fill materials identified in the contract documents.
- D. If fill material is imported from any site without prior written approval from CITY OF IRVINE and/or from a previously un-evaluated source(s), CONTRACTOR shall remove such material from the District's site at their own cost immediately upon discovery of such. Any delay in removal of such material may incur liquidated damages for each day such violation continues. In addition, under such scenario the CITY OF IRVINE Environmental Consultant may collect necessary samples from the area(s) where the said material has been placed (if deemed necessary). All costs associated with such (including sampling, testing, further delineation, removal and disposal of impacted materials, field oversight, consulting, legal charges, and regulatory oversight fees) efforts shall be the CONTRACTOR's sole responsibility.

TABLE 1: MINIMUM SAMPLING FREQUENCY	
Volume (Cubic Yards)	Sampling Frequency
0 – 1,000	1 per 250 CY
1,001 - 5,000	4 samples per first 1,000 CY and 1 sample per each additional 500 CY
Greater than 5,000	12 samples for first 5000 CY and 1 sample per each additional 1,000 CY

IMPORTED MATERIALS CERTIFICATION

This form shall be executed by Contractor and by all entities that, in any way, provide or deliver and/or supply any soils, aggregate, or related materials ("Fill") to the Project Site(s). All Fill shall satisfy the requirements of any environmental review of the Project performed pursuant to the statutes and guidelines of the California Environmental Quality Act, section 21000 et seq. of the Public Resources Code ("CEQA"), and the requirements of section 17210 et seq. of the Education Code, including requirements for a Phase I environmental assessment acceptable to the State of California Department of Education and Department of Toxic Substances Control.

To the furthest extent permitted by California law, the indemnification provisions in the Contract Documents apply to, without limitation, any claim(s) connected with providing, delivering, and/or supplying Fill.

Certification of: ☐ Delivery Firm/Transporter ☐ Supplier ☐ Manufacturer
 ☐ Wholesaler ☐ Broker ☐ Retailer
 ☐ Distributor ☐ Other _____

Type of Entity: ☐ Corporation ☐ General Partnership
 ☐ Limited Partnership ☐ Limited Liability Company
 ☐ Sole Proprietorship ☐ Other _____

Name of firm ("Firm"): _____

Mailing address: _____

Addresses of branch office used for this Project: _____

If subsidiary, name and address of parent company: _____

By my signature below, I hereby certify that I am aware of section 25260 of the Health and Safety Code and the sections referenced therein regarding the definition of hazardous material. I further certify on behalf of the Firm that all soils, aggregates, or related materials provided, delivered, and/or supplied or that will be provided, delivered, and/or supplied by this Firm to the Project Site(s) are free of any and all hazardous material as defined in section 25260 of the Health and Safety Code. I further certify that I am authorized to make this certification on behalf of the Firm.

Date: _____

Proper Name of Contractor: _____

Signature: _____

Print Name: _____

Title: _____

In addition to the requirement to provide this certification, Contractor agrees that it shall provide all documentation requested by the District to confirm compliance with the requirements herein.

END OF SECTION 01 41 32

SECTION 01 42 00 REFERENCES

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. General: This Section specifies procedural and administrative requirements for compliance with governing regulations and codes and standards imposed upon the Work. These requirements include the obtaining of permits, licenses, inspections, releases, and similar statements, as well as payments, associated with regulations, codes, and standards.
- B. Governing Regulations:
 - 1. Refer to General and Supplementary Conditions for requirements related to compliance with governing regulations:
 - a. The Division of the State Architect (DSA), State of California provides design and construction oversight for this Project and as such is subject to the rules and regulations.

1.3 DEFINITIONS

- A. Approved: When used to convey Architect's action on Contractor's submittals, applications, and requests, approved is limited to Architect's duties and responsibilities as stated in the Conditions of the Contract.
- B. Basic Contract: Definitions are included in the Conditions of the Contract.
- C. Directed: A command or instruction by Architect. Other terms including requested, authorized, selected, required, and permitted have the same meaning as directed.
- D. Furnish: Supply and deliver to the Project site, ready for unloading, unpacking, assembly, installation, and similar operations.
- E. Indicated: Requirements expressed by graphic representations or in written form on Drawings, in Specifications, and in other Contract Documents. Other terms including shown, noted, scheduled, and specified have the same meaning as indicated.
- F. Install: Operations at the Project site including unloading, temporarily storing, unpacking, assembling, erecting, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, and similar operations.
- G. Project Site: Space available for performing construction activities. The extent of the Project site is shown on Drawings and may or may not be identical with the description of the land on which the Project is to be built.
- H. Provide: Furnish and install, complete and ready for the intended use.
- I. Regulations: Includes laws, statutes, ordinances, and lawful orders issued by governing authorities, as well as those rules, conventions, and agreements within the construction industry that effectively control the performance of the Work regardless of whether they are

lawfully imposed by a governing authority or not.

- J. Testing Agencies: An independent entity engaged to perform specific inspections or tests, either at the Project site or elsewhere, to report on and, if required, to interpret results of those inspections or tests.

1.4 INDUSTRY STANDARDS

- A. Applicability of Standards: Unless the Contract Documents include more stringent requirements, applicable construction industry standards have the same force and effect as if bound or copied directly into the Contract Documents to the extent referenced. Such standards are made a part of the Contract Documents by reference. Individual Specification Sections indicate which codes and standards Contractor must keep available at the Project site for reference.
- B. Publication Dates: Comply with standards in effect as of date of the Contract Documents unless otherwise indicated.
- C. Conflicting Requirements: Where compliance with two (2) or more standards is specified, and where these standards establish different or conflicting requirements for minimum quantities or quality levels, the most stringent requirement will be enforced, unless the Contract Documents specifically indicate a less stringent requirement. Refer requirements that are different, but apparently equal, and uncertainties as to which quality level is more stringent to Architect/Engineer for a decision before proceeding.
- D. Minimum Quantities or Quality Levels: In every instance the quantity or quality level shown or specified is intended to be the minimum for the Work to be provided or performed. Unless otherwise indicated, the actual Work may either comply exactly, within specified tolerances, with the minimum quantity or quality specified, or may exceed that minimum within reasonable limits. In complying with these requirements, the indicated numeric values are either minimum or maximum values, as noted, or as appropriate for context of the requirements. Refer instances of uncertainty to Architect/Engineer for decision before proceeding.

1.5 ABBREVIATIONS AND ACRONYMS

- A. Industry Organizations - Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the trade association, standards-producing organization, authorities having jurisdiction, or other entity applicable to the context of the text provision:
1. AABC - Associated Air Balance Council; www.aabc.com.
 2. AAMA - American Architectural Manufacturers Association; www.aamanet.org.
 3. AASHTO - American Association of State Highway and Transportation Officials; www.transportation.org.
 4. AATCC - American Association of Textile Chemists and Colorists; www.aatcc.org.
 5. ABMA - American Bearing Manufacturers Association; www.americanbearings.org.
 6. ACI - American Concrete Institute (formerly ACI International); www.concrete.org.
 7. ACPA - American Concrete Pipe Association; www.concrete-pipe.org.
 8. AEIC - Association of Edison Illuminating Companies, Inc. (The); www.aeic.org.
 9. AGA - American Gas Association; www.aga.org.
 10. AHRI - Air-Conditioning, Heating, and Refrigeration Institute (The); www.ahrinet.org.
 11. AI - Asphalt Institute; www.asphaltinstitute.org.
 12. AIA - American Institute of Architects (The); www.aia.org.
 13. AISC - American Institute of Steel Construction; www.aisc.org.
 14. AISI - American Iron and Steel Institute; www.steel.org.

15. AITC - American Institute of Timber Construction; www.aitc-glulam.org.
16. AMCA - Air Movement and Control Association International, Inc.; www.amca.org.
17. ANSI - American National Standards Institute; www.ansi.org.
18. APA - The Engineered Wood Association; www.apawood.org.
19. APA - Architectural Precast Association; www.archprecast.org.
20. API - American Petroleum Institute; www.api.org.
21. ARMA - Asphalt Roofing Manufacturers Association; www.asphaltroofing.org.
22. ASCE - American Society of Civil Engineers; www.asce.org.
23. ASCE/SEI - American Society of Civil Engineers/Structural Engineering Institute; (See ASCE).
24. ASHRAE - American Society of Heating, Refrigerating and Air-Conditioning Engineers; www.ashrae.org.
25. ASME - ASME International (American Society of Mechanical Engineers); www.asme.org.
26. ASSE - American Society of Sanitary Engineering; www.asse-plumbing.org.
27. ASSP - American Society of Safety Professionals (The); www.assp.org.
28. ASTM - ASTM International (American Society for Testing and Materials International); www.astm.org.
29. ATIS - Alliance for Telecommunications Industry Solutions; www.atis.org.
30. AWI - Architectural Woodwork Institute; www.awinet.org.
31. AWMAC - Architectural Woodwork Manufacturers Association of Canada; www.awmac.com.
32. AWWPA - American Wood Protection Association (formerly American Wood-Preservers' Association); www.awpa.com.
33. AWS - American Welding Society; www.aws.org.
34. AWWA - American Water Works Association; www.awwa.org.
35. BHMA - Builders Hardware Manufacturers Association; www.buildershardware.com.
36. BIA - Brick Industry Association (The); www.gobrick.com.
37. BICSI - BICSI, Inc.; www.bicsi.org.
38. BIFMA - BIFMA International (Business and Institutional Furniture Manufacturer's Association); www.bifma.com.
39. BOCA - BOCA (Building Officials and Code Administrators International Inc.); (See ICC).
40. CEA - Consumer Electronics Association; www.ce.org.
41. CFFA - Chemical Fabrics & Film Association, Inc.; www.chemicalfabricsandfilm.com.
42. CFSEI - Cold-Formed Steel Engineers Institute; www.cfsei.org.
43. CGA - Compressed Gas Association; www.cganet.com.
44. CIMA - Cellulose Insulation Manufacturers Association; www.cellulose.org.
45. CISCA - Ceilings & Interior Systems Construction Association; www.cisca.org.
46. CISPI - Cast Iron Soil Pipe Institute; www.cispi.org.
47. CLFMI - Chain Link Fence Manufacturers Institute; www.chainlinkinfo.org.
48. CPA - Composite Panel Association; www.pbmdf.com.
49. CRI - Carpet and Rug Institute (The); www.carpet-rug.org.
50. CRRC - Cool Roof Rating Council; www.coolroofs.org.
51. CRSI - Concrete Reinforcing Steel Institute; www.crsi.org.
52. CSA - Canadian Standards Association; www.csa.ca.
53. CSA - CSA International (formerly IAS - International Approval Services); www.csa-international.org.
54. CSI - Construction Specifications Institute (The); www.csinet.org.
55. CTI - Cooling Technology Institute (formerly Cooling Tower Institute); www.cti.org.
56. CWC - Composite Wood Council; (See CPA).
57. DASMA - Door and Access Systems Manufacturers Association; www.dasma.com.
58. DHI - Door and Hardware Institute; www.dhi.org.
59. DSA - Division of the State Architect, State of California.

60. ECA - Electronic Components Association; www.ec-central.org.
61. ECAMA - Electronic Components Assemblies & Materials Association; (See ECA).
62. EIA - Electronic Industries Alliance; (See TIA).
63. EIMA - EIFS Industry Members Association; www.eima.com.
64. EJMA - Expansion Joint Manufacturers Association, Inc.; www.ejma.org.
65. ESD - ESD Association (Electrostatic Discharge Association); www.esda.org.
66. ESTA - Entertainment Services and Technology Association; (See PLASA).
67. EVO - Efficiency Valuation Organization; www.evo-world.org.
68. FM Approvals - FM Approvals LLC; www.fmglobal.com.
69. FM Global - FM Global (formerly FMG - FM Global); www.fmglobal.com.
70. FSC - Forest Stewardship Council U.S.; www.fscus.org.
71. GA - Gypsum Association; www.gypsum.org.
72. GANA - Glass Association of North America; www.glasswebsite.com.
73. GS - Green Seal; www.greenseal.org.
74. HMMA - Hollow Metal Manufacturers Association; (See NAAMM).
75. HPVA - Hardwood Plywood & Veneer Association; www.hpva.org.
76. HPW - H.P. White Laboratory, Inc.; www.hpwhite.com.
77. ICBO - International Conference of Building Officials; (See ICC).
78. ICC - International Code Council; www.iccsafe.org.
79. ICEA - Insulated Cable Engineers Association, Inc.; www.icea.net.
80. ICPA - International Cast Polymer Alliance; www.icpa-hq.org.
81. ICRI - International Concrete Repair Institute, Inc.; www.icri.org.
82. IEC - International Electrotechnical Commission; www.iec.ch.
83. IEEE - Institute of Electrical and Electronics Engineers, Inc. (The); www.ieee.org.
84. IES - Illuminating Engineering Society (formerly Illuminating Engineering Society of North America); www.ies.org.
85. IESNA - Illuminating Engineering Society of North America; (See IES).
86. IEST - Institute of Environmental Sciences and Technology; www.iest.org.
87. IGMA - Insulating Glass Manufacturers Alliance; www.igmaonline.org.
88. IGSHPA - International Ground Source Heat Pump Association;
www.igshpa.okstate.edu.
89. Intertek - Intertek Group (formerly ETL SEMCO; Intertek Testing Service NA);
www.intertek.com.
90. ISA - International Society of Automation (The) (formerly Instrumentation, Systems,
and Automation Society); www.isa.org.
91. ISAS - Instrumentation, Systems, and Automation Society (The); (See ISA).
92. ISFA - International Surface Fabricators Association (formerly International Solid
Surface Fabricators Association); www.isfanow.org.
93. ISO - International Organization for Standardization; www.iso.org.
94. ISSFA - International Solid Surface Fabricators Association; (See ISFA).
95. ITU - International Telecommunication Union; www.itu.int/home.
96. KCMA - Kitchen Cabinet Manufacturers Association; www.kcma.org.
97. LMA - Laminating Materials Association; (See CPA).
98. LPI - Lightning Protection Institute; www.lightning.org.
99. MBMA - Metal Building Manufacturers Association; www.mbma.com.
100. MCA - Metal Construction Association; www.metalconstruction.org.
101. MFMA - Metal Framing Manufacturers Association, Inc.; www.metalframingmfg.org.
102. MHIA - Material Handling Industry of America; www.mhia.org.
103. MIA - Marble Institute of America; www.marble-institute.com.
104. MMPA - Moulding & Millwork Producers Association (formerly Wood Moulding &
Millwork Producers Association); www.wmmpa.com.
105. MPI - Master Painters Institute; www.paintinfo.com.
106. MSS - Manufacturers Standardization Society of The Valve and Fittings Industry
Inc.; www.mss-hq.org.
107. NAAMM - National Association of Architectural Metal Manufacturers;
www.naamm.org.

108. NACE - NACE International (National Association of Corrosion Engineers International); www.nace.org.
109. NADCA - National Air Duct Cleaners Association; www.nadca.com.
110. NAIMA - North American Insulation Manufacturers Association; www.naima.org.
111. NBGQA - National Building Granite Quarries Association, Inc.; www.nbgqa.com.
112. NCAA - National Collegiate Athletic Association (The); www.ncaa.org.
113. NCMA - National Concrete Masonry Association; www.ncma.org.
114. NEBB - National Environmental Balancing Bureau; www.nebb.org.
115. NECA - National Electrical Contractors Association; www.necanet.org.
116. NelMA - Northeastern Lumber Manufacturers Association; www.nelma.org.
117. NEMA - National Electrical Manufacturers Association; www.nema.org.
118. NETA - InterNational Electrical Testing Association; www.netaworld.org.
119. NFHS - National Federation of State High School Associations; www.nfhs.org.
120. NFPA - NFPA (National Fire Protection Association); www.nfpa.org.
121. NFPA - NFPA International; (See NFPA).
122. NFRC - National Fenestration Rating Council; www.nfrc.org.
123. NHLA - National Hardwood Lumber Association; www.nhla.com.
124. NLGA - National Lumber Grades Authority; www.nlga.org.
125. NOMMA - National Ornamental & Miscellaneous Metals Association; www.nomma.org.
126. NRCA - National Roofing Contractors Association; www.nrca.net.
127. NRMCA - National Ready Mixed Concrete Association; www.nrmca.org.
128. NSF - NSF International (National Sanitation Foundation International); www.nsf.org.
129. NSPE - National Society of Professional Engineers; www.nspe.org.
130. NSSGA - National Stone, Sand & Gravel Association; www.nssga.org.
131. NTMA - National Terrazzo & Mosaic Association, Inc. (The); www.ntma.com.
132. NWFA - National Wood Flooring Association; www.nwfa.org.
133. PDI - Plumbing & Drainage Institute; www.pdionline.org.
134. RCSC - Research Council on Structural Connections; www.boltcouncil.org.
135. RFCI - Resilient Floor Covering Institute; www.rfci.com.
136. RIS - Redwood Inspection Service; www.redwoodinspection.com.
137. SCTE - Society of Cable Telecommunications Engineers; www.scte.org.
138. SDI - Steel Deck Institute; www.sdi.org.
139. SDI - Steel Door Institute; www.steeldoors.org.
140. SEFA - Scientific Equipment and Furniture Association; www.sefalabs.com.
141. SEI/ASCE - Structural Engineering Institute/American Society of Civil Engineers; (See ASCE).
142. SIA - Security Industry Association; www.siaonline.org.
143. SJI - Steel Joist Institute; www.steeljoist.org.
144. SMA - Screen Manufacturers Association; www.smainfo.org.
145. SMACNA - Sheet Metal and Air Conditioning Contractors' National Association; www.smacna.org.
146. SMPTE - Society of Motion Picture and Television Engineers; www.smpte.org.
147. SPFA - Spray Polyurethane Foam Alliance; www.sprayfoam.org.
148. SPIB - Southern Pine Inspection Bureau; www.spib.org.
149. SPRI - Single Ply Roofing Industry; www.spri.org.
150. SRCC - Solar Rating and Certification Corporation; www.solar-rating.org.
151. SSINA - Specialty Steel Industry of North America; www.ssina.com.
152. SSPC - SSPC: The Society for Protective Coatings; www.sspc.org.
153. STI - Steel Tank Institute; www.steeltank.com.
154. SWI - Steel Window Institute; www.steelwindows.com.
155. SWPA - Submersible Wastewater Pump Association; www.swpa.org.
156. TCA - Tilt-Up Concrete Association; www.tilt-up.org.
157. TCNA - Tile Council of North America, Inc. (formerly Tile Council of America); www.tileusa.com.

158. TEMA - Tubular Exchanger Manufacturers Association, Inc.; www.tema.org.
 159. TIA - Telecommunications Industry Association (formerly TIA/EIA - Telecommunications Industry Association/Electronic Industries Alliance); www.tiaonline.org.
 160. TIA/EIA - Telecommunications Industry Association/Electronic Industries Alliance; (See TIA).
 161. TMS - The Masonry Society; www.masonrysociety.org.
 162. TPI - Truss Plate Institute; www.tpinst.org.
 163. TPI - Turfgrass Producers International; www.turfgrasssod.org.
 164. TRI - Tile Roofing Institute; www.tilerroofing.org.
 165. UBC - Uniform Building Code; (See ICC).
 166. UL - Underwriters Laboratories Inc.; www.ul.com.
 167. UNI - Uni-Bell PVC Pipe Association; www.uni-bell.org.
 168. USAV - USA Volleyball; www.usavolleyball.org.
 169. USGBC - U.S. Green Building Council; www.usgbc.org.
 170. USITT - United States Institute for Theatre Technology, Inc.; www.usitt.org.
 171. WASTEC - Waste Equipment Technology Association; www.wastec.org.
 172. WCLIB - West Coast Lumber Inspection Bureau; www.wclib.org.
 173. WCMA - Window Covering Manufacturers Association; www.wcmanet.org.
 174. WDMA - Window & Door Manufacturers Association; www.wdma.com.
 175. WI - Woodwork Institute (formerly WIC - Woodwork Institute of California); www.wicnet.org.
 176. WMMPA - Wood Moulding & Millwork Producers Association; (See MMPA).
 177. WSRCA - Western States Roofing Contractors Association; www.wsrca.com.
 178. WPA - Western Wood Products Association; www.wwpa.org.
- B. Standards and Regulations - Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the standards and regulations:
1. CFR - Code of Federal Regulations; Available from Government Printing Office; www.gpo.gov/fdsys.
 2. FED-STD - Federal Standard; (See FS).
 3. USAB - United States Access Board; www.access-board.gov.
 4. USATBCB - U.S. Architectural & Transportation Barriers Compliance Board; (See USAB).
- C. Code Agencies - Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the Agency:
1. IAPMO - International Association of Plumbing and Mechanical Officials; www.iapmo.org.
 2. ICC - International Code Council; www.iccsafe.org.
 3. ICC-ES - ICC Evaluation Service, LLC; www.icc-es.org.
- D. State Government Agencies - Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. This information is subject to change and is believed to be accurate as of the date of the Contract Documents:
1. CBHF - State of California; Department of Consumer Affairs; Bureau of Electronic Appliance and Repair, Home Furnishings and Thermal Insulation; www.bearhfti.ca.gov.
 2. CCR - California Code of Regulations; Office of Administrative Law; California Title 24 Energy Code; www.calregs.com.
 3. CDHS - California Department of Health Services; (See CDPH).
 4. CDPH - California Department of Public Health; Indoor Air Quality Program; www.cal-iaq.org.
 5. CPUC - California Public Utilities Commission; www.cpuc.ca.gov.
 6. CBC – California Building Code (2022 Edition).

7. CEC – California Electrical Code (2022 Edition).
8. CMC – California Mechanical Code (2022 Edition).
9. CFC – California Fire Code (2022 Edition).

1.6 SUBMITTALS

- A. Permits, Licenses, and Certificates: For Owner's records, submit copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, and similar documents, correspondence, and records established in conjunction with compliance with standards and regulations bearing upon performance of the Work.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION 01 42 00

SECTION 01 57 13 STORM WATER POLLUTION PREVENTION

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Preparation, implementation and monitoring of Storm Water Pollution Prevention Plan (SWPPP) for the purpose of preventing the discharges of pollutants from the construction site into the receiving waters. This includes elimination of non-storm water pollution discharges such as improper dumping, spills or leakage from storage tanks or transfer areas.
- B. Compliance with all local, state and federal regulations governing storm water discharges associated with construction activities such as, but not limited to clearing, excavating, grading, demolition and other land disturbances.
- C. Payment of application and annual fees required by the State Water Resources Control Board (SWRCB) for the duration of the construction of the Project.
- D. Submittal of all Permit Registration Documents (PRDs) through the SWRCB SMARTS online system.
- E. Certification that the construction project has met all of the conditions of the General Construction Storm Water Permit (GCSWP).

1.02 REFERENCES

- A. National Pollutant Discharge Elimination System (NPDES) General Permit No CAS000002.
- B. State Water Resources Control Board (SWRCB) Water Quality Order WQ 2022-0057-DWQ.
- C. California Stormwater Quality Association, Stormwater Best Management Practice Handbook, Construction, latest edition.

1.03 RELATED DOCUMENTS

- A. Project Contract, including General, Special and Supplementary Conditions and other General Requirements.

1.04 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.

LRP	Legally Responsible Person (OWNER).
NOI	Notice of Intent.
NOT	Notice of Termination.
NPDES	National Pollutant Discharge Elimination System.
OEHS	LAUSD Office of Environmental Health and Safety.
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.
QRE	Qualifying Rain Event, is an event that produces 0.5 inches of precipitation with a 48 hour or more period between rain events.
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.
WPCD	Water Pollution Control Drawings.
WDID	Waste Discharge Identification Number.

1.05 SUBMITTALS

- A. The City of Irvine's QSD shall submit the Notice of Intent and all Permit Registration Documents and the Notice of Intent fee required by SWRCB.
- B. The City of Irvine's QSD shall prepare and submit the Storm Water Pollution Prevention Plan for this project to the State Water Resources Control Board (SWRCB) via SMARTS.
- C. The City of Irvine's QSD shall prepare the SWPPP, including the WPCD, Risk Level Determination, and Post Construction Water Balance Calculation. Submit SWPPP to architect of record prior to submittal to SMARTS.
- D. Contractor shall submit qualifications and experience of the QSP for Owner's review and acceptance prior to the submittal of the SWPPP.
- E. Contractor shall submit electronic copies of weekly and quarterly inspections, annual reports, compliance certifications, and test results.
- F. Contractor shall submit the annual report. The General Permit requires all projects that are enrolled for more than one continuous three-month period to submit information and annually certify that their site is in compliance with these requirements. All dischargers must prepare and electronically submit an annual report no later than September 1 of each year using the Storm water Multi-Application Reporting and Tracking System

(SMARTS). The Annual Report must include a summary and evaluation of all sampling and analysis results, original laboratory reports, chain of custody forms, a summary of all corrective actions taken during the compliance year, and identification of any compliance activities or corrective actions that were not implemented.

- G. Within 90 days of when construction is complete or ownership has been transferred, the Contractor shall electronically file a Notice of Termination (NOT), a final site map, and photos through the State Water Boards SMARTS system. Filing a NOT certifies that all General Permit requirements have been met.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Storm Water Pollution Prevention Plan: The City of Irvine's QSD shall provide the quality, grade and type of materials as specified in Stormwater Best Management Practice Handbook, Construction, latest edition, and State Water Resources Control Board (SWRCB) Water Quality Order WQ 2022-0057-DWQ.
- B. The Contractor shall 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 SWPPP IMPLEMENTATION

- A. The Contractor shall hire a Qualified SWPPP Practitioner (QSP), as defined by the Construction General Permit, to implement the Storm Water Pollution Prevention Plan to be consistent with the requirements of SWRCB Water Quality Order WQ 2022-0057-DWQ, and as follows:
 - 1) Install perimeter controls and sediment control BMPs prior to starting construction work at the site.
 - 2) Install effective erosion control BMPs at the jobsite.
 - 3) Protect exposed dirt, such as stockpiles, landscaping areas, and hillsides.
 - 4) Properly manage non-storm water discharges such as ground water, broken utility lines and fire hydrant testing per CGP requirements.
 - 5) Contain on-site storm water at the jobsite. Do not drain on-site water directly into the storm drains.
 - 6) QSP to train personnel for the proper implementation of the SWPPP.
 - 7) Revise the SWPPP to suit changing site conditions and also when properly installed systems are ineffective.

- 8) Adjust BMP's locations and layouts in accordance to construction progress to assure compliance to regulations.
- 9) 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.
- 10) QSP to perform and oversee all monitoring consistent with the identified Risk Level for the site.
- 11) Notification and Report: If pollution occurs in the work area for any reason or when the Contractor becomes aware of any violation of this Section, correct the problem and immediately notify the Inspector. In addition, submit a written report to the Project Civil Engineer within seven (7) calendar days describing the incident and the corrective actions taken. If either the Inspector or Engineer is first to observe pollution or a violation, the Contractor shall also explain in the written report why the Work was inadequately monitored.
- 12) Revise SWPPP to suit changing site conditions and also when properly installed systems are ineffective.
- 13) 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.
- 14) QSP shall submit the annual report. All dischargers must prepare and electronically submit an annual report no later than September 1 of each year using the Storm water Multi-Application Reporting and Tracking System (SMARTS). The Annual Report must include a summary and evaluation of all sampling and analysis results, original laboratory reports, chain of custody forms, a summary of all corrective actions taken during the compliance year, and identification of any compliance activities or corrective actions that were not implemented.

3.02 MONITORING

- A. The Contractor shall conduct examination of storm water pollution prevention controls according to the monitoring requirements identified for the projects risk level as defined by the Construction General Permit.
- B. The Contractor shall prepare and maintain, at the jobsite, a log of each inspection using Site Monitoring Report forms.
- C. The Contractor shall distribute copies of the Owner provided Storm Water Pollution Prevention Plan to their superintendent and subcontractors. At least one (1) copy of the SWPPP shall be available on site at all times.

3.03 SWPPP LIABILITIES AND PENALTIES

- A. Review of the inspection logs by the Owner shall not relieve the Contractor from liabilities arising from non-compliance with storm water pollution regulations.
- B. Payment of Penalties for non-compliance by the Contractor shall be the sole responsibility of the Contractor and will not be reimbursed by the Owner.
- C. Compliance with the Clean Water Act and the State Water Resources Control Board (SWRCB) Water Quality Order WQ 2022-0057-DWQ pertaining to construction activities is the sole responsibility of the Contractor. For any fine(s) levied against the Owner due

to non-compliance by the Contractor, the Owner will have the option to either require payment by Contractor of, or deduct from any payments due the Contractor, the total amount of the fine(s) levied on the Owner and associated costs.

3.04 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.
- 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) Post-Construction BMP Maintenance Plan has been established.

END OF SECTION 01 57 13

SECTION 01 60 00 PRODUCT REQUIREMENTS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for selection of products, including but not limited to:
 - 1. Product delivery, storage, and handling.
 - 2. Manufacturers' written warranties on products.
 - 3. Special warranties.
 - 4. Comparable products.

1.3 DEFINITIONS

- A. Basis of Design Product Specification:
 - 1. A Specification in which a specific manufacturer's product is named and accompanied by the words *basis of design*, including make, model number, or other designation to establish the significant qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics for purposes of evaluating comparable products of additional manufacturers named in the Specification.
- B. Products:
 - 1. Items obtained for incorporating into the Work, whether purchased for Project or taken from previously purchased stock. The term *product* includes the terms *material*, *equipment*, *system*, *assembly*, and terms of similar intent:
 - a. Named products: Items identified by manufacturer's product name, including make, model number, or other designation shown or listed in manufacturer's published product literature current as of date of the Contract Documents.
 - b. New products: Items that have not previously been incorporated into another project or facility. Products salvaged or recycled from other projects are not considered new products.
 - c. Comparable product: Product that is demonstrated and approved through submittal process to have the indicated qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics that equal or exceed those of specified product.

1.4 SUBMITTALS

- A. Comparable Product Requests:
 - 1. Submit request for consideration of each comparable product. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title, and Drawing number(s) and title(s):
 - a. Include data to indicate compliance with the specified requirements.
 - b. Architect's action: If necessary, Architect will request additional information or documentation for evaluation within one (1) week of receipt of a comparable product request. Architect will notify Contractor of approval or rejection of proposed comparable product request within 15 days of receipt of request, or seven (7) days

of receipt of additional information or documentation, whichever is later:

- 1) Form of Approval: As specified in Section 01 33 00: Submittal Procedures.
- 2) Use product specified if Architect does not issue a decision on use of a comparable product request within time allocated.

B. Basis of Design Product Specification Submittal:

1. Comply with requirements in Section 01 33 00: Submittal Procedures. Show compliance with requirements.

1.5 QUALITY ASSURANCE

A. Compatibility of Options:

1. If Contractor is given option of selecting between two (2) or more products for use on Project, select a product compatible with products previously selected, even if previously selected products were also options:
 - a. Each contractor is responsible for providing products and construction methods compatible with products and construction methods of other contractors.
 - b. If a dispute arises between contractors over concurrently selectable but incompatible products, Architect will determine which products shall be used.

1.6 WARRANTY

A. Warranties specified in other Sections shall be in addition to, and run concurrent with, other warranties required by the Contract Documents. Manufacturer's disclaimers and limitations on product warranties do not relieve Contractor of obligations under requirements of the Contract Documents:

1. Manufacturer's warranty: Written warranty furnished by individual manufacturer for a particular product and specifically endorsed by manufacturer to Owner.
2. Warranty: Written warranty required by the Contract Documents to provide specific rights for Owner.

B. Warranties:

1. Prepare a written document that contains appropriate terms and identification, ready for execution:
 - a. Specified form: When specified forms are included with the Specifications, prepare a written document using indicated form properly executed.
 - b. See other Sections for specific content requirements and particular requirements for submitting special warranties.

C. Submittal Time:

1. Comply with requirements in Section 01 77 00: Closeout Procedures.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, and handle products using means and methods that will prevent damage, deterioration, and loss, including theft and vandalism. Comply with manufacturer's written instructions.

B. Delivery and Handling:

1. Schedule delivery to minimize long-term storage at site and to prevent overcrowding of construction spaces.
2. Coordinate delivery with installation time to ensure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other losses.
3. Deliver products to Project site in an undamaged condition in manufacturer's original

sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting, and installing.

4. Inspect products on delivery to determine compliance with the Contract Documents, and to determine that products are undamaged and properly protected.

C. Storage:

1. Store products to allow for inspection and measurement of quantity or counting of units.
2. Store materials in a manner that will not endanger Project structure.
3. Store products that are subject to damage by the elements under cover in a weathertight enclosure above ground, with ventilation adequate to prevent condensation.
4. Protect foam plastic from exposure to sunlight, except to extent necessary for period of installation and concealment.
5. Comply with product manufacturer's written instructions for temperature, humidity, ventilation, and weather-protection requirements for storage.
6. Protect stored products from damage and liquids from freezing.
7. Provide a secure location and enclosure at site for storage of materials and equipment by Owner's construction forces. Coordinate location with Owner.

PART 2 PRODUCTS

2.1 PRODUCT SELECTION PROCEDURES

A. Product Requirements:

1. Provide products that comply with the Contract Documents, are undamaged, and unless otherwise indicated, are new at time of installation:
 - a. Provide products complete with accessories, trim, finish, fasteners, and items needed for complete installation and indicated use and effect.
 - b. Standard products: If available, and unless custom products or nonstandard options are specified, provide standard products of types that have been produced and used successfully in similar situations on other projects.
 - c. Owner reserves the right to limit selection to products with warranties not in conflict with requirements of the Contract Documents.
 - d. Where products are accompanied by the phrase *as selected*, Architect will make selection.
 - e. Descriptive, performance, and reference standard requirements in the Specifications establish salient characteristics of products.

B. Product Selection Procedures:

1. Product: Where Specifications name a single manufacturer and product, provide the named product that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.
2. Manufacturer/Source: Where Specifications name a single manufacturer or source, provide a product by the named manufacturer or source that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.
3. Products: Where Specifications include a list of names of both manufacturers and products, provide one of the products listed that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.
4. Manufacturers: Where Specifications include a list of manufacturers' names, provide a product by one of the manufacturers listed that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.

5. Basis of Design Product: Where Specifications name a product, or refer to a product indicated on Drawings, and include a list of manufacturers, provide the specified or indicated product or a comparable product by one of the other named manufacturers. Drawings and Specifications indicate sizes, profiles, dimensions, and characteristics based on the product named. Comply with requirements for consideration of an unnamed product by one of the named manufacturers.
- C. Visual Matching Specification:
 1. Where Specifications require *match Architect's sample*, provide a product that complies with requirements and matches Architect's sample. Architect's decision will be final on whether a proposed product matches:
 - a. If no product available within specified category matches and complies with specified requirements, comply with requirements of Section 01 25 00: Substitution Procedures and Form for proposal of product.
- D. Visual Selection Specification: Where Specifications include the phrase *selected by Architect* or similar phrase, select a product that complies with requirements. Architect will select color, gloss, pattern, density, or texture from manufacturer's product line that includes both standard and premium items.

2.2 COMPARABLE PRODUCTS

- A. Conditions for Consideration:
 1. Architect will consider Contractor's request for comparable product when the following conditions are satisfied. If the following conditions are not satisfied, Architect may return requests without action, except to record noncompliance with these requirements:
 - a. Evidence that the proposed product does not require revisions to the Contract Documents, that it is consistent with the Contract Documents and will produce the indicated results, and that it is compatible with other portions of the Work.
 - b. Detailed comparison of significant qualities of proposed product with those named in the Specifications. Significant qualities include attributes such as performance, weight, size, durability, visual effect, and specific features and requirements indicated.
 - c. Evidence that proposed product provides specified warranty.
 - d. List of similar installations for completed projects with project names and addresses, and names and addresses of architects and owners, if requested.
 - e. Samples, if requested.

PART 3 EXECUTION (NOT USED)

END OF SECTION 01 60 00

SECTION 01 71 23 FIELD ENGINEERING

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Surveying requirements for the Work.

1.02 RELATED SECTIONS

- A. Section 31 20 00: Earthwork
- B. Section 32 12 16: Asphalt Paving
- C. Section 33 30 00: Sanitary Utilities
- D. Section 33 40 00: Storm Drainage

1.03 SURVEY SERVICE

- A. Unless otherwise stated by the Architect or noted in the Special Provisions, the CONTRACTOR shall provide all surveying services.

PART 2 - PRODUCTS (Not applicable)

PART 3 - EXECUTION

3.01 SUBMITTALS

- A. CONTRACTOR shall submit the name and address of the State of California licensed surveyor to Construction Management Representative (CMR), ARCHITECT and OWNER including any changes as they may occur.
- B. CONTRACTOR shall submit to OWNER copies of cut sheets, coordinate plots, data collector printouts, and other documentation as available to verify completeness and/or accuracy of field surveying work.
- C. Statement of Compliance: CONTRACTOR shall submit a statement of certification signed and sealed by Surveyor, counter-signed by CONTRACTOR indicating compliance with grade elevations, slopes and tolerances.

3.02 LAYOUT OF THE WORK

- A. CONTRACTOR shall employ a State of California licensed surveyor to lay out the entire Work, set grades, lines, levels, control points, vertical and horizontal control, elevations, grids and positions. Before the commencement of Work, surveyor shall, in conjunction with OWNER and Construction Management Representative (CMR) provided engineering survey of the Project site, locate all reference points and benchmarks, then lay out all lines, elevations, and measurements for the entire Work including but not limited to, buildings, grading, paving and utilities.
- B. All work under this contract shall be built in accordance with the lines and grades shown on the plans. Field survey for establishing these, and for the control of construction, shall be the responsibility of the Contractor. All such survey work including construction staking shall be done under the supervision of a California Licensed Land Surveyor or

authorized Civil Engineer. Staking shall be done on all items ordinarily requiring grade and alignment, at intervals normally accepted by the agencies and trade involved.

- C. The CONTRACTOR shall be responsible for any errors in the finished work, and shall notify the Engineer, in writing, within 24 hours, of any discrepancies, or design errors during the construction staking.
- D. Contractor shall immediately remediate any areas found not to meet specification requirements.

3.03 SURVEY REQUIREMENTS

- A. Establish a minimum of two permanent horizontal and vertical control points on the Project site, remote from the work area, referenced to data established by the survey control points.
- B. Indicate the reference points on the project record drawings with the basis of elevation being the established benchmarks.
- C. Establish lines, grades, locations and dimensions by instrumentation. From time to time, verify the layout of all Work by the same methods.
- D. 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.
- E. Calculate and layout proposed finished elevations and intermediate control as required to provide smooth transitions between the spot elevations indicated in the Contract Documents.
- F. Provide stakes and elevations for grading, fill, and topsoil placement.
- G. 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 AC surfaces at key locations such as BC's, EC's, grade breaks, corners or angle points in sufficient number to demonstrate the Work complies with the intent of the Contract Documents.
- H. Provide horizontal and vertical control for batter boards for drainage, utility, and other on-site structures as required.
- I. 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.
- J. 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'. Building pad tolerance will be $\pm 0.10'$.

3.04 ESTABLISHMENT OF GRADES IN HARDSCAPE AREAS

- A. All work shall conform to the lines, elevations, and grades shown on the Grading Plans. Three consecutive points set on the same slope shall be used together so that any

variation from a straight grade can be detected. Any such variation shall be reported to the Engineer. In the absence of such report, the Contractor shall be responsible for any error in the grade of the finished work.

- B. Areas having drainage gradients of 2 percent or more shall have elevation stakes, set with instrument, at grid intervals of 25 feet. Intermediate stakes may be set by using a tightly-drawn string line over the tops of adjacent stakes. Grade stakes must be set at all grade breaks, grade changes, etc.
- C. Areas having drainage gradients of less than 2 percent shall have elevation stakes, set with instrument, at 10 foot intervals. Grade stakes must be set at all grade breaks, grade changes, etc.
- D. Protect and maintain stakes in place until their removal is approved by the Owner. Grade or location stakes lost or disturbed by Contractor, shall be reset by the Surveyor at the expense of Contractor.

3.05 STORM DRAIN & SEWER PIPE INSTALLATION

- A. All storm drain & sewer pipelines, cleanouts, catch basins and drain inlets shall be staked by a licensed surveyor if slope of grade is less than 2% and a complete set of cut sheets shall be supplied to the Inspector. All construction staking shall be installed and verified for grade and alignment prior to the start of construction.

3.06 RECORD DRAWINGS

- A. Upon Substantial Completion, CONTRACTOR shall obtain and pay for reproducible transparencies of the as built survey drawings. Deliver to ARCHITECT, final "record" drawings of the original drawings and completed Work within specified tolerances.
- B. Record drawings shall indicate locations by coordinate of 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 manholes.
- C. Completed record drawing transparencies shall be signed and certified as correct and within specified tolerances by the licensed surveyor.
- D. Attention is called to other sections of the Contract Documents requiring verification or measurements of installed Work by survey. Surveyor shall perform and certify all such surveys or verification are completed in accordance with the Contract Documents.

END OF SECTION 01 71 23

SECTION 01 73 00 EXECUTION

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes administrative and procedural requirements governing execution of the Work including, but not limited to, the following:
 - 1. Construction layout.
 - 2. Field engineering and surveying.
 - 3. Installation of the Work.
 - 4. Coordination of Owner-installed products.
 - 5. Progress cleaning.
 - 6. Starting and adjusting.
 - 7. Protection of installed construction.

1.3 DEFINITIONS

- A. Cutting: Removal of in-place construction necessary to permit installation or performance of other work.
- B. Patching: Fitting and repair work required to restore construction to original conditions after installation of other work.

1.4 SUBMITTALS

- A. Certificates: Submit certificate signed by land surveyor or professional Engineer certifying that location and elevation of improvements comply with requirements.
- B. Landfill Receipts: Submit copy of receipts issued by a landfill facility, licensed to accept hazardous materials, for hazardous waste disposal.
- C. Certified Surveys: Submit two (2) copies signed by land surveyor.
- D. Final Property Survey: Submit ten (10) copies showing the Work performed and record survey data.

1.5 QUALITY ASSURANCE

- A. Land Surveyor Qualifications: A professional land surveyor legally qualified to practice in the State of California, who is experienced in providing land surveying services of the kind indicated.
- B. Manufacturer's Installation Instructions: Obtain and maintain onsite manufacturer's written recommendations and instructions for installation of products and equipment.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Comply with requirements specified in other Sections.
- B. In-Place Materials:
 - 1. Use materials for patching identical to in-place materials. For exposed surfaces, use materials that visually match in-place adjacent surfaces to the fullest extent possible:
 - a. If identical materials are unavailable or cannot be used, use materials that, when installed, will provide a match acceptable to Architect for the visual and functional performance of in-place materials.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Existing Conditions:
 - 1. The existence and location of underground and other utilities and construction indicated as existing are not warranted. Before beginning site Work, investigate and verify existence and location of underground utilities, mechanical and electrical systems, and construction affecting the Work:
 - a. Before construction, verify the location and invert elevation at points of connection of sanitary sewer, storm sewer, and water service piping, underground electrical services, and other utilities.
 - b. Furnish location data for work related to the Work that must be performed by public utilities serving the site.
- B. Examination and Acceptance of Conditions:
 - 1. Before proceeding with each component of the Work, examine substrates, areas, and conditions for compliance with requirements for installation tolerances and other conditions affecting performance. Record observations:
 - a. Examine roughing-in for mechanical and electrical systems to verify actual locations of connections before equipment and fixture installation.
 - b. Examine walls, floors, and roofs for suitable conditions where products and systems are to be installed.
 - c. Verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.
- C. Written Report:
 - 1. Where a written report listing conditions detrimental to performance of the Work is required by other Sections, include the following:
 - a. Description of the Work.
 - b. List of detrimental conditions, including substrates.
 - c. List of unacceptable installation tolerances.
 - d. Recommended corrections.
- D. Proceed with installation after correcting unsatisfactory conditions. Proceeding with the Work indicates acceptance of surfaces and conditions.

3.2 PREPARATION

- A. Existing Utility Information: Furnish information to Owner necessary to adjust, move, or relocate existing utility structures, utility poles, lines, services, or other utility appurtenances located in or affected by construction. Coordinate with authorities having jurisdiction.

- B. Field Measurements: Take field measurements as required to fit the Work properly. Recheck measurements before installing each product. Where portions of the Work are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
- C. Space Requirements: Verify space requirements and dimensions of items shown diagrammatically on Drawings.
- D. Review of Contract Documents and Field Conditions: Immediately on discovery of the need for clarification of the Contract Documents caused by differing field conditions outside the control of Contractor, submit a request for information to Architect according to requirements in Section 01 31 00: Project Management and Coordination.

3.3 CONSTRUCTION LAYOUT

- A. Verification: Before proceeding to lay out the Work, verify layout information shown on Drawings, in relation to the property survey and existing benchmarks. If discrepancies are discovered, notify Architect promptly.
- B. Engage a land surveyor or professional Engineer to lay out the Work using accepted surveying practices:
 - 1. Establish benchmarks and control points to set lines and levels at each story of construction and elsewhere as necessary to locate each element of Project.
 - 2. Establish limits on use of site.
 - 3. Establish dimensions within tolerances indicated. Do not scale Drawings to obtain required dimensions.
 - 4. Inform installers of lines and levels to which they must comply.
 - 5. Check the location, level, and plumb of every major element as the Work progresses.
 - 6. Notify Architect when deviations from required lines and levels exceed allowable tolerances.
 - 7. Close site surveys with an error of closure equal to or less than the standard established by authorities having jurisdiction.
- C. Site Improvements: Locate and lay out site improvements, including pavements, grading, fill and topsoil placement, utility slopes, and rim and invert elevations.
- D. Building Lines and Levels: Locate and lay out control lines and levels for structures, building foundations, column grids, and floor levels, including those required for mechanical and electrical work. Transfer survey markings and elevations for use with control lines and levels. Level foundations and piers from two (2) or more locations.
- E. Record Log: Maintain a log of layout control work. Record deviations from required lines and levels. Include beginning and ending dates and times of surveys, weather conditions, name and duty of each survey party member, and types of instruments and tapes used. Make the log available for reference by Architect.

3.4 FIELD ENGINEERING

- A. Identification: Owner will identify existing benchmarks, control points, and property corners.
- B. Reference Points:
 - 1. Locate existing permanent benchmarks, control points, and similar reference points before beginning the Work. Preserve and protect permanent benchmarks and control points during construction operations:

- a. Do not change or relocate existing benchmarks or control points without prior written approval of Architect. Report lost or destroyed permanent benchmarks or control points promptly. Report the need to relocate permanent benchmarks or control points to Architect before proceeding.
 - b. Replace lost or destroyed permanent benchmarks and control points promptly. Base replacements on the original survey control points.
- C. Benchmarks:
 - 1. Establish and maintain a minimum of two (2) permanent benchmarks on site, referenced to data established by survey control points. Comply with authorities having jurisdiction for type and size of benchmark:
 - a. Record benchmark locations, with horizontal and vertical data, on Project Record Documents.
 - b. Where the actual location or elevation of layout points cannot be marked, provide temporary reference points sufficient to locate the Work.
 - c. Remove temporary reference points when no longer needed. Restore marked construction to its original condition.
- D. Certified Survey: On completion of foundation walls, major site improvements, and other work requiring field-engineering services, prepare a certified survey showing dimensions, locations, angles, and elevations of construction and sitework.
- E. Final Property Survey:
 - 1. Engage a land surveyor or professional Engineer to prepare a final property survey showing significant features (real property) for Project. Include on the survey a certification, signed by land surveyor or professional Engineer, that principal metes, bounds, lines, and levels of Project are accurately positioned as shown on the survey:
 - a. Show boundary lines, monuments, streets, site improvements and utilities, existing improvements and significant vegetation, adjoining properties, acreage, grade contours, and the distance and bearing from a site corner to a legal point.
 - b. Recording: At Substantial Completion, have the final property survey recorded by or with authorities having jurisdiction as the official "property survey."

3.5 INSTALLATION

- A. Locate the Work and components of the Work accurately, in correct alignment and elevation, as indicated:
 - 1. Make vertical work plumb and make horizontal work level.
 - 2. Where space is limited, install components to maximize space available for maintenance and ease of removal for replacement.
 - 3. Conceal pipes, ducts, and wiring in finished areas unless otherwise indicated.
 - 4. Maintain minimum headroom clearance of 96 inches (2,440 mm) in occupied spaces and 90 inches (2,300 mm) in unoccupied spaces.
- B. Comply with manufacturer's written instructions and recommendations for installing products in applications indicated.
- C. Install products at the time and under conditions ensuring the best possible results. Maintain conditions required for product performance until Substantial Completion.
- D. Conduct construction operations so no part of the Work is subjected to damaging operations or loading in excess of that expected during normal conditions of occupancy.
- E. Sequence the Work and allow adequate clearances to accommodate movement of construction items onsite and placement in permanent locations.

- F. Tools and Equipment: Do not use tools or equipment that produce harmful noise levels.
- G. Templates: Obtain and distribute to the parties involved templates for Work specified to be factory prepared and field installed. Check shop drawings of other Work to confirm that adequate provisions are made for locating and installing products to comply with indicated requirements.
- H. Attachment:
 - 1. Provide blocking and attachment plates and anchors and fasteners of adequate size and number to securely anchor each component in place, accurately located and aligned with other portions of the Work. Where size and type of attachments are not indicated, verify size and type required for load conditions:
 - a. Mounting Heights: Where mounting heights are not indicated, mount components at heights directed by Architect.
 - b. Allow for building movement, including thermal expansion and contraction.
 - c. Coordinate installation of anchorages. 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. Deliver such items to Project site in time for installation.
- I. Joints: Make joints of uniform width. Where joint locations in exposed work are not indicated, arrange joints for the best visual effect. Fit exposed connections together to form hairline joints.
- J. Hazardous Materials: Use products, cleaners, and installation materials that are not considered hazardous. Materials containing asbestos and BCPs are prohibited.

3.6 OWNER-INSTALLED PRODUCTS

- A. Site Access: Provide access to site for Owner's construction personnel.
- B. Coordination:
 - 1. Coordinate construction and operations of the Work with Work performed by Owner's construction personnel:
 - a. Construction schedule: Inform Owner of Contractor's preferred construction schedule for Owner's portion of the Work. Adjust construction schedule based on a mutually agreeable timetable. Notify Owner if changes to schedule are required due to differences in actual construction progress.
 - b. Pre-installation conferences: Include Owner's construction personnel at pre-installation conferences covering portions of the Work that are to receive Owner's Work. Attend pre-installation conferences conducted by Owner's construction personnel if portions of the Work depend on Owner's construction.

3.7 PROGRESS CLEANING

- A. Clean site and Work areas daily, including common areas. Enforce requirements strictly. Dispose of materials lawfully:
 - 1. Comply with requirements in NFPA 241 for removal of combustible waste materials and debris.
 - 2. Do not hold waste materials more than seven (7) days during normal weather or three (3) days if the temperature is expected to rise above 80 degrees F (27 degrees C).
 - 3. Containerize hazardous and unsanitary waste materials separately from other waste. Mark containers appropriately and dispose of legally, according to regulations.
 - 4. Use containers intended for holding waste materials of type to be stored.
 - 5. Coordinate progress cleaning for joint-use areas where Contractor and other

contractors are working concurrently.

- B. Site: Maintain site free of waste materials and debris.
- C. Work Areas:
 - 1. Clean areas where Work is in progress to the level of cleanliness necessary for proper execution of the Work:
 - a. Remove liquid spills promptly.
 - b. Where dust would impair proper execution of the Work, broom-clean or vacuum the entire Work area, as appropriate.
- D. Installed Work: Keep installed Work clean. Clean installed surfaces according to written instructions of manufacturer or fabricator of product installed, using only cleaning materials specifically recommended. If specific cleaning materials are not recommended, use cleaning materials that are not hazardous to health or property and that will not damage exposed surfaces.
- E. Concealed Spaces: Remove debris from concealed spaces before enclosing the space.
- F. Exposed Surfaces in Finished Areas: Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.
- G. Waste Disposal: Do not bury or burn waste materials onsite. Do not wash waste materials down sewers or into waterways. Comply with waste disposal requirements in Section 01 50 00: Temporary Facilities and Controls.
- H. During handling and installation, clean and protect construction in progress and adjoining materials already in place. Apply protective covering where required to ensure protection from damage or deterioration at Substantial Completion.
- I. Clean and provide maintenance on completed construction as frequently as necessary through the remainder of the construction period. Adjust and lubricate operable components to ensure operability without damaging effects.
- J. Limiting Exposures: Supervise construction operations to assure that no part of the construction, completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period.

3.8 STARTING AND ADJUSTING

- A. Coordinate startup and adjusting of equipment and operating components with mechanical, plumbing, and electrical requirements.
- B. Start equipment and operating components to confirm proper operation. Remove malfunctioning units, replace with new units, and retest.
- C. Adjust equipment for proper operation. Adjust operating components for proper operation without binding.
- D. Test each piece of equipment to verify proper operation. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
- E. Manufacturer's Field Service: Comply with qualification requirements in Section 01 40 00: Quality Requirements.

3.9 PROTECTION OF INSTALLED CONSTRUCTION

- A. Provide final protection and maintain conditions that ensure installed Work is without damage or deterioration at time of Substantial Completion.
- B. Comply with manufacturer's written instructions for temperature and relative humidity.

END OF SECTION 01 73 00

SECTION 01 73 29 CUTTING AND PATCHING

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes procedural requirements for cutting and patching.

1.3 DEFINITIONS

- A. Cutting: Removal of existing construction necessary to permit installation or performance of other work.
- B. Patching: Fitting and repair work required to restore surfaces to original conditions after installation of other work.

1.4 SUBMITTALS

- A. Cutting and Patching Plan:
 - 1. Submit plan describing procedures at least ten (10) days prior to the time cutting and patching will be performed. Include the following information:
 - a. Extent: Describe reason for and extent of each occurrence of cutting and patching.
 - b. Changes to in-place construction: Describe anticipated results. Include changes to structural elements and operating components as well as changes in building appearance and other significant visual elements.
 - c. Products: List products used for patching and firms or entities that will perform patching work.
 - d. Dates: Indicate when cutting and patching will be performed.
 - e. Utilities and mechanical and electrical systems:
 - 1) List services and systems that cutting and patching procedures will disturb or affect. List services and systems that will be relocated and those that will be temporarily out of service. Indicate length of time permanent services and systems will be disrupted:
 - a) Include description of provisions for temporary services and systems during interruption of permanent services and systems.

1.5 QUALITY ASSURANCE

- A. Cutting and Patching: Comply with requirements for and limitations on cutting and patching of construction elements.
- B. Structural Elements: When cutting and patching structural elements, notify Architect of locations and details of cutting and await directions from Architect before proceeding. Shore, brace, and support structural elements during cutting and patching. Do not cut and patch structural elements in a manner that could change their load-carrying capacity or increase deflection.
- C. Operational Elements:
 - 1. Do not cut and patch operating elements and related components that results in

reducing the capacity to perform as intended or that results in increased maintenance or decreased operational life or safety:

- a. Primary operational systems and equipment.
- b. Fire separation assemblies.
- c. Air or smoke barriers.
- d. Fire suppression systems.
- e. Mechanical systems' piping and ducts.
- f. Control systems.
- g. Communication systems.
- h. Fire detection and alarm systems.
- i. Conveying systems.
- j. Electrical wiring systems.
- k. Operating systems of special construction.

D. Miscellaneous Elements:

1. Do not cut and patch the following elements or related components that change the load bearing capacity, resulting in a reduction of capacity to perform as intended, or that results in increased maintenance or decreased operational life or safety:
 - a. Water, moisture, or vapor barriers.
 - b. Membranes and flashings.
 - c. Exterior curtain wall construction.
 - d. Equipment supports.
 - e. Piping, ductwork, vessels, and equipment.
 - f. Noise and vibration control elements and systems.
 - g. Sprayed fire resistive material.

E. Visual Requirements:

1. Do not cut and patch construction resulting in visual evidence of cutting and patching. Do not cut and patch construction exposed on the exterior or in occupied spaces in a manner that would, in Architect's opinion, reduce the building's aesthetic qualities. Remove and replace construction that has been cut and patched in a visually unsatisfactory manner:
 - a. If possible, retain original installer or fabricator to cut and patch exposed Work. If possible, engage original installer or fabricator. If original installer is not available, engage recognized, experienced, and specialized firm for the Work:
 - 1) Processed concrete finishes.
 - 2) Ornamental metal.
 - 3) Matched veneer woodwork.
 - 4) Preformed metal panels.
 - 5) Roofing.
 - 6) Firestopping.
 - 7) Window system.
 - 8) Fluid applied flooring.
 - 9) Wall covering.
 - 10) HVAC enclosures, cabinets, or covers.

F. Cutting and Patching Conference: Before proceeding, meet at 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.

1.6 WARRANTY

- A. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during installation or cutting and patching operations, by methods and with materials so as not to void existing warranties.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Comply with specified requirements.
- B. Existing Materials:
 - 1. Use materials identical to existing materials. For exposed surfaces, use materials that visually match existing adjacent surfaces to the fullest extent possible:
 - a. If identical materials are unavailable or cannot be used, use materials that, when installed, will match the visual and functional performance of existing materials.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Examine surfaces to be cut and patched and conditions under which cutting and patching are to be performed:
 - 1. Compatibility: Before patching, verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.
 - 2. Proceed with installation only after unsafe or unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Temporary Support: Provide temporary support of Work to be cut.
- B. Protection: Protect existing construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of Project that might be exposed during cutting and patching operations.
- C. Adjoining Areas: Avoid interference with use of adjoining areas or interruption of free passage to adjoining areas.
- D. Existing Services: Where removal, relocation, or abandonment is necessary, bypass existing services before cutting to avoid interruption of services to occupied areas.

3.3 CUTTING AND PATCHING

- A. Employ skilled workers to perform cutting and patching. Proceed with cutting and patching at earliest feasible time, and complete without delay:
 - 1. Cut existing construction to provide for installation of components or performance of construction, and subsequently patch as necessary to restore surfaces to an original condition.
 - 2. Cut in place construction to provide for installation of other components or performance of other construction, and subsequently patch as required to restore surfaces to their original condition.
- B. Temporary Support: Provide temporary support of Work to be cut.
- C. Protection: Protect in place construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of Project that might be exposed during cutting and patching operations.
- D. Adjacent Occupied Areas: Where interference with use of adjoining areas or interruption of

free passage to adjoining areas is unavoidable, coordinate cutting and patching according to requirements in Section 01 10 00: Summary and what is shown on Drawings.

E. Cutting:

1. Cut existing construction by sawing, drilling, breaking, chipping, grinding, and similar operations, including excavation, using methods least likely to damage elements retained or adjoining construction. If possible, review proposed procedures with original installer; comply with original installer's written recommendations:
 - a. Use hand or small power tools designed for sawing and 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.
 - b. Finished surfaces: Cut or drill from exposed or finished side into concealed surfaces.
 - c. Concrete and masonry: Cut using a cutting machine, such as an abrasive saw or a diamond-core drill.
 - d. Excavating and backfilling: Comply with requirements in applicable earthwork specifications by cutting and patching operations.
 - e. Mechanical and electrical services: Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after cutting.
 - f. Proceed with patching after construction operations requiring cutting are complete.

F. Patching:

1. Patch construction by filling, repairing, refinishing, closing up, and similar operations following performance of other Work. Patch with durable seams that are as invisible as possible. Provide materials and comply with installation requirements specified in other Sections of these Specifications:
 - a. Inspection:
 - 1) Where feasible, test and inspect patched areas after completion to demonstrate integrity of installation.
 - b. Exposed finishes:
 - 1) Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction to eliminate evidence of patching and refinishing:
 - a) Clean piping, conduit, and similar features before applying paint or other finishing materials.
 - b) Restore damaged pipe covering to its original condition.
2. Floors and walls: Where walls or partitions are removed, extend one finished area into another, patch and repair surfaces in new space. Provide even surface of uniform finish, color, texture, and appearance. Remove existing floor and wall coverings and replace with new materials, if necessary, to achieve uniform color and appearance.
3. Where patching occurs in a painted surface, apply primer and intermediate paint coats over the patch and apply final paint coat over entire unbroken surface containing the patch. Provide additional coats until patch blends with adjacent surfaces.
4. Ceilings: Patch, repair, or rehang existing ceilings as necessary to provide an even-plane surface of uniform appearance.
5. Exterior building enclosure: Patch components and restore enclosure to a weathertight condition.

END OF SECTION 01 73 29

SECTION 01 74 19 CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for the following:
 - 1. Salvaging nonhazardous demolition and construction waste.
 - 2. Recycling nonhazardous demolition and construction waste.
 - 3. Disposing of nonhazardous demolition and construction waste.

1.3 DEFINITIONS

- A. Construction Waste: Building and site improvement materials and other solid waste resulting from construction, remodeling, renovation, or repair operations. Construction waste includes packaging.
- B. Demolition Waste: Building and site improvement materials resulting from demolition or selective demolition operations.
- C. 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.
- D. Recycle: Recovery of demolition or construction waste for subsequent processing in preparation for reuse.
- E. Salvage: Recovery of demolition or construction waste and subsequent sale or reuse in another facility.
- F. Salvage and Reuse: Recovery of demolition or construction waste and subsequent incorporation into the Work.

1.4 SUBMITTALS

- A. Waste Management Plan: Submit plan within ten (10) days of date established for commencement of the Work.
- B. Waste Reduction Progress Reports:
 - 1. Concurrent with each Application for Payment, submit report. Use Form CWM-7 for construction waste and Form CWM-8 for demolition waste. Include the following information:
 - a. Material category.
 - b. Generation point of waste.
 - c. Total quantity of waste in tons (tonnes).
 - d. Quantity of waste salvaged, both estimated and actual in tons (tonnes).
 - e. Quantity of waste recycled, both estimated and actual in tons (tonnes).
 - f. Total quantity of waste recovered (salvaged plus recycled) in tons (tonnes).
 - g. Total quantity of waste recovered (salvaged plus recycled) as a percentage of total

waste.

- C. Waste Reduction Calculations: Before request for Substantial Completion, submit calculated end of Project rates for salvage, recycling, and disposal as a percentage of total waste generated by the Work.
- D. Records of Donations: Indicate receipt and acceptance of salvageable waste donated to individuals and organizations. Indicate whether organization is tax exempt.
- E. Records of Sales: Indicate receipt and acceptance of salvageable waste sold to individuals and organizations. Indicate whether organization is tax exempt.
- F. Recycling and Processing Facility Records: Indicate receipt and acceptance of recyclable waste by recycling and processing facilities licensed to accept them. Include manifests, weight tickets, receipts, and invoices.
- G. Landfill and Incinerator Disposal Records: Indicate receipt and acceptance of waste by landfills and incinerator facilities licensed to accept them. Include manifests, weight tickets, receipts, and invoices.
- H. Statement of Refrigerant Recovery: Signed by refrigerant recovery technician responsible for recovering refrigerant, stating that refrigerant that was present was recovered and that recovery was performed according to EPA regulations. Include name and address of technician and date refrigerant was recovered.

1.5 QUALITY ASSURANCE

- A. Waste Management Coordinator Qualifications: Firm having minimum ten (10) years of documented experience in specializing in waste management coordination.
- B. Refrigerant Recovery Technician Qualifications: Certified by EPA-approved certification program.
- C. Regulatory Requirements: Comply with hauling and disposal regulations of authorities having jurisdiction.
- D. Waste Management Conference:
 - 1. Conduct conference at site. Review methods and procedures related to waste management including, but not limited to, the following:
 - a. Review and discuss waste management plan including responsibilities of waste management coordinator.
 - b. Review requirements for documenting quantities of each type of waste and its disposition.
 - c. Review and finalize procedures for materials separation and verify availability of containers and bins needed to avoid delays.
 - d. Review procedures for periodic waste collection and transportation to recycling and disposal facilities.
 - e. Review waste management requirements for each trade.

1.6 PERFORMANCE REQUIREMENTS

- A. Conform to County regulations regarding Solid Waste Control.
- B. Achieve end of Project rates for salvage/recycling of 50 percent by weight of total nonhazardous solid waste generated by the Work. 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. Demolition waste:
 - a. Asphalt paving.
 - b. Concrete.
 - c. Concrete reinforcing steel.
 - d. Brick.
 - e. Concrete masonry units.
 - f. Wood studs.
 - g. Wood joists.
 - h. Plywood and oriented strand board.
 - i. Wood paneling.
 - j. Wood trim.
 - k. Structural and miscellaneous steel.
 - l. Rough hardware.
 - m. Roofing.
 - n. Insulation.
 - o. Doors and frames.
 - p. Door hardware.
 - q. Windows.
 - r. Glazing.
 - s. Metal studs.
 - t. Gypsum board.
 - u. Acoustical tile and panels.
 - v. Carpet.
 - w. Carpet pad.
 - x. Demountable partitions.
 - y. Equipment.
 - z. Cabinets.
 - aa. Plumbing fixtures.
 - bb. Piping.
 - cc. Supports and hangers.
 - dd. Valves.
 - ee. Sprinklers.
 - ff. Mechanical equipment.
 - gg. Refrigerants.
 - hh. Electrical conduit.
 - ii. Copper wiring.
 - jj. Lighting fixtures.
 - kk. Lamps.
 - ll. Ballasts.
 - mm. Electrical devices.
 - nn. Switchgear and panelboards.
 - oo. Transformers.
2. Construction waste:
 - a. Masonry and CMU.
 - b. Lumber.
 - c. Wood sheet materials.
 - d. Wood trim.
 - e. Metals.
 - f. Roofing.
 - g. Insulation.
 - h. Carpet and pad.
 - i. Gypsum board.
 - j. Piping.

- k. Electrical conduit.
- l. Packaging - Regardless of salvage/recycle goal indicated in "General" Paragraph above, salvage or recycle 100 percent of the following uncontaminated packaging materials:
 - 1) Paper.
 - 2) Cardboard.
 - 3) Boxes.
 - 4) Plastic sheet and film.
 - 5) Polystyrene packaging.
 - 6) Wood crates.
 - 7) Plastic pails.

1.7 WASTE MANAGEMENT PLAN

- A. Develop a waste management plan and requirements. Plan shall consist of waste identification, waste reduction work plan, and cost/revenue analysis. Distinguish between demolition and construction waste. Indicate quantities by weight or volume but use same units of measure throughout waste management plan.
- B. Waste Identification: Indicate anticipated types and quantities of demolition site clearing and construction waste generated by the Work. Use Form CWM-1 for construction waste and Form CWM-2 for demolition waste. Include estimated quantities and assumptions for estimates.
- C. Waste Reduction Work Plan:
 - 1. List each type of waste and whether it will be salvaged, recycled, or disposed of in landfill or incinerator. Use Form CWM-3 for construction waste and Form CWM-4 for demolition waste. 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.
 - 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.
 - e. Disposed materials: Indicate how and where materials will be disposed of. Include name, address, and telephone number of each landfill and incinerator facility.
 - f. 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.
- D. Cost/Revenue Analysis:
 - 1. Indicate total cost of waste disposal as if there was no waste management plan and net additional cost or net savings resulting from implementing waste management plan. Use Form CWM-5 for construction waste and Form CWM-6 for demolition waste. Include the following:
 - a. Total quantity of waste.
 - b. Estimated cost of disposal (cost per unit). Include hauling and tipping fees and cost of collection containers for each type of waste.
 - c. Total cost of disposal (with no waste management).
 - d. Revenue from salvaged materials.

- e. Revenue from recycled materials.
- f. Savings in hauling and tipping fees by donating materials.
- g. Savings in hauling and tipping fees that are avoided.
- h. Handling and transportation costs. Include cost of collection containers for each type of waste.
- i. Net additional cost or net savings from waste management plan.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.1 PLAN IMPLEMENTATION

- A. 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. Waste Management Coordinator: Engage a waste management coordinator to be responsible for implementing, monitoring, and reporting status of waste management work plan.
- C. Training:
 - 1. Train workers, subcontractors, and suppliers on proper waste management procedures, as appropriate for the Work:
 - a. Distribute waste management plan to everyone concerned within three (3) days of submittal return.
 - b. Distribute waste management plan to entities when they first begin work onsite. Review plan procedures and locations established for salvage, recycling, and disposal.
- D. Site Access and Temporary Controls:
 - 1. Conduct waste management operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities:
 - a. Designate and label specific areas on Project site necessary for separating materials that are to be salvaged, recycled, reused, donated, and sold.
 - b. Comply with Section 01 50 00: Temporary Facilities and Controls for the control of dust and dirt, environmental protection, and noise control.
- E. Waste Management in Historic Zones or Areas: Hauling equipment and other materials shall be of sizes that clear surfaces within historic spaces, areas, rooms, and openings, by 12 inches (300 mm) or more.

3.2 SALVAGING DEMOLITION WASTE

- A. Salvaged Items for Reuse in the Work:
 - 1. Salvage items for reuse and handle:
 - a. Clean salvaged items.
 - b. Pack or crate items after cleaning. Identify contents of containers with label indicating elements, date of removal, quantity, and location where removed.
 - c. Store items in a secure area until installation.
 - d. Protect items from damage during transport and storage.
 - e. Install salvaged items to comply with installation requirements for new materials

and equipment. Provide connections, supports, and miscellaneous materials necessary to make items functional for use indicated.

- B. Salvaged Items for Sale and Donation: Not permitted on Project site.
- C. Salvaged Items for Owner's Use:
 - 1. Salvage items for Owner's use and handle as follows:
 - a. Clean salvaged items.
 - b. Pack or crate items after cleaning. Identify contents of containers with label indicating elements, date of removal, quantity, and location where removed.
 - c. Store items in a secure area until delivery to Owner.
 - d. Transport items to Owner's storage area designated by Owner.
 - e. Protect items from damage during transport and storage.
- D. Doors and Hardware: Brace open end of door frames. Except for removing door closers, leave door hardware attached to doors, unless otherwise designated by Owner.
- E. Equipment: Drain tanks, piping, and fixtures. Seal openings with caps or plugs. Protect equipment from exposure to weather.
- F. Plumbing Fixtures: Separate by type and size.
- G. Lighting Fixtures: Separate lamps by type and protect from breakage.
- H. Electrical Devices: Separate switches, receptacles, switchgear, transformers, meters, panelboards, circuit breakers, and other devices by type.

3.3 RECYCLING WASTE

- A. Recycle paper and beverage containers used by onsite workers.
- B. Recycling Incentives: Revenues, savings, rebates, tax credits, and other incentives received for recycling waste materials shall accrue to Owner.
- 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:
 - 1. 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:
 - a. 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:
 - 1) Inspect containers and bins for contamination and remove contaminated materials if found.
 - b. Stockpile processed materials onsite without intermixing with other materials. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.
 - c. Stockpile materials away from construction area. Do not store within drip line of remaining trees.
 - d. Store components off the ground and protect from the weather.
 - e. Remove recyclable waste from Owner's property and transport to recycling receiver or processor.

3.4 DISPOSAL OF WASTE

- A. 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 to accumulate onsite.
 - 2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
- B. Burning:
 - 1. Do not burn waste materials:
 - a. Burning of waste materials is permitted only at designated areas on Owner's property, provided required permits are obtained. Provide full-time monitoring for burning materials until fires are extinguished.
- C. Disposal: Remove waste materials and dispose of at designated spoil areas on Owner's property.

3.5 ATTACHMENTS

- A. Form CWM-1 for construction waste identification.
- B. Form CWM-2 for demolition waste identification.
- C. Form CWM-3 for construction waste reduction work plan.
- D. Form CWM-4 for demolition waste reduction work plan.
- E. Form CWM-5 cost/revenue analysis of construction waste reduction work plan.
- F. Form CWM-6 cost/revenue analysis of demolition waste reduction work plan.
- G. Form CWM-7 for construction waste
- H. Form CWM-8 for demolition waste.

CWM FORMS ON FOLLOWING PAGES

FORM CWM-1: CONSTRUCTION WASTE IDENTIFICATION							
MATERIAL CATEGORY	GENERATION POINT	EST. QUANTITY OF MATERIALS RECEIVED* (A)	EST. WASTE - % (B)	TOTAL EST. QUANTITY OF WASTE* (C = A x B)	EST. VOLUME CY (CM)	EST. WEIGHT TONS (TONNES)	REMARKS AND ASSUMPTIONS
Packaging: Cardboard							
Packaging: Boxes							
Packaging: Plastic Sheet or Film							
Packaging: Polystyrene							
Packaging: Pallets or Skids							
Packaging: Crates							
Packaging: Paint Cans							
Packaging: Plastic Pails							
Site-Clearing Waste							
Masonry or CMU							
Lumber: Cut-Offs							
Lumber: Warped Pieces							
Plywood or OSB (scraps)							
Wood Forms							
Wood Waste Chutes							
Wood Trim (cut-offs)							
Metals							
Insulation							
Roofing							
Joint Sealant Tubes							
Gypsum Board (scraps)							
Carpet and Pad (scraps)							
Piping							
Electrical Conduit							
Other:							

FORM CWM-2: DEMOLITION WASTE IDENTIFICATION				
MATERIAL DESCRIPTION	EST. QUANTITY	EST. VOLUME CY (CM)	EST. WEIGHT TONS (TONNES)	REMARKS AND ASSUMPTIONS
Asphaltic Concrete Paving				
Concrete				
Brick				
CMU				
Lumber				
Plywood and OSB				
Wood Paneling				
Wood Trim				
Miscellaneous Metals				
Structural Steel				
Rough Hardware				
Insulation				
Roofing				
Doors and Frames				
Door Hardware				
Windows				
Glazing				
Acoustical Tile				
Carpet				
Carpet Pad				
Demountable Partitions				
Equipment				
Cabinets				
Plumbing Fixtures				
Piping				
Piping Supports and Hangers				
Valves				
Sprinklers				
Mechanical Equipment				
Electrical Conduit				
Copper Wiring				
Light Fixtures				
Lamps				
Lighting Ballasts				
Electrical Devices				
Switchgear and Panelboards				
Transformers				
Other:				

FORM CWM-3: CONSTRUCTION WASTE REDUCTION WORK PLAN						
MATERIAL CATEGORY	GENERATION POINT	TOTAL EST. QUANTITY OF WASTE TONS (TONNES)	DISPOSAL METHOD AND QUANTITY			HANDLING AND TRANSPORTION PROCEDURES
			EST. AMOUNT SALVAGED TONS (TONNES)	EST. AMOUNT RECYCLED TONS (TONNES)	EST. AMOUNT DISPOSED TO LANDFILL TONS (TONNES)	
Packaging: Cardboard						
Packaging: Boxes						
Packaging: Plastic Sheet or Film						
Packaging: Polystyrene						
Packaging: Pallets or Skids						
Packaging: Crates						
Packaging: Paint Cans						
Packaging: Plastic Pails						
Site-Clearing Waste						
Masonry or CMU						
Lumber: Cut-Offs						
Lumber: Warped Pieces						
Plywood or OSB (scraps)						
Wood Forms						
Wood Waste Chutes						
Wood Trim (cut-offs)						
Metals						
Insulation						
Roofing						
Joint Sealant Tubes						
Gypsum Board (scraps)						
Carpet and Pad (scraps)						
Piping						
Electrical Conduit						
Other:						

FORM CWM-4: DEMOLITION WASTE REDUCTION WORK PLAN						
MATERIAL CATEGORY	GENERATION POINT	TOTAL EST. QUANTITY OF WASTE TONS (TONNES)	DISPOSAL METHOD AND QUANTITY			HANDLING AND TRANSPORTION PROCEDURES
			EST. AMOUNT SALVAGED TONS (TONNES)	EST. AMOUNT RECYCLED TONS (TONNES)	EST. AMOUNT DISPOSED TO LANDFILL TONS (TONNES)	
Asphaltic Concrete Paving						
Concrete						
Brick						
CMU						
Lumber						
Plywood and OSB						
Wood Paneling						
Wood Trim						
Miscellaneous Metals						
Structural Steel						
Rough Hardware						
Insulation						
Roofing						
Doors and Frames						
Door Hardware						
Windows						
Glazing						
Acoustical Tile						
Carpet						
Carpet Pad						
Demountable Partitions						
Equipment						
Cabinets						
Plumbing Fixtures						
Piping						
Supports and Hangers						
Valves						
Sprinklers						
Mechanical Equipment						
Electrical Conduit						
Copper Wiring						
Light Fixtures						
Lamps						
Lighting Ballasts						
Electrical Devices						
Switchgear and Panelboards						
Transformers						
Other:						

FORM CWM-5: COST/REVENUE ANALYSIS OF CONSTRUCTION WASTE REDUCTION WORK PLAN								
MATERIALS	TOTAL QUANTITY OF MATERIALS (VOL. OR WEIGHT) (A)	EST. COST OF DISPOSAL (B)	TOTAL EST. COST OF DISPOSAL (C = A x B)	REVENUE FROM SALVAGED MATERIALS (D)	REVENUE FROM RECYCLED MATERIALS (E)	LANDFILL TIPPING FEES AVOIDED (F)	HANDLING AND TRANSPORTATION COSTS AVOIDED (G)	NET COST SAVINGS OF WORK PLAN (H = D+E+F+G)
Packaging: Cardboard								
Packaging: Boxes								
Packaging: Plastic Sheet or Film								
Packaging: Polystyrene								
Packaging: Pallets or Skids								
Packaging: Crates								
Packaging: Paint Cans								
Packaging: Plastic Pails								
Site-Clearing Waste								
Masonry or CMU								
Lumber: Cut-Offs								
Lumber: Warped Pieces								
Plywood or OSB (scraps)								
Wood Forms								
Wood Waste Chutes								
Wood Trim (cut-offs)								
Metals								
Insulation								
Roofing								
Joint Sealant Tubes								
Gypsum Board (scraps)								
Carpet and Pad (scraps)								
Piping								
Electrical Conduit								
Other:								

FORM CWM-6: COST/REVENUE ANALYSIS OF DEMOLITION WASTE REDUCTION WORK PLAN								
MATERIALS	TOTAL QUANTITY OF MATERIALS (VOL. OR WEIGHT) (A)	EST. COST OF DISPOSAL (B)	TOTAL EST. COST OF DISPOSAL (C = A x B)	REVENUE FROM SALVAGED MATERIALS (D)	REVENUE FROM RECYCLED MATERIALS (E)	LANDFILL TIPPING FEES AVOIDED (F)	HANDLING AND TRANSPORTATION COSTS AVOIDED (G)	NET COST SAVINGS OF WORK PLAN (H = D+E+F+G)
Asphaltic Concrete Paving								
Concrete								
Brick								
CMU								
Lumber								
Plywood and OSB								
Wood Paneling								
Wood Trim								
Miscellaneous Metals								
Structural Steel								
Rough Hardware								
Insulation								
Roofing								
Doors and Frames								
Door Hardware								
Windows								
Glazing								
Acoustical Tile								
Carpet								
Carpet Pad								
Demountable Partitions								
Equipment								
Cabinets								
Plumbing Fixtures								
Piping								
Supports and Hangers								
Valves								
Sprinklers								
Mech. Equipment								
Electrical Conduit								
Copper Wiring								
Light Fixtures								
Lamps								
Lighting Ballasts								
Electrical Devices								
Switchgear and Panelboards								
Transformers								
Other:								

FORM CWM-7: CONSTRUCTION WASTE REDUCTION PROGRESS REPORT								
MATERIAL CATEGORY	GENERATION POINT	TOTAL QUANTITY OF WASTE TONS (TONNES) (A)	QUANTITY OF WASTE SALVAGED		QUANTITY OF WASTE RECYCLED		TOTAL QUANTITY OF WASTE RECOVERED TONS (TONNES) (D = B + C)	TOTAL QUANTITY OF WASTE RECOVERED % (D / A x 100)
			ESTIMATED TONS (TONNES)	ACTUAL TONS (TONNES) (B)	ESTIMATED TONS (TONNES)	ACTUAL TONS (TONNES) (C)		
Packaging: Cardboard								
Packaging: Boxes								
Packaging: Plastic Sheet or Film								
Packaging: Polystyrene								
Packaging: Pallets or Skids								
Packaging: Crates								
Packaging: Paint Cans								
Packaging: Plastic Pails								
Site-Clearing Waste								
Masonry or CMU								
Lumber: Cut-Offs								
Lumber: Warped Pieces								
Plywood or OSB (scraps)								
Wood Forms								
Wood Waste Chutes								
Wood Trim (cut-offs)								
Metals								
Insulation								
Roofing								
Joint Sealant Tubes								
Gypsum Board (scraps)								
Carpet and Pad (scraps)								
Piping								
Electrical Conduit								
Other:								

FORM CWM-8: DEMOLITION WASTE REDUCTION PROGRESS REPORT								
MATERIAL CATEGORY	GENERATION POINT	TOTAL QUANTITY OF WASTE TONS (TONNES) (A)	QUANTITY OF WASTE SALVAGED		QUANTITY OF WASTE RECYCLED		TOTAL QUANTITY OF WASTE RECOVERED TONS (TONNES) (D = B + C)	TOTAL QUANTITY OF WASTE RECOVERED % (D / A x 100)
			ESTIMATE D TONS (TONNES)	ACTUAL TONS (TONNES) (B)	ESTIMATE D TONS (TONNES)	ACTUAL TONS (TONNES) (C)		
Asphaltic Concrete Paving								
Concrete								
Brick								
CMU								
Lumber								
Plywood and OSB								
Wood Paneling								
Wood Trim								
Miscellaneous Metals								
Structural Steel								
Rough Hardware								
Insulation								
Roofing								
Doors and Frames								
Door Hardware								
Windows								
Glazing								
Acoustical Tile								
Carpet								
Carpet Pad								
Demountable Partitions								
Equipment								
Cabinets								
Plumbing Fixtures								
Piping								
Supports and Hangers								
Valves								
Sprinklers								
Mechanical Equipment								
Electrical Conduit								
Copper Wiring								
Light Fixtures								
Lamps								
Lighting Ballasts								
Electrical Devices								
Switchgear and Panelboards								
Transformers								
Other:								

END OF SECTION 01 74 19

SECTION 01 77 10 DSA PROJECT CLOSEOUT AND CERTIFICATION PROCESS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.
- B. Related Sections:
 - 1. Section 01 31 00: Project Management and Coordination.
 - 2. Section 01 32 10: Preconstruction Conference Notes
 - 3. Section 01 42 00: References.
 - 4. Section 01 73 00: Execution.
 - 5. Section 01 77 22: Substantial Completion Procedures.

1.2 PRE-CONSTRUCTION

- A. DSA Documents Required:
 - 1. **SSS 103 Form** to provide DSA and General Contractor with a Structural Testing and Inspections list (T&I).
 - 2. **DSA Form 5** is to be filled out for District to select a Project Inspector (P.I.) to be hired for the particular project type (Class 1, 2 or 3) required. This Project Inspector must be interviewed and approved by the Architect of Record & Structural Engineer of Record. The Project Inspector and Special Testing Laboratory must be DSA Approved.
 - 3. **Pre-Construction Meeting** will be conducted by the Design Professional. Use standard PBK Pre-Con Sheet and customize for your project. Identify and discuss regulatory responsibilities of Design Professionals, Project Inspector, Testing Lab, General Contractor, the District and DSA.
 - 4. **Provide Documents** such as DSA Approved Plans & Specs, Soils Reports, Hazard Material Report, Addendums and any Material/Color Boards to the General Contractor and Project Inspector.
 - 5. **DSA Approvals.** The Design Professionals responsibility to obtain timely DSA Approval of all Addendums, Construction Change Directives and any changes to the approved Construction Documents. These changes can be a CCD "A" or a CCD "B" to filled out on the DSA 140 Form. CCD "A" is work that effects changes to Structural Safety, Fire Life Safety or Access Compliance. CCD "B" is all other work that will make DSA aware of other important changes but do not affect Structural Safety, Fire Life Safety or Access Compliance. (Simple color of paint or floor finish, cabinet finishes for example are not to be submitted). Deferred Approvals by DSA will be the responsibility of the General Contractor.
 - 6. **Submit DSA Form 102** for Construction Start Notice and Inspection Card Request. This form will include Notice of Construction Start Date, information on the School District, Scope of Work, Listing of Project Participants (Design Professionals, Project Inspector, In-Plant Inspector if any, General Contractor, Laboratory of Record, Geotechnical Engineer, Project Delivery Method, Collaborators for DSA Box Type of Access granted).

1.3 CONSTRUCTION

- A. Project Review:
 - 1. **Project Inspector** shall provide continuous inspection during construction, provide daily and semi-monthly reports of progress of the scope of work to the District, the Design Professionals and DSA. Participate in resolutions for questions from the

contractor and report the status of DSA Field Trip Note issues. Provide a current written record of all work inspected and monitor testing and special inspections required. The Project Inspector will notify contractor of any defective work or deviation from the DSA Approved Plans. If this work is not corrected a Deviation Notice will be issued by the P.I. This can sometimes require the Design Professionals to issue a CCD to DSA for Approval of additional or amended construction documents.

2. **Design Professional** shall observe the construction, obtain deviations from the approved documents by means of COs, CCDs, RFIs, PCOs, ASIs, etc. Resolve DSA Field Trip Note issues.
3. **General Contractors** shall construct the project per the approved plans, timely corrections of Deviations noted by the Project Inspector or Design Professionals and timely submission of Deferred Approvals.
4. **Testing Laboratory** shall provide material testing and special inspections, submit all materials testing and special inspections reports to DSA, Design Professional, Structural Engineer, and Project Inspector.

1.4 CLOSE OUT & CERTIFICATION

A. Project Closeout:

1. Contractor shall notify the Design Professional & the District when they are completed enough to have a Punch Walk conducted. After the Punch List items have been completed the contractor shall notify the Design Professionals for issuance of a Notice of Substantial Completion that will start the warranty process for work completed.
2. **Certification is a letter** issued by DSA Certifying that the building project has been completed in accordance with requirements as to the safety and design of the Education Code sections 17280-17316 and 81130-81147. Without Certification the School Board has liability for an future damage to public safety and DSA will be unable to approve plans affecting uncertified construction at any time in the future.
3. **Closing document** should be obtained and submitted to DSA as soon as they become obtainable. Close out is initiated by the DSA Field Engineer. DSA will issue a 90 Day Letter requesting outstanding documents or unresolved issued that are required. All these need to be resolved prior to DSA issuing letter of certification.
4. **District responsibilities** include issuing Notice of Completion and submit fee to DSA invoices. DSA Form 168 for final cost of construction and submit to DSA.
5. **Design Professionals responsibilities** include resolving any outstanding issues related to the DSA 90 Day Letter, and submit a Verified Report DSA Form 6A/E.
6. **Contractors & Project Inspectors responsibilities** include submit Verified Report DSA Form 6.
7. **Laboratories responsibilities** include submit Lab Verified Report DSA Form 291, Special Inspection Verified Report DSA Form 292, and submit Geotechnical Verified Report DSA Form 293.

END OF SECTION 01 77 10

SECTION 02 41 19 SELECTIVE DEMOLITION

PART 1 - GENERAL

- A. Removal of designated building equipment and fixtures.
- B. Removal of designated construction.
- C. Disposal of materials.
- D. Storage of salvaged materials.
- E. Cap and identify utilities.
- F. Temporary partitions to allow building occupancy.
- G. Temporary fire protection.
- H. Schedule of materials and equipment.

1.2 DEFINITIONS

- A. Remove: Detach items from existing construction and legally dispose of them off-site unless indicated to be removed and salvaged.
- B. Disposal: Removal off-site of demolition waste and subsequently deposit in landfill acceptable to authorities having jurisdiction.
- C. Existing to Remain: Items of construction that are not to be removed and that are not indicated to be removed.

1.3 MATERIALS OWNERSHIP

- A. Historic items, relics, cornerstones, commemorative plaques, tablets and similar objects encountered during demolition are to remain the Owner's property.
- B. Carefully remove each item in a manner to prevent damage and deliver to Owner.

1.4 SUBMITTALS

- A. Predemolition Photographs: Show conditions of exiting adjacent construction and site improvements that might be misconstrued as damaged by demolition operations. Submit before work begins.
- B. Record Documents: Submit under provisions of Section 01 77 00. Accurately record locations of utilities and subsurface obstructions.

1.5 REGULATORY REQUIREMENTS

- A. Conform to applicable codes for demolition work, safety of structure, electrical disconnection and reconnection dust control and disposal of materials.
- B. Comply with California Fire Code (CFC), California Code of Regulations, (CCR) Title 24, Part 9, Chapter 14 - Fire Safety During Construction and Demolition.
- C. Obtain required permits from authorities.
- D. Notify affected utility companies before starting work and comply with their requirements.
- E. Do not close or obstruct egress width to exits.
- F. Do not disable or disrupt building fire or life safety systems without 3 day prior written notice to the Owner.

1.6 PROJECT CONDITIONS

- A. Areas of buildings to be demolished will be evacuated and their use discontinued before start of work.
- B. Owner will occupy building(s) adjacent to demolition area. Conduct demolition so owner's operation will not be disrupted.
- C. Provide at least 72 hour notice to Owner of activities that will affect Owner's operation.
- D. Maintain access to existing walkways, exits and other adjacent occupied facilities.
- E. Owner assumes no responsibility for areas of buildings to be demolished.
- F. Hazardous Materials: It is not anticipated that hazardous materials will be encountered in the work.
 - 1. Hazardous materials will be removed by Owner before start of work.
 - 2. Hazardous materials will be removed by Owner under separate contract.
 - 3. If materials suspected of containing hazardous materials are encountered, do not disturb. Notify Architect.
 - 4. Conform to applicable regulatory procedures when discovering hazardous or contaminated materials.

1.7 SEQUENCING

- A. Sequence work under the provisions of Section 01 11 00.
- B. Owner will conduct salvage operations before demolition begins to remove materials and equipment that the Owner chooses to retain.
- D. Notify Owner in writing 5 days in advance of any required work to be performed on a weekend or holiday.
- E. Coordinate utility and building service interruptions with Owner.
- F. Schedule tie-ins to existing systems to minimize disruption.
- G. Coordinate Work to ensure fire sprinklers, fire alarms, smoke detectors, emergency lighting, exit signs and other life safety systems remain in full operation in occupied areas.

1.9 PROJECT CONDITIONS

- A. Conduct demolition to minimize interference with adjacent and occupied building areas.
- B. Cease operations immediately if structure appears to be in danger and notify Architect. Do not resume operations until directed.

3. PART 3 - EXECUTION

3.1 EXAMINATION

- A. Correlate existing conditions with requirements indicated.
- B. Inventory and record condition of items to be removed and salvaged. Execute predemolition photographs.
- D. Verify that hazardous waste remediation is complete.

3.2 PREPARATION

- A. Existing Utilities: Locate, identify, disconnect and seal or cap off indicated utilities serving areas to be demolished.
- B. Salvaged Items: Clean, pack and identify items for delivery to Owner.
- C. Protect existing items which are not indicated to be salvaged, removed, or altered.
- D. Erect and maintain weatherproof closures for exterior openings.
- E. Erect and maintain temporary partitions to prevent spread of dust, fumes, noise, and smoke to provide for Owner occupancy as specified in Section 01 11 00.

3.3 DEMOLITION

- A. Conduct demolition to minimize interference with adjacent [and occupied] building areas.
- B. Cease operations immediately if structure appears to be in danger. Notify Architect. Do not resume operations until directed.
- C. Maintain protected egress and access to the Work.
- D. Maintain fire safety during demolition in accordance with CFC, Chapter 14.
- E. Demolish in an orderly and careful manner. Protect existing supporting structural members.

3.4 SALVAGING OF DEMOLITION

MATERIALS

- A. Clean salvaged items.
- B. Pack or crate items after cleaning. Identify contents.
- C. Store items in secure area until delivery to Owner.
- D. Protect items from damage.
- E. Install salvaged items to comply with requirements for new materials and equipment.

3.5 RECYCLING OF DEMOLITION MATERIALS

- A. Separate recycled demolition materials from other demolished materials.

- B. Stockpile processed materials on-site without intermixing with other materials.
- C. Do not store materials within drip line of trees
- D. Transport recyclable materials that are not indicated to be reused off Owner's property to recycling receiver or processor.
- E. Recycled incentives received for building demolition materials shall be equally shared between Contractor and Owner.
- F. Wood Materials: Sort and stack members according to size, type and length. Separate dimensional and engineered lumber, panel products, and treated wood materials.
- G. Metals: Separate by metal type. Remove nuts, bolts and rough hardware. Sort structural steel by type and size.
- H. Roofing: Separate organic and fiberglass shingles and felts. Remove nails, staples and accessories.
- I. Doors and Hardware: Brace open end of door frames. Leave hardware attached to doors.
- J. Carpet and Pad: Store clean dry carpet and pad in a closed container or trailer.
- K. Gypsum Board: Stack large clean pieces on pallets. Remove edge trim and sort with metals. Remove and dispose of fasteners.
- L. Acoustical Ceiling Materials: Stack panels and tiles on pallets. Separate suspension system and sort with metals.
- M. Equipment: Drain tanks, piping and fixtures. Seal openings with caps or plugs.
- N. Piping: Reduce piping to straight lengths and store by type and size. Separate supports, hangers, valves and other components.
- O. Lighting Fixtures: Remove lamps and separate by type.
- P. Electrical Devices: Separate switches, receptacles, switchgear, transformers, meters, panelboards, circuit breakers, and other devices by type.
- Q. Conduit: Reduce conduit to straight lengths and store by type and size.

3.6 DISPOSAL OF DEMOLISHED MATERIALS

- A. Except for items to be salvaged, reinstalled, or otherwise indicated to remain, remove demolished materials from Project site and legally dispose of them in an EPA – approved landfill.
- B. Do not burn or bury materials on site.

3.7 CLEANING

- A. Clean adjacent structures and improvements of dust, dirt and debris caused by demolition.

- B. Remove temporary construction.
- C. Return adjacent areas to condition existing before demolition operations began.
- D. Leave site in a clean condition.

END OF SECTION 02 41 19

SECTION 033000
CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes cast-in-place concrete, including formwork, reinforcement, concrete materials, mixture design, placement procedures, and finishes, for all concrete shown on the structural drawings, including, but not necessarily limited to, the following:
 - 1. Footings.
 - 2. Foundation walls.
 - 3. Slabs-on-grade.

1.3 DEFINITIONS

- A. Cementitious Materials: Portland cement alone or in combination with one or more of the following: blended hydraulic cement, fly ash and other pozzolans, ground granulated blast-furnace slag, and silica fume; subject to compliance with requirements.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Design Mixtures: For each concrete mixture. Submit alternate design mixtures when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.
 - 1. Indicate amounts of mixing water to be withheld for later addition at Project site.
- C. Steel Reinforcement Shop Drawings: Placing drawings that detail fabrication, bending, and placement. Include bar sizes, lengths, material, grade, bar schedules, stirrup spacing, bent bar diagrams, bar arrangement, splices and laps, mechanical connections, tie spacing, hoop spacing, and supports for concrete reinforcement.
- D. Formwork Shop Drawings: Prepared by or under the supervision of a qualified professional engineer detailing fabrication, assembly, and support of formwork.

1. Shoring and Reshoring: Indicate proposed schedule and sequence of stripping formwork, shoring removal, and reshoring installation and removal.
- E. Construction Joint Layout: Indicate proposed construction joints required to construct the structure.
 1. Location of construction joints is subject to approval of the Project Architect and structural Engineer.
- F. Samples: For waterstops, vapor retarder and other construction-related products as described herein or on the drawings.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Contractor/Subcontractor/Installer.
- B. Material Certificates: For each of the following, signed by manufacturers:
 1. Cementitious materials.
 2. Admixtures.
 3. Form materials and form-release agents.
 4. Steel reinforcement and accessories.
 5. Fiber reinforcement.
 6. Waterstops.
 7. Curing compounds.
 8. Floor and slab treatments.
 9. Bonding agents.
 10. Adhesives.
 11. Vapor retarders.
 12. Semi-rigid joint filler.
 13. Joint-filler strips.
 14. Repair materials.
- C. Material Test Reports: For the following, from a qualified testing agency retained and paid for by the Owner, indicating compliance with requirements:
 1. Aggregates. Include service record data indicating absence of deleterious expansion of concrete due to alkali aggregate reactivity.
- D. Floor surface flatness and levelness measurements indicating compliance with specified tolerances.
- E. Field quality-control reports.
- F. Minutes of pre-installation conference.

1.6 QUALITY ASSURANCE

- A. **Installer Qualifications:** A qualified installer who employs on Project personnel qualified as ACI-certified Flatwork Technician and Finisher and a supervisor who is an ACI-certified Concrete Flatwork Technician.
- B. **Manufacturer Qualifications:** A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94/C 94M requirements for production facilities and equipment.
 - 1. Manufacturer certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities."
- C. **Testing Agency Qualifications:** An independent agency retained and paid for by the Owner, qualified according to ASTM C 1077 and ASTM E 329 for testing indicated.
 - 1. Personnel conducting field tests shall be qualified as ACI Concrete Field Testing Technician, Grade 1, according to ACI CP-1 or an equivalent certification program.
 - 2. Personnel performing laboratory tests shall be ACI-certified Concrete Strength Testing Technician and Concrete Laboratory Testing Technician - Grade I. Testing Agency laboratory supervisor shall be an ACI-certified Concrete Laboratory Testing Technician - Grade II.
- D. **Source Limitations:** Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant, obtain aggregate from single source, and obtain admixtures from single source from single manufacturer.
- E. **ACI Publications:** Comply with the following unless modified by requirements in the Contract Documents:
 - 1. ACI 301, "Specifications for Structural Concrete."
 - 2. ACI 117, "Specifications for Tolerances for Concrete Construction and Materials."
- F. **Concrete Testing Service:** The Owner will engage a qualified independent testing agency approved by DSA to perform material evaluation tests.
- G. **Pre-installation Conference:** Conduct conference at Project site.
 - 1. Before submitting design mixtures, review concrete design mixture and examine procedures for ensuring quality of concrete materials. Require representatives of each entity directly concerned with cast-in-place concrete to attend, including the following:
 - a. Contractor's superintendent.
 - b. Entity responsible for concrete design mixtures.
 - c. Ready-mix concrete manufacturer.
 - d. Concrete subcontractor.
 - e. Special concrete finish subcontractor.

2. Review shall include, but not be limited to, the following subjects as applicable to the project: special inspection and testing and inspecting agency procedures for field quality control; concrete finishes and finishing; cold- and hot-weather concreting procedures; curing procedures; construction, contraction and isolation joints and joint-filler strips; semi-rigid joint fillers; forms and form removal limitations; shoring and reshoring procedures; vapor-retarder installation; anchor rod and anchorage device installation tolerances; steel reinforcement installation; floor and slab flatness and levelness measurement; concrete repair procedures; and concrete protection.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Steel Reinforcement: Deliver, store, and handle steel reinforcement to prevent bending and damage. Avoid damaging coatings on steel reinforcement as applicable.
- B. Waterstops: Store waterstops under cover to protect from moisture, sunlight, dirt, oil, and other contaminants.

PART 2 - PRODUCTS

2.1 FORM-FACING MATERIALS

- A. Smooth-Formed Finished Concrete: Form-facing panels that will provide continuous, true, and smooth concrete surfaces. Furnish in largest practicable sizes to minimize number of joints.
 1. Plywood, metal, or other approved panel materials.
 2. Exterior-grade plywood panels, suitable for concrete forms, complying with DOC PS 1, and as follows:
 - a. High-density overlay, Class 1 or better.
 - b. Medium-density overlay, Class 1 or better; mill-release agent treated and edge sealed.
 - c. Structural 1, B-B or better; mill oiled and edge sealed.
 - d. B-B (Concrete Form), Class 1 or better; mill oiled and edge sealed.
- B. Rough-Formed Finished Concrete: Plywood, lumber, metal, or another approved material. Provide lumber dressed on at least two edges and one side for tight fit.
- C. Forms for Cylindrical Columns, Pedestals, and Supports: Metal, glass-fiber-reinforced plastic, paper, or fiber tubes that will produce surfaces with gradual or abrupt irregularities not exceeding specified formwork surface class. Provide units with sufficient wall thickness to resist plastic concrete loads without detrimental deformation.
- D. Pan-Type Forms: Glass-fiber-reinforced plastic or formed steel, stiffened to resist plastic concrete loads without detrimental deformation.

- E. Void Forms: Biodegradable paper surface, treated for moisture resistance, structurally sufficient to support weight of plastic concrete and other superimposed loads.
- F. Chamfer Strips: Wood, metal, PVC, or rubber strips, 3/4 by 3/4 inch, minimum.
- G. Rustication Strips: Wood, metal, PVC, or rubber strips, kerfed for ease of form removal.
- H. Form-Release Agent: Commercially formulated form-release agent that will not bond with, stain, or adversely affect concrete surfaces and will not impair subsequent treatments of concrete surfaces.
 - 1. Formulate form-release agent with rust inhibitor for steel form-facing materials.
- I. Form Ties: Factory-fabricated, removable or snap-off metal or glass-fiber-reinforced plastic form ties designed to resist lateral pressure of fresh concrete on forms and to prevent spalling of concrete on removal.
 - 1. Furnish units that will leave no corrodible metal closer than 1 inch to the plane of exposed concrete surface.
 - 2. Furnish ties that, when removed, will leave holes no larger than 1 inch in diameter in concrete surface.
 - 3. Furnish ties with integral water-barrier plates to walls indicated to receive dampproofing or waterproofing.

2.2 STEEL REINFORCEMENT

- A. Reinforcing Bars: ASTM A 615/A 615M, Grade 60, deformed.
- B. Low-Alloy-Steel Reinforcing Bars where reinforcing bars are to be welded: ASTM A 706/A 706M, deformed.
- C. Steel Bar Mats: ASTM A 184/A 184M, fabricated from ASTM A 615/A 615M, Grade 60 or ASTM A 706/A 706M, deformed bars, assembled with clips.
- D. Deformed-Steel Welded Wire Reinforcement: ASTM A 497/A 497M, flat sheet.

2.3 REINFORCEMENT ACCESSORIES

- A. Joint Dowel Bars: ASTM A 615/A 615M, Grade 60, plain-steel bars, cut true to length with ends square and free of burrs.
- B. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire reinforcement in place. Manufacture bar supports from steel wire, plastic, or precast concrete according to CRSI's "Manual of Standard Practice," of greater compressive strength than concrete and as follows:

1. For concrete surfaces exposed to view where legs of wire bar supports contact forms, use CRSI Class 1 plastic-protected steel wire or CRSI Class 2 stainless-steel bar supports.
2. For epoxy-coated reinforcement, use epoxy-coated or other dielectric-polymer-coated wire bar supports.
3. For zinc-coated reinforcement, use galvanized wire or dielectric-polymer-coated wire bar supports.

2.4 CONCRETE MATERIALS

- A. Cementitious Material: Use the following cementitious materials, of the same type, brand, and source, throughout Project:
 1. Portland Cement: ASTM C 150, Type II
- B. Silica Fume: ASTM C 1240, amorphous silica.
- C. Normal-Weight Aggregates: ASTM C 33, coarse aggregate or better, graded. Provide aggregates from a single source.
 1. Maximum Coarse-Aggregate Size: 1 inch nominal and as indicated on drawings.
 2. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.
- D. Water: ASTM C 94/C 94M and potable.

2.5 ADMIXTURES

- A. Air-Entraining Admixture: ASTM C 260.
- B. Chemical Admixtures: Provide admixtures certified by manufacturer to be compatible with other admixtures and that will not contribute water-soluble chloride ions exceeding those permitted in hardened concrete. Do not use calcium chloride or admixtures containing calcium chloride.
 1. Water-Reducing Admixture: ASTM C 494/C 494M, Type A.
 2. Retarding Admixture: ASTM C 494/C 494M, Type B.
 3. Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type D.
 4. High-Range, Water-Reducing Admixture: ASTM C 494/C 494M, Type F.
 5. High-Range, Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type G.
 6. Plasticizing and Retarding Admixture: ASTM C 1017/C 1017M, Type II.
- C. Set-Accelerating Corrosion-Inhibiting Admixture: Commercially formulated, anodic inhibitor or mixed cathodic and anodic inhibitor; capable of forming a protective barrier and minimizing chloride reactions with steel reinforcement in concrete and complying with ASTM C 494/C 494M, Type C.

- D. Non-Set-Accelerating Corrosion-Inhibiting Admixture: Commercially formulated, non-set-accelerating, anodic inhibitor or mixed cathodic and anodic inhibitor; capable of forming a protective barrier and minimizing chloride reactions with steel reinforcement in concrete.
- E. Color Pigment: ASTM C 979, synthetic mineral-oxide pigments or colored water-reducing admixtures; color stable, free of carbon black, nonfading, and resistant to lime and other alkalis.
 - 1. Color: As selected by Architect from manufacturer's full range.

2.6 WATERSTOPS

- A. Flexible Rubber Waterstops: CE CRD-C 513, with factory-installed metal eyelets, for embedding in concrete to prevent passage of fluids through joints. Factory fabricate corners, intersections, and directional changes.

2.7 CURING MATERIALS

- A. Evaporation Retarder: Waterborne, monomolecular film forming, manufactured for application to fresh concrete.
- B. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. when dry.
- C. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.
- D. Water: Potable.
- E. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B, nondissipating, certified in writing by curing compound manufacturer to not interfere with bonding of floor covering.

2.8 RELATED MATERIALS

- A. Expansion- and Isolation-Joint-Filler Strips: ASTM D 1751, asphalt-saturated cellulosic fiber or ASTM D 1752, cork or self-expanding cork.
- B. Semirigid Joint Filler: Two-component, semirigid, 100 percent solids, epoxy resin with a Type A shore durometer hardness of 80 or aromatic polyurea with a Type A shore durometer hardness range of 90 to 95 per ASTM D 2240.
- C. Bonding Agent: ASTM C 1059/C 1059M, Type II, non-redispersible, acrylic emulsion or styrene butadiene.

- D. Epoxy Bonding Adhesive: ASTM C 881, two-component epoxy resin, capable of humid curing and bonding to damp surfaces, of class suitable for application temperature and of grade to suit requirements, and as follows:
 - 1. Types IV and V, load bearing, for bonding freshly mixed concrete to hardened concrete.
- E. Reglets: Fabricate reglets of not less than 0.022-inch-thick, galvanized-steel sheet. Temporarily fill or cover face opening of reglet to prevent intrusion of concrete or debris.
- F. Dovetail Anchor Slots: Hot-dip galvanized-steel sheet, not less than 0.034 inch thick, with bent tab anchors. Temporarily fill or cover face opening of slots to prevent intrusion of concrete or debris.

2.9 REPAIR MATERIALS

- A. Repair Underlayment: Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/8 inch and that can be feathered at edges to match adjacent floor elevations.
 - 1. Cement Binder: ASTM C 150, Portland cement or hydraulic or blended hydraulic cement as defined in ASTM C 219.
 - 2. Primer: Product of underlayment manufacturer recommended for substrate, conditions, and application.
 - 3. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch or coarse sand as recommended by underlayment manufacturer.
 - 4. Compressive Strength: Not less than 4100 psi at 28 days when tested according to ASTM C 109/C 109M.

2.10 CONCRETE MIXTURES, GENERAL

- A. Prepare design mixtures for each type and strength of concrete, proportioned on the basis of laboratory trial mixture or field test data, or both, according to ACI 301.
 - 1. Use a qualified independent testing agency for preparing and reporting proposed mixture designs based on laboratory trial mixtures.
- B. Cementitious Materials: Limit percentage, by weight, of cementitious materials other than Portland cement in concrete as follows:
 - 1. Fly Ash: 15 percent.
 - 2. Combined Fly Ash and Pozzolan: 15 percent.
 - 3. Silica Fume: 10 percent.
 - 4. Combined Fly Ash, Pozzolans, and Silica Fume: 25 percent with fly ash or pozzolans not exceeding 15 percent and silica fume not exceeding 10 percent.
- C. Limit water-soluble, chloride-ion content in hardened concrete to 1.00 percent by weight of cement.

- D. Admixtures: Use admixtures according to manufacturer's written instructions.
1. Use water-reducing, high-range water-reducing, and/or plasticizing admixtures in concrete, as required, for placement and workability.
 2. Use water-reducing and retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.
 3. Use water-reducing admixture in pumped concrete, concrete for heavy-use industrial slabs and parking structure slabs, concrete required to be watertight, and concrete with a water-cementitious materials ratio below 0.50.
 4. Use corrosion-inhibiting admixture in concrete mixtures where indicated.
- E. Color Pigment: Add color pigment to concrete mixture according to manufacturer's written instructions and to result in hardened concrete color consistent with approved mockup.

2.11 CONCRETE MIXTURES FOR BUILDING ELEMENTS

- A. Footings, Foundation Walls, and Slabs-on-Grade: Proportion normal-weight concrete mixture as follows:
1. Minimum Compressive Strength: 4000 psi at 28 days.
 2. Maximum Water-Cementitious Materials Ratio: 0.45.
 3. Slump Limit: 5 inches plus or minus 1 inch.
 4. Air Content: 5.5 percent, plus or minus 1.5 percent at point of delivery for 1-inch nominal maximum aggregate size.
 5. Air Content: 6 percent, plus or minus 1.5 percent at point of delivery for 1-inch nominal maximum aggregate size.

2.12 FABRICATING REINFORCEMENT

- A. Fabricate steel reinforcement according to CRSI's "Manual of Standard Practice."

2.13 CONCRETE MIXING

- A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C 94/C 94M and ASTM C 1116/C 1116M, and furnish batch ticket information.
1. When air temperature is between 85 and 90 deg F, reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F, reduce mixing and delivery time to 60 minutes.
- B. Project-Site Mixing: Measure, batch, and mix concrete materials and concrete according to ASTM C 94/C 94M. Mix concrete materials in appropriate drum-type batch machine mixer.
1. For mixer capacity of 1 cu. yd. or smaller, continue mixing at least 1-1/2 minutes, but not more than 5 minutes after ingredients are in mixer, before any part of batch is released.

2. For mixer capacity larger than 1 cu. yd., increase mixing time by 15 seconds for each additional 1 cu. yd..
3. Provide batch ticket for each batch discharged and used in the Work, indicating Project identification name and number, date, mixture type, mixture time, quantity, and amount of water added. Record approximate location of final deposit in structure.

PART 3 - EXECUTION

3.1 FORMWORK

- A. Design, erect, shore, brace, and maintain formwork, according to ACI 301, to support vertical, lateral, static, and dynamic loads, and construction loads that might be applied, until structure can support such loads.
- B. Construct formwork so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117.
- C. Limit concrete surface irregularities, designated by ACI 347 as abrupt or gradual, as follows:
 1. Class A, 1/8 inch for smooth-formed finished surfaces.
 2. Class B, 1/4 inch for rough-formed finished surfaces.
- D. Construct forms tight enough to prevent loss of concrete mortar.
- E. Fabricate forms for easy removal without hammering or prying against concrete surfaces. Provide crush or wrecking plates where stripping may damage cast concrete surfaces. Provide top forms for inclined surfaces steeper than 1.5 horizontal to 1 vertical.
 1. Install keyways, reglets, recesses, and the like, for easy removal.
 2. Do not use rust-stained steel form-facing material.
- F. Set edge forms, bulkheads, and intermediate screed strips for slabs to achieve required elevations and slopes in finished concrete surfaces. Provide and secure units to support screed strips; use strike-off templates or compacting-type screeds.
- G. Provide temporary openings for cleanouts and inspection ports where interior area of formwork is inaccessible. Close openings with panels tightly fitted to forms and securely braced to prevent loss of concrete mortar. Locate temporary openings in forms at inconspicuous locations.
- H. Provide $\frac{3}{4}$ " chamfer (or as otherwise directed on the drawings) at exterior corners and edges of permanently exposed concrete.
- I. Form openings, chases, offsets, sinkages, keyways, reglets, blocking, screeds, and bulkheads required in the Work. Determine sizes and locations from trades providing such items.

- J. Clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, and other debris just before placing concrete.
- K. Retighten forms and bracing before placing concrete, as required, to prevent mortar leaks and maintain proper alignment.
- L. Coat contact surfaces of forms with form-release agent, according to manufacturer's written instructions, before placing reinforcement.

3.2 EMBEDDED ITEMS

- A. Place and secure anchorage devices and other embedded items required for adjoining work that is attached to or supported by cast-in-place concrete. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
 - 1. Install anchor rods, accurately located, to elevations required and complying with tolerances in Section 7.5 of AISC's "Code of Standard Practice for Steel Buildings and Bridges."
 - 2. Install reglets to receive waterproofing and to receive through-wall flashings in outer face of concrete frame at exterior walls, where flashing is shown at lintels, shelf angles, and other conditions.
 - 3. Install dovetail anchor slots in concrete structures as indicated.

3.3 REMOVING AND REUSING FORMS

- A. General: Formwork for sides of beams, walls, columns, and similar parts of the Work that does not support weight of concrete may be removed after cumulatively curing at not less than 50 deg F for 24 hours after placing concrete. Concrete has to be hard enough to not be damaged by form-removal operations and curing and protection operations need to be maintained.
 - 1. Leave formwork for beam soffits, joists, slabs, and other structural elements that supports weight of concrete in place until concrete has achieved at least 75 percent of its 28-day design compressive strength.
 - 2. Remove forms only if shores have been arranged to permit removal of forms without loosening or disturbing shores.
- B. Clean and repair surfaces of forms to be reused in the Work. Split, frayed, delaminated, or otherwise damaged form-facing material will not be acceptable for exposed surfaces. Apply new form-release agent.
- C. When forms are reused, clean surfaces, remove fins and laitance, and tighten to close joints. Align and secure joints to avoid offsets. Do not use patched forms for exposed concrete surfaces unless approved by Architect.

3.4 SHORES AND RESHORES

- A. Comply with ACI 318 (ACI 318M) and ACI 301 for design, installation, and removal of shoring and reshoring.
 - 1. Do not remove shoring or reshoring until measurement of slab tolerances is complete.
- B.]Plan sequence of removal of shores and reshore to avoid damage to concrete. Locate and provide adequate reshoring to support construction without excessive stress or deflection.

3.5 STEEL REINFORCEMENT

- A. General: Comply with CRSI's "Manual of Standard Practice" for placing reinforcement.
 - 1. Do not cut or puncture vapor retarder. Repair damage and reseal vapor retarder before placing concrete.
- B. Clean reinforcement of loose rust and mill scale, earth, ice, and other foreign materials that would reduce bond to concrete.
- C. Accurately position, support, and secure reinforcement against displacement. Locate and support reinforcement with bar supports to maintain minimum concrete cover. Do not tack weld crossing reinforcing bars.
- D. Set wire ties with ends directed into concrete, not toward exposed concrete surfaces.
- E. Install welded wire reinforcement in longest practicable lengths on bar supports spaced to minimize sagging. Lap edges and ends of adjoining sheets at least one mesh spacing. Offset laps of adjoining sheet widths to prevent continuous laps in either direction. Lace overlaps with wire.

3.6 JOINTS

- A. General: Construct joints true to line with faces perpendicular to surface plane of concrete.
- B. Construction Joints: Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Architect.
 - 1. Place joints perpendicular to main reinforcement. Continue reinforcement across construction joints unless otherwise indicated. Do not continue reinforcement through sides of strip placements of floors and slabs.
 - 2. Form keyed joints as indicated. Embed keys at least 1-1/2 inches into concrete.
 - 3. Use a bonding agent at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.
 - 4. Use epoxy-bonding adhesive at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.

- C. Contraction Joints in Slabs-on-Grade: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to one-fourth of concrete thickness as follows:
 - 1. Grooved Joints: Form contraction joints after initial floating by grooving and finishing each edge of joint to a radius of 1/8 inch. Repeat grooving of contraction joints after applying surface finishes. Eliminate groover tool marks on concrete surfaces.
 - 2. Sawed Joints: Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch-wide joints into concrete when cutting action will not tear, abrade, or otherwise damage surface and before concrete develops random contraction cracks.
- D. Isolation Joints in Slabs-on-Grade: After removing formwork, install joint-filler strips at slab junctions with vertical surfaces, such as column pedestals, foundation walls, grade beams, and other locations, as indicated.
 - 1. Extend joint-filler strips full width and depth of joint, terminating flush with finished concrete surface unless otherwise indicated.
 - 2. Terminate full-width joint-filler strips not less than 1/2 inch or more than 1 inch below finished concrete surface where joint sealants are indicated.
 - 3. Install joint-filler strips in lengths as long as practicable. Where more than one length is required, lace or clip sections together.
- E. Doweled Joints: Install dowel bars and support assemblies at joints where indicated. Lubricate or asphalt coat one-half of dowel length to prevent concrete bonding to one side of joint.

3.7 WATERSTOPS

- A. Flexible Waterstops: Install in construction joints and at other joints indicated to form a continuous diaphragm. Install in longest lengths practicable. Support and protect exposed waterstops during progress of the Work. Field fabricate joints in waterstops according to manufacturer's written instructions.
- B. Self-Expanding Strip Waterstops: Install in construction joints and at other locations indicated, according to manufacturer's written instructions, adhesive bonding, mechanically fastening, and firmly pressing into place. Install in longest lengths practicable.

3.8 CONCRETE PLACEMENT

- A. Before placing concrete, verify that installation of formwork, reinforcement, and embedded items is complete and that required inspections have been performed.
- B. Before test sampling and placing concrete, water may be added at Project site, subject to limitations of ACI 301, up to amount allowed in mix design.

1. Do not add water to concrete after adding high-range water-reducing admixtures to mixture.
- C. Deposit concrete continuously in one layer or in horizontal layers of such thickness that no new concrete will be placed on concrete that has hardened enough to cause seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as indicated. Deposit concrete to avoid segregation.
1. Deposit concrete in horizontal layers of depth to not exceed formwork design pressures and in a manner to avoid inclined construction joints.
 2. Consolidate placed concrete with mechanical vibrating equipment according to ACI 301.
 3. Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations to rapidly penetrate placed layer and at least 6 inches into preceding layer. Do not insert vibrators into lower layers of concrete that have begun to lose plasticity. At each insertion, limit duration of vibration to time necessary to consolidate concrete and complete embedment of reinforcement and other embedded items without causing mixture constituents to segregate.
- D. Deposit and consolidate concrete for floors and slabs in a continuous operation, within limits of construction joints, until placement of a panel or section is complete.
1. Consolidate concrete during placement operations so concrete is thoroughly worked around reinforcement and other embedded items and into corners.
 2. Maintain reinforcement in position on chairs during concrete placement.
 3. Screed slab surfaces with a straightedge and strike off to correct elevations.
 4. Slope surfaces uniformly to drains where required.
 5. Begin initial floating using bull floats or darbies to form a uniform and open-textured surface plane, before excess bleedwater appears on the surface. Do not further disturb slab surfaces before starting finishing operations.
- E. Hot-Weather Placement: Comply with ACI 301 and as follows:
1. Maintain concrete temperature below 90 deg F at time of placement. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.
 2. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade uniformly moist without standing water, soft spots, or dry areas.

3.9 FINISHING FORMED SURFACES

- A. Rough-Formed Finish: As-cast concrete texture imparted by form-facing material with tie holes and defects repaired and patched. Remove fins and other projections that exceed specified limits on formed-surface irregularities.
1. Apply to concrete surfaces not exposed to public view.

- B. Smooth-Formed Finish: As-cast concrete texture imparted by form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams. Repair and patch tie holes and defects. Remove fins and other projections that exceed specified limits on formed-surface irregularities.
 - 1. Apply to concrete surfaces exposed to public view, or as otherwise directed by the Architect.
- C. Rubbed Finish: Apply the following to smooth-formed finished as-cast concrete where indicated:
 - 1. Smooth-Rubbed Finish: Not later than one day after form removal, moisten concrete surfaces and rub with carborundum brick or another abrasive until producing a uniform color and texture. Do not apply cement grout other than that created by the rubbing process.
 - 2. Grout-Cleaned Finish: Wet concrete surfaces and apply grout of a consistency of thick paint to coat surfaces and fill small holes. Mix one part portland cement to one and one-half parts fine sand with a 1:1 mixture of bonding admixture and water. Add white portland cement in amounts determined by trial patches so color of dry grout will match adjacent surfaces. Scrub grout into voids and remove excess grout. When grout whitens, rub surface with clean burlap and keep surface damp by fog spray for at least 36 hours.
 - 3. Cork-Floated Finish: Wet concrete surfaces and apply a stiff grout. Mix one part portland cement and one part fine sand with a 1:1 mixture of bonding agent and water. Add white portland cement in amounts determined by trial patches so color of dry grout will match adjacent surfaces. Compress grout into voids by grinding surface. In a swirling motion, finish surface with a cork float.
- D. Related Unformed Surfaces: At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike off smooth and finish with a texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces unless otherwise indicated.

3.10 MISCELLANEOUS CONCRETE ITEMS

- A. Filling In: Fill in holes and openings left in concrete structures after work of other trades is in place unless otherwise indicated. Mix, place, and cure concrete, as specified, to blend with in-place construction. Provide other miscellaneous concrete filling indicated or required to complete the Work.
- B. Curbs: Provide monolithic finish to interior curbs by stripping forms while concrete is still green and by steel-troweling surfaces to a hard, dense finish with corners, intersections, and terminations slightly rounded.
- C. Equipment Bases and Foundations: Provide machine and equipment bases and foundations as shown on Drawings. Set anchor bolts for machines and equipment at correct elevations, complying with diagrams or templates from manufacturer furnishing machines and equipment.

- D. Steel Pan Stairs: Provide concrete fill for steel pan stair treads, landings, and associated items. Cast-in inserts and accessories as shown on Drawings. Screed, tamp, and trowel finish concrete surfaces.

3.11 CONCRETE PROTECTING AND CURING

- A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and ACI 301 for hot-weather protection during curing.
- B. Evaporation Retarder: Apply evaporation retarder to unformed concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq. ft. x h before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete, but before float finishing.
- C. Formed Surfaces: Cure formed concrete surfaces, including underside of beams, supported slabs, and other similar surfaces. If forms remain during curing period, moist cure after loosening forms. If removing forms before end of curing period, continue curing for the remainder of the curing period.
- D. Unformed Surfaces: Begin curing immediately after finishing concrete. Cure unformed surfaces, including floors and slabs, concrete floor toppings, and other surfaces.
- E. Cure concrete according to ACI 308.1, by one or a combination of the following methods:
 - 1. Moisture Curing: Keep surfaces continuously moist for not less than seven days with the following materials:
 - a. Water.
 - b. Continuous water-fog spray.
 - c. Absorptive cover, water saturated, and kept continuously wet. Cover concrete surfaces and edges with 12-inch lap over adjacent absorptive covers.
 - 2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches, and sealed by waterproof tape or adhesive. Cure for not less than seven days. Immediately repair any holes or tears during curing period using cover material and waterproof tape.
 - a. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive floor coverings.
 - b. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive penetrating liquid floor treatments.
 - c. Cure concrete surfaces to receive floor coverings with either a moisture-retaining cover or a curing compound that the manufacturer certifies will not interfere with bonding of floor covering used on Project.

3. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating and repair damage during curing period.
 - a. Removal: After curing period has elapsed, remove curing compound without damaging concrete surfaces by method recommended by curing compound manufacturer, unless manufacturer certifies in writing that curing compound will not interfere with bonding of floor covering used on this Project.
4. Curing and Sealing Compound: Apply uniformly to floors and slabs indicated in a continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Repeat process 24 hours later and apply a second coat. Maintain continuity of coating and repair damage during curing period.

3.12 JOINT FILLING

- A. Prepare, clean, and install joint filler according to manufacturer's written instructions.
 1. Defer joint filling until concrete has aged at least **[one] [six]** month(s). Do not fill joints until construction traffic has permanently ceased.
- B. Remove dirt, debris, saw cuttings, curing compounds, and sealers from joints; leave contact faces of joint clean and dry.
- C. Install semi-rigid joint filler full depth in saw-cut joints and at least 2 inches deep in formed joints. Overfill joint and trim joint filler flush with top of joint after hardening.

3.13 CONCRETE SURFACE REPAIRS

- A. Defective Concrete: Repair and patch defective areas when approved by Architect. Remove and replace concrete that cannot be repaired and patched to Architect's approval.
- B. Patching Mortar: Mix dry-pack patching mortar, consisting of one part Portland cement to two and one-half parts fine aggregate passing a No. 16 sieve, using only enough water for handling and placing.
- C. Repairing Formed Surfaces: Surface defects include color and texture irregularities, cracks, spalls, air bubbles, honeycombs, rock pockets, fins and other projections on the surface, and stains and other discolorations that cannot be removed by cleaning.
 1. Immediately after form removal, cut out honeycombs, rock pockets, and voids more than 1/2 inch in any dimension to solid concrete. Limit cut depth to 3/4 inch. Make edges of cuts perpendicular to concrete surface. Clean, dampen with water, and brush-coat holes and voids with bonding agent. Fill and compact with patching

- mortar before bonding agent has dried. Fill form-tie voids with patching mortar or cone plugs secured in place with bonding agent.
2. Repair defects on surfaces exposed to view by blending white Portland cement and standard Portland cement so that, when dry, patching mortar will match surrounding color. Patch a test area at inconspicuous locations to verify mixture and color match before proceeding with patching. Compact mortar in place and strike off slightly higher than surrounding surface.
 3. Repair defects on concealed formed surfaces that affect concrete's durability and structural performance as determined by Architect.
- D. Repairing Unformed Surfaces: Test unformed surfaces, such as floors and slabs, for finish and verify surface tolerances specified for each surface. Correct low and high areas. Test surfaces sloped to drain for trueness of slope and smoothness; use a sloped template.
1. Repair finished surfaces containing defects. Surface defects include spalls, popouts, honeycombs, rock pockets, crazing and cracks in excess of 0.01 inch wide or that penetrate to reinforcement or completely through unreinforced sections regardless of width, and other objectionable conditions.
 2. After concrete has cured at least 14 days, correct high areas by grinding.
 3. Correct localized low areas during or immediately after completing surface finishing operations by cutting out low areas and replacing with patching mortar. Finish repaired areas to blend into adjacent concrete.
 4. Correct other low areas scheduled to receive floor coverings with a repair underlayment. Prepare, mix, and apply repair underlayment and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface. Feather edges to match adjacent floor elevations.
 5. Correct other low areas scheduled to remain exposed with a repair topping. Cut out low areas to ensure a minimum repair topping depth of 1/4 inch to match adjacent floor elevations. Prepare, mix, and apply repair topping and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface.
 6. Repair defective areas, except random cracks and single holes 1 inch or less in diameter, by cutting out and replacing with fresh concrete. Remove defective areas with clean, square cuts and expose steel reinforcement with at least a 3/4-inch clearance all around. Dampen concrete surfaces in contact with patching concrete and apply bonding agent. Mix patching concrete of same materials and mixture as original concrete except without coarse aggregate. Place, compact, and finish to blend with adjacent finished concrete. Cure in same manner as adjacent concrete.
 7. Repair random cracks and single holes 1 inch or less in diameter with patching mortar. Groove top of cracks and cut out holes to sound concrete and clean off dust, dirt, and loose particles. Dampen cleaned concrete surfaces and apply bonding agent. Place patching mortar before bonding agent has dried. Compact patching mortar and finish to match adjacent concrete. Keep patched area continuously moist for at least 72 hours.
- E. Perform structural repairs of concrete, subject to Architect's approval, using epoxy adhesive and patching mortar.

- F. Repair materials and installation not specified above may be used, subject to Architect's approval.

3.14 FIELD QUALITY CONTROL

- A. Testing and Inspecting: Owner will engage a special inspector and/or qualified testing and inspecting agency to perform field tests and inspections and prepare test reports.
- B. Inspections:
 - 1. Steel reinforcement placement.
 - 2. Steel reinforcement welding.
 - 3. Headed bolts and studs.
 - 4. Verification of use of required design mixture.
 - 5. Concrete placement, including conveying and depositing.
 - 6. Curing procedures and maintenance of curing temperature.
 - 7. Verification of concrete strength before removal of shores and forms from beams and slabs.
- C. Concrete Tests: Testing of composite samples of fresh concrete obtained according to ASTM C 172 shall be performed according to the following requirements:
 - 1. Testing Frequency: Obtain one composite sample for each day's pour of each concrete mixture exceeding 5 cu. yd., but less than 25 cu. yd., plus one set for each additional 50 cu. yd. or fraction thereof.
 - 2. Testing Frequency: Obtain at least one composite sample for each 100 cu. yd. or fraction thereof of each concrete mixture placed each day.
 - a. When frequency of testing will provide fewer than five compressive-strength tests for each concrete mixture, testing shall be conducted from at least five randomly selected batches or from each batch if fewer than five are used.
 - 3. Slump: ASTM C 143/C 143M; one test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mixture. Perform additional tests when concrete consistency appears to change.
 - 4. Air Content: ASTM C 231, pressure method, for normal-weight concrete; ASTM C 173/C 173M, volumetric method, for structural lightweight concrete; one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
 - 5. Concrete Temperature: ASTM C 1064/C 1064M; one test hourly when air temperature is 40 deg F and below and when 80 deg F and above, and one test for each composite sample.
 - 6. Unit Weight: ASTM C 567, fresh unit weight of structural lightweight concrete; one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
 - 7. Compression Test Specimens: ASTM C 31/C 31M.
 - a. Cast and laboratory cure two sets of two standard cylinder specimens for each composite sample.

- b. Cast and field cure two sets of two standard cylinder specimens for each composite sample.
 - 8. Compressive-Strength Tests: ASTM C 39/C 39M; test one set of two laboratory-cured specimens at 7 days and one set of two specimens at 28 days.
 - a. Test one set of two field-cured specimens at 7 days and one set of two specimens at 28 days.
 - b. A compressive-strength test shall be the average compressive strength from a set of two specimens obtained from same composite sample and tested at age indicated.
 - 9. When strength of field-cured cylinders is less than 85 percent of companion laboratory-cured cylinders, Contractor shall evaluate operations and provide corrective procedures for protecting and curing in-place concrete.
 - 10. Strength of each concrete mixture will be satisfactory if every average of any three consecutive compressive-strength tests equals or exceeds specified compressive strength and no compressive-strength test value falls below specified compressive strength by more than 500 psi.
 - 11. Test results shall be reported in writing to Architect, concrete manufacturer, and Contractor within 48 hours of testing. Reports of compressive-strength tests shall contain Project identification name and number, date of concrete placement, name of concrete testing and inspecting agency, location of concrete batch in Work, design compressive strength at 28 days, concrete mixture proportions and materials, compressive breaking strength, and type of break for both 7- and 28-day tests.
 - 12. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by Architect but will not be used as sole basis for approval or rejection of concrete.
 - 13. Additional Tests: Testing and inspecting agency shall make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by Architect. Testing and inspecting agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C 42/C 42M or by other methods as directed by Architect.
 - 14. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
 - 15. Correct deficiencies in the Work that test reports and inspections indicate do not comply with the Contract Documents.
- D. Measure floor and slab flatness and levelness according to ASTM E 1155 (ASTM E 1155M) within 48 hours of finishing.

END OF SECTION

SECTION 03 3010 - LANDSCAPE CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS: The Drawings, Division 0 and Division 1 apply to work under this Section.

1.2 SUMMARY:

A. Work Included: The work includes, but is not necessarily limited to:

Concrete Seat walls
Concrete Walls
Concrete Stairs and Steps

1.3 QUALITY ASSURANCE:

A. Requirements of Regulatory Agencies:

1. Perform work in accordance with all applicable laws, codes and regulations required by City of College Station, Texas.

B. Reference Standards:

1. American Concrete Institute (ACI):

211.1-77	Recommended Practice for Selecting Proportions for Normal Weight Concrete.
214-77	Recommended Practice for Evaluation of Compressive Test Results of Field Concrete.
305-73	Recommended Practice for Hot Weather Concreting.
306-66	Recommended Practice for Cold Weather Concreting.
347-68	Recommended Practice for Concrete Formwork.

2. American Society for Testing and Materials (ASTM):

A-82-76	Cold Drawn Steel Wire for Concrete Reinforcement.
A185-73	Welded Steel Wire Fabric for Concrete Reinforcement.
A615-78	Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.
C33-78	Concrete Aggregates.
C94-78	Ready Mixed Concrete.
C150-78a	Portland Cement.

- C260-77 Air Entraining Admixtures.
 - C330-77 Lightweight Aggregates for Structural Concrete.
 - C494-79 Chemical Admixtures for Concrete.
 - D1751-73 Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Non-extruding and resilient Bitumens Type).
3. Concrete Reinforcing Steel Institute (CRSI):
- Manual of Standard Practice.
 - Recommended Practice for Placing Reinforcing Bars.

C. Testing Laboratory Services

- 1. Perform all required tests and coordinate all efforts with the designated testing laboratory.
- 2. Cooperate with testing laboratories to permit proper testing and inspection procedures.

1.4 SUBMITTALS:

A. Forms: Submit Data with complete illustrations and/or descriptions for the following:

- 1. Inserts, anchors, sleeves and other embedded items.
- 2. Expansion joint fillers.

B. Cast-In-Place Concrete:

- 1. Mix Designs for Exposed Concrete: (Refer to Section 32 1314 for concrete mix design components/mix for all exposed concrete)
 - a. Prepare individual concrete mix designs for:
 - Each different required concrete strength class.
 - Each different type aggregate.
 - Each different admixture to be used.
 - b. If mix designs are based upon field experience with materials to be used, submit substantiating data at time of submitting mix designs. If suitable field performance data cannot be provided, submit laboratory confirmatory test results upon each proposed mix design. Use only mix designs accepted in writing by Landscape Architect.
 - c. All of the concrete on this project except concrete foundations that are below finished grade is intended to be limestone in color. The mix

design and products for the mix design are described in section 32 1314 and shall be the mix for all exposed concrete described in this section.

2. Product Data: Submit to Landscape Architect:
 - a. Certified mill reports on cements.
 - b. Certified sieve analysis on aggregates.
 - c. Cement manufacturer's name and brand name.
 - d. Manufacturer's name and brand names of materials listed as products of more than one approved manufacturer.
 - e. Vapor Barrier
 - f. Waterproofing admixture
3. Truck Delivery Tickets: Include on each ticket:
 - a. Certification required by ASTM C94.
 - b. Type and brand name of cement.
 - c. Amount of cement, in pounds.
 - d. Total amount of water, in gallons.
 - e. Maximum size aggregate.
- C. Samples: Approved samples shall be the standards for finishes in concrete work.
 1. Concrete walls, and seat walls: Furnish 4' long complete sections with specified finish, expansion joints, architectural jointing, and skateboard deterrents.
 2. Concrete Stairs and steps: Submit sample for any anti-slip devices.
- D. Shop Drawings:
 1. Submit copies of drawings showing concrete construction of walls, caps and rails, including profiles and thickness, details of all lifting devices, joinery details, anchorage, sealing methods, water stops, finishes, location of all joints for all exposed concrete.
 2. Shop Drawings: Submit copies of sub-slab shop drawings indicating expansion joint layout. Layout shall be submitted in conjunction with granite shop drawings. Expansion joints shall align accordingly.

1.5 DELIVERY, STORAGE AND HANDLING:

- A. Store new and reusable form lumber and form plywood under heavy waterproof coverings or where well protected from inclement weather.

- B. Stack oiled form plywood on sticking to permit proper ventilation between uses.
- C. Handle and store metal forms in such manner as to prevent damage by denting, warping, twisting and rusting.
- D. Deliver reinforcing to site in easily handled bundles with identification tags securely wired into place. Store reinforcing to prevent damage and protect from corrosion and deformation.

1.6 GENERAL REQUIREMENTS:

- A. All concrete work shall be true to line and grade as indicated on the drawings. The Contractor shall be responsible for proper drainage, without birdbaths, on all concrete paving surfaces. Any discrepancies or omissions on drawings, or conditions on the site, which prevent this Contractor from providing proper drainage shall be brought to the attention of the Owner in writing for correction or relief before work proceeds.
- B. Do not embed piping, other than electrical conduit, in structural concrete. Locate conduit to maintain strength of structures at maximum. Verify size, length and location of electrical conduit.
- C. Anchor plates, inserts and other items embedded in concrete shall be accurately secured so that they will not be displaced during placing of concrete.
- D. Surface Tolerance: Finished paving surfaces shall not vary more than one-quarter (1/4") inch measured with a ten (10') foot metal straight edge, except at grade changes. No birdbaths or other surface irregularities will be permitted. Correct irregularities as directed.

1.7 ENVIRONMENTAL CONDITIONS:

- A. Observe provisions of ACI-305 when ambient temperature is 90 degrees F. and greater.
- B. Observe provisions of ACI-306 when ambient temperature is 40 degrees F. and less.

1.8 RECORDS: Maintain record of concrete placement, shoring and form removal. Record test cylinder strength used to determine early form removal. Keep record available for Landscape Architect's examination.

1.9 WARRANTY: Furnish written warranty issued by form release agent manufacturer that form release agent shall be non-staining and shall not interfere with applied finishes such as paint, mastic or mortar applied materials.

PART 2 - PRODUCTS

2.1 MIX DESIGN FOR ALL EXPOSED CONCRETE: (Refer to section 32 1314)

- A. The mix design specified in section 32 1313 shall be used for all exposed concrete and shall be provided by the same supplier. All exposed vertical concrete shall be 4000 psi.
- B. Mix design for water feature components (Walls, Basins, etc.) shall include Xypex waterproofing admixture at a rate of 16 pounds per cubic yard.

2.2 MIX DESIGNS FOR FOUNDATIONS & STRUCTURAL CONCRETE: Reference Structural Specifications

2.3 REINFORCING:

- A. Reinforcing Bars: ASTM A615, deformed billet-steel, clean and free from rust, scale, or coating that will reduce bond.
- B. Welded Wire Fabric: Is not acceptable
- C. Cold Drawn Steel Wire: ASTM A82.
- D. Bar Chairs: 16 gauge galvanized steel wire, with three (3") inch X three (3") inch base, or solid plastic of proper sizes and design to properly support and position reinforcing steel.

2.4 METAL DOWELS: ASTM A36.

2.5 EXPANSION JOINT MATERIALS:

- A. Premolded Joint Filler: To be "Sonoflex-F", a closed cell plastic joint filler, as manufactured by Sonneborn-Contech, Building Products Division, Contech, Incorporated, or approved equal.
- B. Joint Sealant: To be "Sonolastic Sealant Two-Part" as manufactured by Sonneborn-Contech, Building Products Division, Contech, Incorporated, or approved equal. Color shall match adjacent concrete work.
- C. All Expansion joints shall ½" thick Redwood or wolmanized pine: Preformed with dowels as provided by Contractors Paving Supply in Stafford, Texas or approved equal.

2.6 CURING MEMBRANE:

- A. The Contractor shall submit a manufacturer of a spray on curing membrane to be used on all exposed concrete surfaces for approval. Conform to ASTM 309.
- B. The Contractor shall select a fugitive color for above.
- C. In lieu of above, the Contractor can submit a plan for slow curing all concrete for approval by the Landscape Architect.

2.7 VAPOR BARRIERS:

- A. Vapor Barrier (Under all slabs) shall comply with ASTM E1745 Class A, maximum WVTR 0.008, minimum 15 mils thick. Include manufacturer's recommended adhesive or pressure-sensitive tape.
- B. Granular Fill: Clean mixture of crushed stone or crushed or uncrushed gravel; ASTM D 448, Size 57, with 100 percent passing a 1-1/2-inch sieve and 0 to 5 percent passing a No. 8 sieve.
- C. Fine-Graded Granular Material: Clean mixture of crushed stone, crushed gravel, and manufactured or natural sand; ASTM D 448, Size 10, with 100 percent passing a 3/8-inch sieve, 10 to 30 percent passing a No. 100 sieve, and at least 5 percent passing No. 200 sieve; complying with deleterious substance limits of ASTM C 33 for fine aggregates.

2.8 WOOD FORMS:

- A. Form Lumber: Number 1 Southern pine or Number 1 Douglas Fir-Larch, surfaced four sides; true and straight members free from cupping, warping, loose knots, excessive checking and other structural defects. Exposed concrete shall have an architecturally smooth finish equal to using masonite on the inside of the formwork.
- B. Moldings and Chamfer Strips: "C-Select" or "Finish" Southern pine, straight, sound, and free of knots and other defects. Moldings and chamfer strips shall be sanded smooth and painted to avoid water absorption during concrete curing time resulting in the same finish as the adjacent form finished concrete.
- C. Used form materials may be reused provided that they are thoroughly cleaned and acceptable finishes can be produced.

2.9 METAL FORMS:

- A. Heavy gauge steel of sufficient strength to prevent undue deflection, properly braced. Use only materials with smooth and regular contact surfaces, free from dents and irregularities that affect regularity and finish surface of concrete.

2.10 FORM-FACING MATERIALS:

- A. General: Comply with Section 033000 "Cast-in-Place Concrete" for formwork and other form-facing material requirements.
- B. **Board-Form-Facing Panels for As-Cast Finishes:** 1 by 6 inch nominal smooth sawn fir planks, offset lengths staggered, nonabsorptive that will provide continuous and true architectural concrete surfaces which exhibit a fine level of wood grain. Match approved mock-up. Leave
- C. Form Joint Tape: Compressible foam tape; pressure sensitive; AAMA 800, "Specification 810.1, Expanded Cellular Glazing Tape"; minimum 1/4 inch thick.
- D. Form Joint Sealant: Elastomeric sealant complying with ASTM C 920, Type M or Type S, Grade NS, that adheres to form joint substrates.

- E. Sealer: Penetrating, clear, polyurethane wood form sealer formulated to reduce absorption of bleed water and prevent migration of set-retarding chemicals from wood.
- F. Form-Release Agent: Commercially formulated, colorless form-release agent that will not bond with, stain, or adversely affect architectural concrete surfaces and will not impair subsequent treatments of those surfaces.
- G. Form Ties: Factory-fabricated, glass-fiber-reinforced plastic ties designed to resist lateral pressure of fresh concrete on forms and to prevent spalling of concrete on removal.
 - 1. Furnish glass-fiber-reinforced plastic ties, 1/2 inch in diameter, of color selected by Architect from manufacturer's full range.
 - 2. Furnish ties with integral water-barrier plates to walls indicated to receive dampproofing or waterproofing.
- H. Waterproofing for Fountain Basins and Walls: Bituthene BIT-017 system for Pools, Fountains, Steps as supplied by Grace.
 - 1. Use Bituthene Liquid Membrane to smooth rough vertical areas.
 - 2. Use Bituthene Deck Prep Surface Treatment to smooth rough deck areas
- H. Waterstops: Superstop Bentonite Waterstop Material as supplied by Tremco.

PART 3 - EXECUTION

3.1 DESIGN OF MIXES AND PROPORTIONING:

- A. Proportioning and mixing of cement, aggregate, admixture and water to attain required plasticity and strength shall be in accordance with ACI-304.
- B. Concrete Mixture: Concrete mixtures shall be designed by an approved commercial testing laboratory at no expense to the Owner, using approved materials furnished by the Contractor to obtain a minimum compressive strength of 4,000 pounds per square inch at 28 days of age and an air content by volume of six (6%) percent plus or minus 1.0 percent. The slump of the concrete shall be not more than four (4") inches.

3.2 SETTING FORMWORK:

- A. Forms shall be constructed accurately to dimensions, plumb and true to line and grade. Forms shall be substantial, mortar tight and braced, and tied so as to maintain position and shape during placing of reinforcing and concrete. Wavy surfaces and bulged walls or slab surfaces resulting from settlement or springing of formwork will not be acceptable.
- B. Do not re-use forms for exposed concrete surfaces. Coat all wood forms with form oil or release agent before pouring. Release agent shall be required on form surfaces where concrete is exposed to view in finished work.

- C. The Contractor shall carefully examine Drawings and provide all recesses and all openings of proper sizes or shapes required or as may be directed by Landscape Architect for installation of all work requiring openings.
- D. Forms shall be constructed and assembled in such a manner that construction joints shall occur at locations, where indicated on the drawings. Forms shall be thoroughly cleaned out before concrete is placed and forms may be removed without damage to concrete.
- D. Forms for exposed concrete that is not specified as "board form finished" shall result in a smooth architectural finish equal to using masonite on the inside of the forms. All joints/seams in formwork shall be filled and sanded to result in a seamless finish.
- E. Board-Form-Facing Panels for As-Cast Finishes: 1 by 6 inch nominal smooth sawn fir planks, offset lengths staggered, nonabsorptive that will provide continuous and true architectural concrete surfaces which exhibit a fine level of wood grain. Match approved mock-up.
- F. Where joints are not indicated on the drawings, the seams in concrete form work shall be filled and sanded to avoid an interruption in the architecturally smooth concrete finish.
- G. Care shall be taken in all details of forming, setting, reinforcing, mixing and placing all concrete exposed in finish work to obtain smooth, even surfaces of dense concrete, and clean sharp inside and outside corners, except where tooled corners are indicated. Use of form oil will be required to prevent concrete from bonding to form. Vibrator shall be used when requested.
- H. Earthforms may be used for footings only where soil is firm and stable and concrete will not be exposed. Excavations shall be cut neat and accurate to size, and all exposed concrete shall be formed with the form extending at least six (6") inches below finish grade. Do not allow earth to dry, keep soil moist if exposed more than twelve (12) hours before pouring concrete.
- I. Forms shall be carefully observed and checked for alignment and level as the work proceeds. All needed adjustment or additional bracing shall be done promptly. Form ties shall be installed in an approved pattern since form tie recesses are a part of the design. Landscape Architect's approval is required.
- J. After forms have been placed and approved, the Contractor shall see that all other trades have been properly notified and are given sufficient time to complete installation of their work. Placing of reinforcing steel shall proceed progressively with work of other trades and each shall arrange their working schedules so as to avoid disturbing or moving of work already installed by one trade to admit the work of another. Each trade shall be entirely responsible for proper installation and securing of the work and each shall keep his work under observation during placing of concrete.
- K. Before pouring footings or foundations, see that bottoms of excavations are undisturbed earth free from water or frost, properly cleaned and leveled off and compacted as requirements of the ACI building code. Do not place on frozen earth, non-compacted fill or dried and cracked excavations.
- L. Forms shall remain in place long enough to allow concrete to set properly and the Contractor shall assume all responsibility for removing same. In no case shall

supporting forms or shoring be removed until concrete has sufficient strength to carry its own weight and the load upon it with safety. (See Curing.)

3.3 VAPOR BARRIER

- A. Plastic Vapor Barriers: Place, protect, and repair vapor barriers according to ASTM E 1643 and manufacturer's written instructions.
 - 1. Lap joints 6 inches and seal with manufacturers recommended tape.
- B. Granular Course: Cover vapor barrier with granular fill, moisten, and compact with mechanical equipment to elevation tolerances of plus 0 inch or minus 3/4 inch.
 - 1. Place and compact a 1/2-inch- thick layer of fine-graded granular material over granular fill.

3.3 PLACING REINFORCEMENT:

- A. Fabricate reinforcing steel in accordance with ACI-318 with tolerances conforming to ACI-301.
- B. Place all reinforcement as shown on drawings. Place accurately and securely fasten and support reinforcement to prevent displacement before or during pouring. Hang footing bars from forms or use suitable reinforcing chairs. Support wire mesh with suitable reinforcing chairs.
- C. Do not heat bars for bending or straightening. Do not tack weld bars.
- D. Clean, bend and place reinforcement in accordance with current requirements of the ACI Manual of Concrete Practice.
- E. Reinforcement Splices:
 - Welded wire fabric - one mesh minimum.
 - Reinforcing bars - 24 bar diameter minimum, except as otherwise noted.

3.4 PLACING CONCRETE:

- A. Concrete shall be deposited so as to require as little rehandling as practicable. All placing equipment shall be clean and free from hardened concrete.
- B. Placing shall be continuous between transverse joints or in individual sections of the work. Spade concrete thoroughly along forms and expansion joints, and work carefully into corners and around reinforcement. Tamp and screed to a dense mass. Vibrators may be used provided they are operated under experienced supervision and forms are constructed to withstand their action.
- C. Convey concrete from mixer to place of final deposit in one continuous operation and until entire unit being placed is complete. Maintain plasticity of concrete to flow readily into formwork and embed reinforcement without segregation of aggregates.

- D. Use chutes of uniform shape and slope controlling concrete fall to not more than three (3') feet.
- E. Place no partially hardened, contaminated or retampered concrete.
- F. Drag vibrators in horizontal position when consolidating thin concrete slabs. Do not use vibrators for concrete distribution.

3.5 FINISHES: Refer to 32 13 14

3.6 JOINTS: Reference Drawings for Locations of each type joint.

- A. Score Joints: Score joints shall be formed in the fresh concrete using a jointer to cut the groove so that a smooth uniform impression is obtained. All joints shall be struck before and after brooming/troweling. Contractor to fabricate special score joint tools as shown on plans.
- B. Expansion Joints and Edging: Expansion joints shall be formed provided at the location and intervals as shown on the plans, and at all locations where concrete paving abuts buildings, curbs, or other structures. Approved joint material shall be placed with top edge one-half (1/2") inch below the paved surface, and shall be securely held in place to prevent movement. Joint and other edges shall be formed in the fresh concrete using an edging tool to provide a smooth uniform impression. All edges shall be struck before and after brooming. After the curing period, expansion joints shall be carefully cleaned and filled with approved joint compound to one-quarter (1/4") inch below paved surface in such a manner as to avoid spilling on paved surfaces or overflow from joint.

3.7 WATERPROOFING: Install in accordance with manufacturers printed instructions.

3.8 CURING AND PROTECTION AND PATCHING

- A. Protect concrete against frost, rapid drying and damage by rain and keep moist for at least seven (7) days after placing. Protect during this period by wet burlap, canvas covering (ASTM 171) or liquid curing compound. Curing by the use of saturated burlap. Sprinkler or membrane where approved shall commence immediately upon completion of finishing. Secure Owner's approval of proposed method. During this period, maintain concrete above 70 degrees F. for at least three (3) days or above 50 degrees F. for at least five (5) days. Concrete from which forms are removed within seven (7) days after pouring shall be sprayed during the curing period as frequently as drying conditions may require. Concrete covering shall be a type that will not stain or discolor finished concrete surfaces. Cure concrete in accordance with requirements of the current ACI Manual of Concrete Practice. Apply a spray on curing compound in accordance with manufacturer's recommendation and as specified herein where allowed.
- B. Protect all concrete work against injury and defacement to walls and steps during subsequent construction operations, and until acceptance by the Owner.
- C. PATCHING:
 - 1. The use of "pavecrete" or other surfacing material will not be permitted.

2. Minor chips (2" X 2") or less which occasionally occur as a result of related construction activities may be patched using approved material.
3. The color and finish of all patches must exactly duplicate the surrounding pavement.
4. Remove any stains or spills on finished concrete work immediately.
5. Upon completion of the work clean all areas.

END OF SECTION

SECTION 042200
CONCRETE UNIT MASONRY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

- 1. Concrete masonry units.
- 2. Mortar and grout.
- 3. Steel reinforcing bars.
- 4. Masonry joint reinforcement.
- 5. Ties and anchors.
- 6. Embedded flashing.

B. Related Sections:

- 1. Section 033000 "Cast-in-Place Concrete" for dovetail slots for masonry anchors.
- 2. Section 051200 "Structural Steel Framing" for installing anchor sections of adjustable masonry anchors for connecting to structural-steel frame.

1.3 DEFINITIONS

- A. CMU(s): Concrete masonry unit(s).
- B. Reinforced Masonry: Masonry containing reinforcing steel in grouted cells.

1.4 PERFORMANCE REQUIREMENTS

- A. Provide structural unit masonry that develops indicated net-area compressive strengths at 28 days.
 - 1. Determine net-area compressive strength of masonry by testing masonry prisms according to ASTM C 1314.

1.5 PRECONSTRUCTION TESTING

- A. Preconstruction Testing Service: Owner will engage a qualified independent testing agency approved by DSA to perform preconstruction testing indicated

below. Retesting of materials that fail to comply with specified requirements shall be done at Contractor's expense.

1. Concrete Masonry Unit Test: For each type of unit required, according to ASTM C 140 for compressive strength.
2. Mortar Test (Property Specification): For each mix required, according to ASTM C 780 for compressive strength.
3. Grout Test (Compressive Strength): For each mix required, according to ASTM C 1019.
4. Prism Test: For each type of construction required, according to ASTM C 1314.

1.6 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: For the following:
 1. Masonry Units: Show sizes, profiles, coursing, and locations of special shapes.
 2. Reinforcing Steel: Detail bending and placement of unit masonry reinforcing bars. Comply with ACI 315, "Details and Detailing of Concrete Reinforcement." Show elevations of reinforced walls.
- C. Samples for Verification: For each type and color of the following:
 1. All types of CMUs specified in the Documents.
 2. All mortars, pigmented and colored-aggregate. Make Samples using same sand and mortar ingredients to be used on Project.
 3. Accessories embedded in masonry.

1.7 INFORMATIONAL SUBMITTALS

- A. List of Materials Used in Constructing Mockups: List generic product names together with manufacturers, manufacturers' product names, model numbers, lot numbers, batch numbers, source of supply, and other information as required to identify materials used. Include mix proportions for mortar and grout and source of aggregates.
 1. Submittal is for information only. Neither receipt of list nor approval of mockup constitutes approval of deviations from the Contract Documents unless such deviations are specifically brought to the attention of Architect and approved in writing.
- B. Qualification Data: For testing agency.
- C. Material Certificates: For each type and size of the following:
 1. Masonry units.

- a. Include data on material properties and material test reports substantiating compliance with requirements.
 - 2. Cementitious materials. Include brand, type, and name of manufacturer.
 - 3. Preblended, dry mortar mixes. Include description of type and proportions of ingredients.
 - 4. Grout mixes. Include description of type and proportions of ingredients.
 - 5. Reinforcing bars.
 - 6. Joint reinforcement.
 - 7. Anchors, ties, and metal accessories.
- D. Mix Designs: For each type of mortar and grout. Include description of type and proportions of ingredients.
- 1. Include test reports for mortar mixes required to comply with property specification. Test according to ASTM C 109/C 109M for compressive strength, ASTM C 1506 for water retention, and ASTM C 91 for air content.
 - 2. Include test reports, according to ASTM C 1019, for grout mixes required to comply with compressive strength requirement.
- E. Cold-Weather and Hot-Weather Procedures: Detailed description of methods, materials, and equipment to be used to comply with requirements.

1.8 QUALITY ASSURANCE

- A. Testing Agency Qualifications: Qualified according to ASTM C 1093 and approved by DSA for testing indicated.
- B. Source Limitations for Masonry Units: Obtain exposed masonry units of a uniform texture and color, or a uniform blend within the ranges accepted for these characteristics, from single source from single manufacturer for each product required.
- C. Source Limitations for Mortar Materials: Obtain mortar ingredients of a uniform quality, including color for exposed masonry, from single manufacturer for each cementitious component and from single source or producer for each aggregate.
- D. Masonry Standard: Comply with TMS 602 unless modified by requirements in the Contract Documents.
- E. Sample Panels: Build sample panels to verify selections made under sample submittals and to demonstrate aesthetic effects. Comply with requirements in Section 014000 "Quality Requirements" for mockups.
 - 1. Build sample panels for each type of exposed unit masonry construction in sizes approximately 48 inches long by 48 inches high by full thickness.
 - 2. Protect approved sample panels from the elements with weather-resistant membrane.

3. Approval of sample panels is for color, texture, and blending of masonry units; relationship of mortar and sealant colors to masonry unit colors; tooling of joints; aesthetic qualities of workmanship; and other material and construction qualities specifically approved by Architect in writing.

a. Approval of sample panels does not constitute approval of deviations from the Contract Documents contained in sample panels unless such deviations are specifically approved by Architect in writing.

F. Pre-installation Conference: Conduct conference at Project site to comply with requirements in Section 013100 "Project Management and Coordination."

1.9 DELIVERY, STORAGE, AND HANDLING

A. Store masonry units on elevated platforms in a dry location. If units are not stored in an enclosed location, cover tops and sides of stacks with waterproof sheeting, securely tied. If units become wet, do not install until they are dry.

B. Store cementitious materials on elevated platforms, under cover, and in a dry location. Do not use cementitious materials that have become damp.

C. Store aggregates where grading and other required characteristics can be maintained and contamination avoided.

D. Deliver pre-blended, dry mortar mix in moisture-resistant containers designed for use with dispensing silos. Store pre-blended, dry mortar mix in delivery containers on elevated platforms, under cover, and in a dry location or in covered weatherproof dispensing silos.

E. Store masonry accessories, including metal items, to prevent corrosion and accumulation of dirt and oil.

1.10 PROJECT CONDITIONS

A. Protection of Masonry: During construction, cover tops of walls, projections, and sills with waterproof sheeting at end of each day's work. Cover partially completed masonry when construction is not in progress.

1. Extend cover a minimum of 24 inches down both sides of walls and hold cover securely in place.

B. Do not apply uniform floor or roof loads for at least 12 hours and concentrated loads for at least three days after building masonry walls or columns.

C. Stain Prevention: Prevent grout, mortar, and soil from staining the face of masonry to be left exposed or painted. Immediately remove grout, mortar, and soil that come in contact with such masonry.

1. Protect base of walls from rain-splashed mud and from mortar splatter by spreading coverings on ground and over wall surface.
 2. Protect sills, ledges, and projections from mortar droppings.
 3. Protect surfaces of window and door frames, as well as similar products with painted and integral finishes, from mortar droppings.
 4. Turn scaffold boards near the wall on edge at the end of each day to prevent rain from splashing mortar and dirt onto completed masonry.
- D. Hot-Weather Requirements: Comply with hot-weather construction requirements contained in TMS 602.

PART 2 - PRODUCTS

2.1 MASONRY UNITS, GENERAL

- A. Defective Units: Referenced masonry unit standards may allow a certain percentage of units to contain chips, cracks, or other defects exceeding limits stated in the standard. Do not use units where such defects will be exposed in the completed Work.
- B. Fire-Resistance Ratings: Where indicated, provide units that comply with requirements for fire-resistance ratings indicated as determined by testing according to ASTM E 119, by equivalent masonry thickness, or by other means, as acceptable to authorities having jurisdiction.

2.2 CONCRETE MASONRY UNITS

- A. Shapes: Provide shapes indicated and as follows, with exposed surfaces matching exposed faces of adjacent units unless otherwise indicated.
1. Provide special shapes for lintels, corners, jambs, sashes, movement joints, headers, bonding, and other special conditions.
 2. Provide square-edged units for outside corners unless otherwise indicated.
- B. CMUs: ASTM C 90.
1. Unit Compressive Strength: Provide units with minimum average net-area compressive strength of 2,500 psi.
 2. Density Classification: Medium weight unless otherwise indicated.
 3. Size (Width): Manufactured to dimensions 3/8 inch less than nominal dimensions.
 4. Exposed Faces: Provide color and texture matching the range represented by Architect's sample.
 5. Faces to Receive Plaster: Where units are indicated to receive a direct application of plaster, provide textured-face units made with gap-graded aggregates.

2.3 LINTELS

- A. Masonry Lintels: Prefabricated or built-in-place masonry lintels made from bond beam CMUs with reinforcing bars placed as indicated and filled with coarse grout. Cure precast lintels before handling and installing. Temporarily support built-in-place lintels until cured.

2.4 MORTAR AND GROUT MATERIALS

- A. Portland Cement: ASTM C 150, Type I or II, except Type III may be used for cold-weather construction. Provide natural color or white cement as required to produce mortar color indicated.
- B. Mortar Cement: ASTM C 1329.
- C. Aggregate for Mortar: ASTM C 144.
 - 1. For mortar that is exposed to view, use washed aggregate consisting of natural sand or crushed stone.
 - 2. For joints less than 1/4 inch thick, use aggregate graded with 100 percent passing the No. 16 sieve.
 - 3. White-Mortar Aggregates: Natural white sand or crushed white stone.
 - 4. Colored-Mortar Aggregates: Natural sand or crushed stone of color necessary to produce required mortar color.
- D. Aggregate for Grout: ASTM C 404.
- E. Water: Potable.

2.5 REINFORCEMENT

- A. Uncoated Steel Reinforcing Bars: ASTM A 615/A 615M

2.6 TIES AND ANCHORS

- A. Materials: Provide ties and anchors specified in this article that are made from materials that comply with the following unless otherwise indicated.
 - 1. Hot-Dip Galvanized, Carbon-Steel Wire: ASTM A 82/A 82M; with ASTM A 153/A 153M, Class B-2 coating.
 - 2. Stainless-Steel Wire: ASTM A 580/A 580M, Type 304 or Type 316.
 - 3. Galvanized Steel Sheet: ASTM A 653/A 653M, Commercial Steel, G60 (Z180) zinc coating.
 - 4. Steel Sheet, Galvanized after Fabrication: ASTM A 1008/A 1008M, Commercial Steel, with ASTM A 153/A 153M, Class B coating.
 - 5. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.

- B. Adjustable Anchors for Connecting to Structural Steel Framing: Provide anchors that allow vertical or horizontal adjustment but resist tension and compression forces perpendicular to plane of wall.
 - 1. Anchor Section for Welding to Steel Frame: Crimped 1/4-inch-diameter, hot-dip galvanized steel wire. Mill-galvanized wire may be used at interior walls unless otherwise indicated.
 - 2. Tie Section: Triangular-shaped wire tie, sized to extend within 1 inch of masonry face, made from 0.187-inch-diameter min., hot-dip galvanized steel wire.

2.7 MISCELLANEOUS ANCHORS

- A. Anchor Bolts: Headed steel bolts complying with ASTM A 307, Grade A (ASTM F 568M, Property Class 4.6); with ASTM A 563 (ASTM A 563M) hex nuts and, where indicated, flat washers; hot-dip galvanized to comply with ASTM A 153/A 153M, Class C; of dimensions indicated.
- B. Post-installed Anchors: Expansion anchors or chemical anchors.
 - 1. Load Capacity: Capable of sustaining, without failure, a load equal to six times the load imposed when installed in unit masonry and four times the load imposed when installed in concrete, as determined by testing according to ASTM E 488, conducted by a qualified independent testing agency.
 - 2. Material for Interior Locations: Carbon-steel components zinc plated to comply with ASTM B 633 or ASTM F 1941 (ASTM F 1941M), Class Fe/Zn 5 unless otherwise indicated.
 - 3. Material for Exterior Locations and Where Stainless Steel Is Indicated: Alloy Group 1 or Group 2 stainless-steel bolts, ASTM F 593 (ASTM F 738M), and nuts, ASTM F 594 (ASTM F 836M).

2.8 MISCELLANEOUS MASONRY ACCESSORIES

- A. Compressible Filler: Premolded filler strips complying with ASTM D 1056, Grade 2A1; compressible up to 35 percent; of width and thickness indicated; formulated from neoprene, urethane or PVC.
- B. Preformed Control-Joint Gaskets: Made from styrene-butadiene-rubber compound, complying with ASTM D 2000, Designation M2AA-805, or PVC, complying with ASTM D 2287, Type PVC-65406 and designed to fit standard sash block and to maintain lateral stability in masonry wall; size and configuration as indicated.
- C. Bond-Breaker Strips: Asphalt-saturated, organic roofing felt complying with ASTM D 226, Type I (No. 15 asphalt felt).
- D. Reinforcing Bar Positioners: Wire units designed to fit into mortar bed joints spanning masonry unit cells and hold reinforcing bars in center of cells. Units are formed from 0.148-inch steel wire, hot-dip galvanized after fabrication. Provide units designed for number of bars indicated.

2.9 MORTAR AND GROUT MIXES

- A. General: Do not use admixtures, including pigments, air-entraining agents, accelerators, retarders, water-repellent agents, antifreeze compounds, or other admixtures unless otherwise indicated.
 - 1. Do not use calcium chloride in mortar or grout.
 - 2. Use Portland cement-lime mortar unless otherwise indicated.
- B. Preblended, Dry Mortar Mix: Furnish dry mortar ingredients in form of a preblended mix. Measure quantities by weight to ensure accurate proportions, and thoroughly blend ingredients before delivering to Project site.
- C. Mortar for Unit Masonry: Type M or S conforming with ASTM C 270.
- D. Grout for Unit Masonry: Comply with ASTM C 476.
 - 1. Use grout of type indicated or, if not otherwise indicated, of type (fine or coarse) that will comply with Table 1.15.1 in TMS 602 for dimensions of grout spaces and pour height.
 - 2. Proportion grout in accordance with ASTM C 476, Table 1 or paragraph 4.2.2 for specified 28-day compressive strength indicated, but not less than 2000 psi.
 - 3. Provide grout with a slump of 8 to 11 inches as measured according to ASTM C 143/C 143M.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
 - 1. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of work.
 - 2. Verify that foundations are within tolerances specified.
 - 3. Verify that reinforcing dowels are properly placed.
- B. Before installation, examine rough-in and built-in construction for piping systems to verify actual locations of piping connections.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL

- A. Build chases and recesses to accommodate items specified in this and other Sections.

- B. Leave openings for equipment to be installed before completing masonry. After installing equipment, complete masonry to match the construction immediately adjacent to opening.
- C. Use full-size units without cutting if possible. If cutting is required to provide a continuous pattern or to fit adjoining construction, cut units with motor-driven saws; provide clean, sharp, unchipped edges. Allow units to dry before laying unless wetting of units is specified. Install cut units with cut surfaces and, where possible, cut edges concealed.

3.3 TOLERANCES

A. Dimensions and Locations of Elements:

- 1. For dimensions in cross section or elevation do not vary by more than plus 1/2 inch or minus 1/4 inch.
- 2. For location of elements in plan do not vary from that indicated by more than plus or minus 1/2 inch.
- 3. For location of elements in elevation do not vary from that indicated by more than plus or minus 1/4 inch in a story height or 1/2 inch total.

B. Lines and Levels:

- 1. For bed joints and top surfaces of bearing walls do not vary from level by more than 1/4 inch in 10 feet, or 1/2 inch maximum.
- 2. For conspicuous horizontal lines, such as lintels, sills, parapets, and reveals, do not vary from level by more than 1/8 inch in 10 feet, 1/4 inch in 20 feet, or 1/2 inch maximum.
- 3. For vertical lines and surfaces do not vary from plumb by more than 1/4 inch in 10, 3/8 inch in 20 feet, or 1/2 inch maximum.
- 4. For conspicuous vertical lines, such as external corners, door jambs, reveals, and expansion and control joints, do not vary from plumb by more than 1/8 inch in 10 feet, 1/4 inch in 20 feet, or 1/2 inch maximum.
- 5. For lines and surfaces do not vary from straight by more than 1/4 inch in 10 feet, 3/8 inch in 20 feet, or 1/2 inch maximum.
- 6. For vertical alignment of exposed head joints, do not vary from plumb by more than 1/4 inch in 10 feet, or 1/2 inch maximum.

C. Joints:

- 1. For bed joints, do not vary from thickness indicated by more than plus or minus 1/8 inch, with a maximum thickness limited to 1/2 inch.
- 2. For exposed bed joints, do not vary from bed-joint thickness of adjacent courses by more than 1/8 inch.
- 3. For head and collar joints, do not vary from thickness indicated by more than plus 3/8 inch or minus 1/4 inch.
- 4. For exposed head joints, do not vary from thickness indicated by more than plus or minus 1/8 inch.

3.4 LAYING MASONRY WALLS

- A. Lay out walls in advance for accurate spacing of surface bond patterns with uniform joint thicknesses and for accurate location of openings, movement-type joints, returns, and offsets. Avoid using less-than-half-size units, particularly at corners, jambs, and, where possible, at other locations.
- B. Bond Pattern for Exposed Masonry: Unless otherwise indicated, lay exposed masonry in running bond; do not use units with less than nominal 4-inch horizontal face dimensions at corners or jambs.
- C. Lay concealed masonry with all units in a wythe in running bond or bonded by lapping not less than 4-inches. Bond and interlock each course of each wythe at corners. Do not use units with less than nominal 4-inch horizontal face dimensions at corners or jambs.
- D. Stopping and Resuming Work: Stop work by racking back units in each course from those in course below; do not tooth. When resuming work, clean masonry surfaces that are to receive mortar before laying fresh masonry.
- E. Built-in Work: As construction progresses, build in items specified in this and other Sections. Fill in solidly with masonry around built-in items.
- F. Fill space between steel frames and masonry solidly with mortar unless otherwise indicated.
- G. Where built-in items are to be embedded in cores of hollow masonry units, place a layer of metal lath, wire mesh, or plastic mesh in the joint below and rod mortar or grout into core.
- H. Fill cores in hollow CMUs with grout 24 inches under bearing plates, beams, lintels, posts, and similar items unless otherwise indicated.
- I. Build non-load-bearing interior partitions full height of story to underside of solid floor or roof structure above unless otherwise indicated.
 - 1. Install compressible filler in joint between top of partition and underside of structure above.
 - 2. Fasten partition top anchors to structure above and build into top of partition. Grout cells of CMUs solidly around plastic tubes of anchors and push tubes down into grout to provide 1/2-inch clearance between end of anchor rod and end of tube. Space anchors 48 inches maximum o.c. unless otherwise indicated.
 - 3. Wedge non-load-bearing partitions against structure above with small pieces of tile, slate, or metal. Fill joint with mortar after dead-load deflection of structure above approaches final position.
 - 4. At fire-rated partitions, treat joint between top of partition and underside of structure above to comply with Section 078446 "Fire-Resistive Joint Systems."

3.5 MORTAR BEDDING AND JOINTING

- A. Lay solid masonry units with completely filled bed and head joints; butter ends with sufficient mortar to fill head joints and shove into place. Do not deeply furrow bed joints or slush head joints.
- B. Set cast-stone trim units in full bed of mortar with full vertical joints. Fill dowel, anchor, and similar holes.
 - 1. Clean soiled surfaces with fiber brush and soap powder and rinse thoroughly with clear water.
 - 2. Allow cleaned surfaces to dry before setting.
 - 3. Wet joint surfaces thoroughly before applying mortar.
- C. Tool exposed joints slightly concave when thumbprint hard, using a jointer larger than joint thickness unless otherwise indicated.
- D. Cut joints flush for masonry walls to receive plaster or other direct-applied finishes (other than paint) unless otherwise indicated.

3.6 ANCHORING MASONRY TO STRUCTURAL STEEL AND CONCRETE

- A. Anchor masonry to structural steel and concrete where masonry abuts or faces structural steel or concrete to comply with the following:
 - 1. Provide an open space not less than 1/2 inch wide between masonry and structural steel or concrete unless otherwise indicated. Keep open space free of mortar and other rigid materials.
 - 2. Anchor masonry with anchors embedded in masonry joints and attached to structure.
 - 3. Space anchors as indicated, but not more than 24 inches o.c. vertically and 36 inches o.c. horizontally.

3.7 CONTROL AND EXPANSION JOINTS

- A. General: Install control and expansion joint materials in unit masonry as masonry progresses. Do not allow materials to span control and expansion joints without provision to allow for in-plane wall or partition movement.
- B. Form control joints in concrete masonry using one of the following methods:
 - 1. Fit bond-breaker strips into hollow contour in ends of CMUs on one side of control joint. Fill resultant core with grout and rake out joints in exposed faces for application of sealant.
 - 2. Install preformed control-joint gaskets designed to fit standard sash block.
 - 3. Install interlocking units designed for control joints. Install bond-breaker strips at joint. Keep head joints free and clear of mortar or rake out joint for application of sealant.

4. Install temporary foam-plastic filler in head joints and remove filler when unit masonry is complete for application of sealant.

3.8 LINTELS

- A. Provide concrete or masonry lintels where shown and where openings of more than 12 inches for brick-size units and 24 inches for block-size units are shown without structural steel or other supporting lintels.
- B. Provide minimum bearing of 8 inches at each jamb unless otherwise indicated.

3.9 FLASHING

- A. General: Install embedded flashing in masonry at lintels, ledges, other obstructions to downward flow of water in wall, and where indicated.
- B. Install flashing as follows unless otherwise indicated:
 1. Prepare masonry surfaces so they are smooth and free from projections that could puncture flashing. Where flashing is within mortar joint, place through-wall flashing on sloping bed of mortar and cover with mortar. Before covering with mortar, seal penetrations in flashing with adhesive, sealant, or tape as recommended by flashing manufacturer.
 2. At lintels, extend flashing a minimum of 6 inches into masonry at each end. At heads and sills, extend flashing 6 inches at ends and turn up not less than 2 inches to form end dams.
 3. Interlock end joints of ribbed sheet metal flashing by overlapping ribs not less than 1-1/2 inches or as recommended by flashing manufacturer, and seal lap with elastomeric sealant complying with requirements in Section 079200 "Joint Sealants" for application indicated.
 4. Install metal drip edges and sealant stops with ribbed sheet metal flashing by interlocking hemmed edges to form hooked seam. Seal seam with elastomeric sealant complying with requirements in Section 079200 "Joint Sealants" for application indicated.
 5. Install metal drip edges beneath flexible flashing at exterior face of wall. Stop flexible flashing 1/2 inch back from outside face of wall and adhere flexible flashing to top of metal drip edge.
 6. Install metal flashing termination beneath flexible flashing at exterior face of wall. Stop flexible flashing 1/2 inch back from outside face of wall and adhere flexible flashing to top of metal flashing termination.
 7. Cut flexible flashing off flush with face of wall after masonry wall construction is completed.
- C. Install single-wythe CMU flashing system in bed joints of CMU walls where indicated to comply with manufacturer's written instructions. Install CMU cell pans with upturned edges located below face shells and webs of CMUs above and with weep spouts aligned with face of wall. Install CMU web covers so that they cover upturned edges of CMU cell pans at CMU webs and extend from face shell to face shell.

- D. Install reglets and nailers for flashing and other related construction where they are shown to be built into masonry.

3.10 REINFORCED UNIT MASONRY INSTALLATION

- A. Temporary Formwork and Shores: Construct formwork and shores as needed to support reinforced masonry elements during construction.
 - 1. Construct formwork to provide shape, line, and dimensions of completed masonry as indicated. Make forms sufficiently tight to prevent leakage of mortar and grout. Brace, tie, and support forms to maintain position and shape during construction and curing of reinforced masonry.
 - 2. Do not remove forms and shores until reinforced masonry members have hardened sufficiently to carry their own weight and other loads that may be placed on them during construction.
- B. Placing Reinforcement: Comply with requirements in TMS 602.
- C. Grouting: Do not place grout until entire height of masonry to be grouted has attained enough strength to resist grout pressure.
 - 1. Comply with requirements in TMS 602 for cleanouts and for grout placement, including minimum grout space and maximum pour height.
 - 2. Limit height of vertical grout pours to not more than 60 inches.

3.11 FIELD QUALITY CONTROL

- A. Testing and Inspecting: Owner will engage special inspectors to perform tests and inspections and prepare reports. Allow inspectors access to scaffolding and work areas, as needed to perform tests and inspections. Retesting of materials that fail to meet specified requirements shall be done at Contractor's expense.
- B. Inspections: Level 2 special inspections according to the "California Building Code."
 - 1. Begin masonry construction only after inspectors have verified proportions of site-prepared mortar.
 - 2. Place grout only after inspectors have verified compliance of grout spaces and of grades, sizes, and locations of reinforcement.
 - 3. Place grout only after inspectors have verified proportions of site-prepared grout.
- C. Testing Prior to Construction: One set of tests.
- D. Testing Frequency: One set of tests for each 5000 sq. ft. of wall area or portion thereof.
- E. Concrete Masonry Unit Test: For each type of unit provided, according to ASTM C 140 for compressive strength.

- F. Mortar Aggregate Ratio Test (Proportion Specification): For each mix provided, according to ASTM C 780.
- G. Mortar Test (Property Specification): For each mix provided, according to ASTM C 780. Test mortar for mortar air content and compressive strength.
- H. Grout Test (Compressive Strength): For each mix provided, according to ASTM C 1019.
- I. Prism Test: For each type of construction provided, according to ASTM C 1314 at 7 days and at 28 days.

3.12 PARGING

- A. Parge exterior faces of below-grade masonry walls, where indicated, in 2 uniform coats to a total thickness of 3/4 inch. Dampen wall before applying first coat and scarify first coat to ensure full bond to subsequent coat.
- B. Use a steel-trowel finish to produce a smooth, flat, dense surface with a maximum surface variation of 1/8 inch per foot. Form a wash at top of parging and a cove at bottom.
- C. Damp-cure parging for at least 24 hours and protect parging until cured.

3.13 REPAIRING, POINTING, AND CLEANING

- A. Remove and replace masonry units that are loose, chipped, broken, stained, or otherwise damaged or that do not match adjoining units. Install new units to match adjoining units; install in fresh mortar, pointed to eliminate evidence of replacement.
- B. Pointing: During the tooling of joints, enlarge voids and holes, except weep holes, and completely fill with mortar. Point up joints, including corners, openings, and adjacent construction, to provide a neat, uniform appearance. Prepare joints for sealant application, where indicated.
- C. In-Progress Cleaning: Clean unit masonry as work progresses by dry brushing to remove mortar fins and smears before tooling joints.
- D. Final Cleaning: After mortar is thoroughly set and cured, clean exposed masonry as follows:
 - 1. Remove large mortar particles by hand with wooden paddles and nonmetallic scrape hoes or chisels.
 - 2. Test cleaning methods on sample wall panel; leave one-half of panel uncleaned for comparison purposes. Obtain Architect's approval of sample cleaning before proceeding with cleaning of masonry.

3. Protect adjacent stone and non-masonry surfaces from contact with cleaner by covering them with liquid strippable masking agent or polyethylene film and waterproof masking tape.
4. Wet wall surfaces with water before applying cleaners; remove cleaners promptly by rinsing surfaces thoroughly with clear water.
5. Clean concrete masonry by cleaning method indicated in NCMA TEK 8-2A applicable to type of stain on exposed surfaces.

3.14 MASONRY WASTE DISPOSAL

- A. Salvageable Materials: Unless otherwise indicated, excess masonry materials are Contractor's property. At completion of unit masonry work, remove from Project site.
- B. Waste Disposal as Fill Material: Dispose of clean masonry waste, including excess or soil-contaminated sand, waste mortar, and broken masonry units, by crushing and mixing with fill material as fill is placed.
 1. Crush masonry waste to less than 4 inches in each dimension.
 2. Mix masonry waste with at least two parts of specified fill material for each part of masonry waste. Fill material is specified in Section 312000 "Earth Moving."
 3. Do not dispose of masonry waste as fill within 18 inches of finished grade.
- C. Excess Masonry Waste: Remove excess clean masonry waste that cannot be used as fill, as described above, and other masonry waste, and legally dispose of off Owner's property.

END OF SECTION

SECTION 05 12 00

STRUCTURAL STEEL FRAMING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:

- 1. Structural steel.
- 2. Grout.

- B. Related Sections:

- 1. Section 053100 "Steel Decking" for field installation of shear connectors through deck.

1.3 DEFINITIONS

- A. Structural Steel: Elements of structural-steel frame, as classified by AISC 303, "Code of Standard Practice for Steel Buildings and Bridges."
- B. Seismic-Load-Resisting System: Elements of structural-steel frame designated as "SLRS" or along grid lines designated as "SLRS" on Drawings, including columns, beams, and braces and their connections.
- C. Heavy Sections: Rolled and built-up sections as follows:
 - 1. Shapes included in ASTM A 6/A 6M with flanges thicker than 1-1/2 inches.
 - 2. Welded built-up members with plates thicker than 2 inches.
 - 3. Column base plates thicker than 2 inches).

1.4 PERFORMANCE REQUIREMENTS

- A. Connections: As detailed on the drawings. Contractor has no connection design responsibilities.
- B. Moment Connections: Type FR, fully restrained as detailed on the drawings.

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.

Shop Drawings: Show fabrication of structural-steel components.

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.
 4. Indicate type, size, and length of bolts, distinguishing between shop and field bolts. Identify pretensioned and slip-critical high-strength bolted connections.
- B. Welding Procedure Specifications (WPSs) and Procedure Qualification Records (PQRs): Provide according to AWS D1.1/D1.1M, "Structural Welding Code - Steel," for each welded joint whether prequalified or qualified by testing, including the following:
1. Power source (constant current or constant voltage).
 2. Electrode manufacturer and trade name.

1.6 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For qualified Contractor, Installer and Fabricator.
- B. Welding certificates.
- C. Paint Compatibility Certificates: From manufacturers of topcoats applied over shop primers, certifying that shop primers are compatible with topcoats.
- D. Mill test reports for structural steel, including chemical and physical properties.
- E. Product Test Reports: For the following:
1. Bolts, nuts, and washers including mechanical properties and chemical analysis.
 2. Direct-tension indicators.
 3. Tension-control, high-strength bolt-nut-washer assemblies.
 4. Shear stud connectors.
 5. Shop primers.
 6. Nonshrink grout.
- F. Source quality-control reports.

1.7 QUALITY ASSURANCE

- A. Shop-Painting Applicators: Qualified according to AISC's Sophisticated Paint Endorsement P1 or SSPC-QP 3, "Standard Procedure for Evaluating Qualifications of Shop Painting Applicators."
- B. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."
1. Welders and welding operators performing work on bottom-flange, demand-critical welds shall pass the supplemental welder qualification testing, as required by AWS D1.8. FCAW-S and FCAW-G shall be considered separate processes for welding personnel qualification.
- C. Comply with applicable provisions of the following specifications and documents:
1. AISC 303.
 2. AISC 341.

3. AISC 360.
4. RCSC's "Specification for Structural Joints Using High-Strength Bolts."

D. Pre-installation Conference: Conduct conference at Project site.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. 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.
- B. Store fasteners in a protected place in sealed containers with manufacturer's labels intact.
1. Fasteners may be repackaged provided Owner's testing and inspecting agency observes repackaging and seals containers.
 2. Clean and relubricate bolts and nuts that become dry or rusty before use.
 3. Comply with manufacturers' written recommendations for cleaning and lubricating ASTM F 1852 fasteners and for retesting fasteners after lubrication.

1.9 COORDINATION

- A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' recommendations to ensure that shop primers and topcoats are compatible with one another.
- B. Coordinate installation of anchorage items to be embedded in or attached to other construction without delaying the Work. Provide setting diagrams, sheet metal templates, instructions, and directions for installation.

PART 2 - PRODUCTS

2.1 STRUCTURAL-STEEL MATERIALS

- A. W-Shapes: ASTM A 992/A (Fy = 50 ksi; Fu = 65 ksi).
- B. Channels, Angles, M-Shapes: ASTM A 36/A 36M (Fy = 36 ksi; Fu = 58 ksi).
- C. Plate and Bar: ASTM A 36/A 36M (Fy = 36 ksi; Fu = 58 ksi).
- D. Cold-Formed Hollow Structural Sections, Rectangular and Square: ASTM A 500, Grade B (Fy = 46 ksi; Fu = 58 ksi).
- E. Cold-Formed Hollow Structural Sections, Round: ASTM A 500, Grade B (Fy = 42 ksi; Fu = 58 ksi).
- F. Steel Pipe: ASTM A 53/A 53M, Type E or S, Grade B.
1. Weight Class: As shown on the drawings.
 2. Finish: Black except where indicated to be galvanized.

- G. Welding Electrodes: Comply with AWS requirements.

2.2 BOLTS, CONNECTORS, AND ANCHORS

- A. High-Strength Bolts, Nuts, and Washers: ASTM F3125, Grade A325, Type 1, heavy-hex steel structural bolts; ASTM A 563, Grade C, (ASTM A 563M, Class 8S) heavy-hex carbon-steel nuts; and ASTM F 436 (ASTM F 436M), Type 1, hardened carbon-steel washers; all with plain finish.
 - 1. Direct-Tension Indicators: ASTM F 959, Type 325 (ASTM F 959M, Type 8.8), compressible-washer type with plain finish.
- B. Headed Anchor Rods: ASTM F 1554, Grade 36, straight.
 - 1. Nuts: ASTM A 563 (ASTM A 563M) heavy-hex carbon steel.
 - 2. Plate Washers: ASTM A 36/A 36M carbon steel.
 - 3. Washers: ASTM F 436 (ASTM F 436M), Type 1, hardened carbon steel.
 - 4. Finish: Plain, unless galvanization is required per the Documents; provide mechanically deposited zinc coating, ASTM B 695, Class 50.
- C. Threaded Rods: ASTM A 36/A 36M.
 - 1. Nuts: ASTM A 563 (ASTM A 563M) heavy-hex carbon steel.
 - 2. Washers: ASTM F 436 (ASTM F 436M), Type 1, hardened carbon steel.
 - 3. Finish: Plain, unless galvanization is required per the drawings; mechanically deposited zinc coating, ASTM B 695, Class 50.

2.3 PRIMER

- A. Low-Emitting Materials: Paints and coatings shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
- B. Primer: Fabricator's standard lead- and chromate-free, nonasphaltic, rust-inhibiting primer complying with MPI#79 and compatible with topcoat.
- C. Galvanizing Repair Paint: MPI#18, MPI#19, or SSPC-Paint 20, ASTM A 780.

2.4 GROUT

- A. Metallic, Shrinkage-Resistant Grout: ASTM C 1107, factory-packaged, metallic aggregate grout, mixed with water to consistency suitable for application and a 30-minute working time.
- B. Nonmetallic, Shrinkage-Resistant Grout: ASTM C 1107, factory-packaged, nonmetallic aggregate grout, noncorrosive and nonstaining, mixed with water to consistency suitable for application and a 30-minute working time.

2.5 FABRICATION

- A. Structural Steel: Fabricate and assemble in shop to greatest extent possible. Fabricate according to AISC's "Code of Standard Practice for Steel Buildings and Bridges" and AISC 360.
 - 1. Camber structural-steel members where indicated.

2. Fabricate beams with rolling camber up.
 3. Identify high-strength structural steel according to ASTM A 6/A 6M and maintain markings until structural steel has been erected.
 4. Mark and match-mark materials for field assembly.
 5. Complete structural-steel assemblies, including welding of units, before starting shop-priming operations.
- B. Thermal Cutting: Perform thermal cutting by machine to greatest extent possible.
1. Plane thermally cut edges to be welded to comply with requirements in AWS D1.1/D1.1M.
- C. Bolt Holes: Cut, drill, or punch standard bolt holes perpendicular to metal surfaces.
- D. Finishing: Accurately finish ends of columns and other members transmitting bearing loads.
- E. Cleaning: Clean and prepare steel surfaces that are to remain unpainted according to SSPC-SP 1, "Solvent Cleaning, or SSPC-SP 2, "Hand Tool Cleaning, or SSPC-SP 3, "Power Tool Cleaning."
- F. Holes: Provide holes required for securing other work to structural steel and for other work to pass through steel framing members.
1. Cut, drill, or punch holes perpendicular to steel surfaces. Do not thermally cut bolt holes or enlarge holes by burning.
 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.

2.6 SHOP CONNECTIONS

- A. High-Strength Bolts: Shop install high-strength bolts according to RCSC's "Specification for Structural Joints Using High-Strength Bolts" as shown on the drawings for type of bolt and type of joint specified.
1. Joint Type: As shown on the drawings as snug tightened, pretensioned or slip critical.
- B. Weld Connections: Comply with AWS D1.1/D1.1M and AWS D1.8/D1.8M for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work.
1. Assemble and weld built-up sections by methods that will maintain true alignment of axes without exceeding tolerances in AISC 303 for mill material.

2.7 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.
 3. Surfaces to be high-strength bolted with slip-critical connections.
 4. Surfaces to receive sprayed fire-resistive materials (applied fireproofing).
 5. Galvanized surfaces.
- B. Surface Preparation: Clean surfaces to be painted. Remove loose rust and mill scale and spatter, slag, or flux deposits. Prepare surfaces according to the following specifications and standards:
1. SSPC-SP 2, "Hand Tool Cleaning."

2. SSPC-SP 3, "Power Tool Cleaning."
3. SSPC-SP 7/NACE No. 4, "Brush-Off Blast Cleaning."
4. SSPC-SP 11, "Power Tool Cleaning to Bare Metal."
5. SSPC-SP 14/NACE No. 8, "Industrial Blast Cleaning."
6. SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
7. SSPC-SP 10/NACE No. 2, "Near-White Blast Cleaning."
8. SSPC-SP 5/NACE No. 1, "White Metal Blast Cleaning."
9. SSPC-SP 8, "Pickling."

- 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.
- D. Painting: Prepare steel and apply a one-coat, nonasphaltic primer complying with SSPC-PS Guide 7.00, "Painting System Guide 7.00: Guide for Selecting One-Coat Shop Painting Systems," to provide a dry film thickness of not less than 1.5 mils.

2.8 GALVANIZING

- A. Hot-Dip Galvanized Finish: Apply zinc coating by the hot-dip process to structural steel according to ASTM A 123/A 123M.
1. Fill vent and drain holes that will be exposed in the finished Work unless they will function as weep holes, by plugging with zinc solder and filing off smooth.
 2. Galvanize lintels, shelf angles and welded door frames attached to structural-steel frame and located in exterior walls.

2.9 SOURCE QUALITY CONTROL

- A. Testing Agency: Owner will engage an independent testing and inspecting agency to perform shop tests and inspections and prepare test reports.
1. Provide testing agency with access to places where structural-steel work is being fabricated or produced to perform tests and inspections.
- B. Correct deficiencies in Work that test reports and inspections indicate does not comply with the Contract Documents.
- C. Bolted Connections: Shop-bolted connections will be tested and inspected by Owner-retained entity according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."
- D. Welded Connections: In addition to visual inspection, shop-welded connections will be tested and inspected according to AWS D1.1/D1.1M and the following inspection procedures, at testing agency's option:
1. Liquid Penetrant Inspection: ASTM E 165.
 2. Magnetic Particle Inspection: ASTM E 709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration will not be accepted.
 3. Ultrasonic Inspection: ASTM E 164.
 4. Radiographic Inspection: ASTM E 94.

PART 3 - EXECUTION

3.1 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. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Provide temporary shores, guys, braces, and other supports during erection to keep structural steel secure, plumb, and in alignment against temporary construction loads and loads equal in intensity to design loads. Remove temporary supports when permanent structural steel, connections, and bracing are in place unless otherwise indicated.
 - 1. Do not remove temporary shoring supporting composite deck construction until cast-in-place concrete has attained its design compressive strength.

3.3 ERECTION

- A. Set structural steel accurately in locations and to elevations indicated and according to AISC 303 and AISC 360.
- B. Base Plates: Clean concrete- and masonry-bearing surfaces of bond-reducing materials, and roughen surfaces prior to setting plates. Clean bottom surface of plates.
 - 1. Set plates for structural members on wedges, shims, or setting nuts as required.
 - 2. Weld plate washers to top of baseplate.
 - 3. Snug-tighten anchor rods after supported members have been positioned and plumbed. Do not remove wedges or shims but, if protruding, cut off flush with edge of plate before packing with grout.
 - 4. Promptly pack grout solidly between bearing surfaces and plates so no voids remain. Neatly finish exposed surfaces; protect grout and allow to cure. Comply with manufacturer's written installation instructions.
- C. Maintain erection tolerances of structural steel within AISC's "Code of Standard Practice for Steel Buildings and Bridges."
- D. Align and adjust various members that form part of complete frame or structure before permanently fastening. Before assembly, clean bearing surfaces and other surfaces that will be in permanent contact with members. Perform necessary adjustments to compensate for discrepancies in elevations and alignment.
 - 1. Level and plumb individual members of structure.
 - 2. Make allowances for difference between temperature at time of erection and mean temperature when structure is completed and in service.
- E. Splice members only where indicated.

- F. Do not use thermal cutting during erection unless approved by Engineer. Finish thermally cut sections within smoothness limits in AWS D1.1/D1.1M.
- G. Do not enlarge unfair holes in members by burning or using drift pins. Ream holes that must be enlarged to admit bolts.

3.4 FIELD CONNECTIONS

- A. High-Strength Bolts: Install high-strength bolts according to RCSC's "Specification for Structural Joints Using High-Strength Bolts" for type of bolt and type of joint specified.
 - 1. Joint Type: Snug tightened, pretensioned or slip critical as shown on the drawings.
- B. Weld Connections: Comply with AWS D1.1/D1.1M and AWS D1.8/D1.8M for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work.
 - 1. Comply with AISC 303 and AISC 360 for bearing, alignment, adequacy of temporary connections, and removal of paint on surfaces adjacent to field welds.
 - 2. Remove backing bars or runoff tabs where indicated or allowed, back gouge, and grind steel smooth.
 - 3. Assemble and weld built-up sections by methods that will maintain true alignment of axes without exceeding tolerances in AISC's "Code of Standard Practice for Steel Buildings and Bridges" for mill material.

3.5 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified independent testing and inspecting agency to inspect field welds and high-strength bolted connections.
- B. Bolted Connections: Bolted connections will be tested and inspected according to RCSC's "Specification for Structural Joints Using High-Strength Bolts."
- C. Welded Connections: Field welds will be visually inspected according to AWS D1.1/D1.1M.
 - 1. In addition to visual inspection, field welds will be tested and inspected according to AWS D1.1/D1.1M and the following inspection procedures, at testing agency's option:
 - a. Liquid Penetrant Inspection: ASTM E 165.
 - b. Magnetic Particle Inspection: ASTM E 709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration will not be accepted.
 - c. Ultrasonic Inspection: ASTM E 164.
 - d. Radiographic Inspection: ASTM E 94.
- D. Correct deficiencies in Work that test reports and inspections indicate does not comply with the Contract Documents.

3.6 REPAIRS AND PROTECTION

- A. Galvanized Surfaces: Clean areas where galvanizing is damaged or missing and repair galvanizing to comply with ASTM A 780.

- B. Touchup Painting: Immediately after erection, clean exposed areas where primer is damaged or missing and paint 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.

END OF SECTION 051200

SECTION 053100

STEEL DECKING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Roof deck.
- B. Related Requirements:
 - 1. Section 051200 "Structural Steel Framing" for shop- and field-welded shear connectors.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of deck, accessory, and product indicated.
- B. Shop Drawings:
 - 1. Include layout and types of deck panels, anchorage details, reinforcing channels, pans, cut deck openings, special jointing, accessories, and attachments to other construction.

1.4 INFORMATIONAL SUBMITTALS

- A. Welding certificates.
- B. Product Certificates: For each type of steel deck.
- C. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, indicating that each of the following complies with requirements:
 - 1. Power-actuated mechanical fasteners.
 - 2. Acoustical roof deck.

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- D. Evaluation Reports: For steel deck.
- E. Field quality-control reports.

1.5 QUALITY ASSURANCE

- A. Testing Agency Qualifications: Qualified according to ASTM E 329 for testing indicated.
- B. Welding Qualifications: Qualify procedures and personnel according to AWS D1.3, "Structural Welding Code - Sheet Steel."
- C. FM Global Listing: Provide steel roof deck evaluated by FM Global and listed in its "Approval Guide, Building Materials" for Class 1 fire rating and Class 1-90 windstorm ratings.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Protect steel deck from corrosion, deformation, and other damage during delivery, storage, and handling.
- B. Stack steel deck on platforms or pallets and slope to provide drainage. Protect with a waterproof covering and ventilate to avoid condensation.
 - 1. Protect and ventilate acoustical cellular roof deck with factory-installed insulation to maintain insulation free of moisture.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. AISI Specifications: Comply with calculated structural characteristics of steel deck according to AISI's "North American Specification for the Design of Cold-Formed Steel Structural Members."
- B. Fire-Resistance Ratings: Comply with ASTM E 119; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 - 1. Indicate design designations from UL's "Fire Resistance Directory" or from the listings of another qualified testing agency.
- C. Low-Emitting Materials: Paints and coatings shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

2.2 ROOF DECK

- A. Roof Deck: Example manufacturers may be listed on the drawings. Use the listed manufacturers or approved equal in accordance with these requirements. Fabricate panels, without top-flange stiffening grooves, to comply with "SDI Specifications and Commentary for Steel Roof Deck," in SDI Publication No. 31, and with the following:
1. Prime-Painted Steel Sheet: ASTM A 1008/A 1008M, Structural Steel (SS), Grade 33 minimum, shop primed with manufacturer's standard baked-on, rust-inhibitive primer.
 2. Galvanized-Steel Sheet: ASTM A 653/A 653M, Structural Steel (SS), Grade 33, G60 zinc coating.
 3. Galvanized and Shop-Primed Steel Sheet: ASTM A 653/A 653M, Structural Steel (SS), Grade 33, G60 zinc coating; cleaned, pretreated, and primed with manufacturer's standard baked-on, rust-inhibitive primer.
 4. Aluminum-Zinc-Alloy-Coated Steel Sheet: ASTM A 792/A 792M, Structural Steel (SS), Grade 33 minimum, AZ50 aluminum-zinc-alloy coating.
 5. Deck Profile: As indicated on the drawings.
 6. Cellular Deck Profile: As indicated on the drawings, with bottom plate.
 7. Profile Depth: As indicated on the drawings.
 8. Design Uncoated-Steel Thickness: As indicated on the drawings.
 9. Design Uncoated-Steel Thicknesses; Deck Unit/Bottom Plate: As indicated on the drawings.
 10. Span Condition: As indicated on the drawings.
 11. Side Laps: Unless noted otherwise on the drawings, overlapped or interlocking seam at Contractor's option.

2.3 ACCESSORIES

- A. General: Provide manufacturer's standard accessory materials for deck that comply with requirements indicated.
- B. Mechanical Fasteners: Corrosion-resistant, low-velocity, power-actuated or pneumatically driven carbon-steel fasteners; or self-drilling, self-threading screws.
- C. Side-Lap Fasteners: Corrosion-resistant, hexagonal washer head; self-drilling, carbon-steel screws, No. 10 minimum diameter.
- D. Flexible Closure Strips: Vulcanized, closed-cell, synthetic rubber.
- E. Miscellaneous Sheet Metal Deck Accessories: Steel sheet, minimum yield strength of 33,000 psi, not less than 0.0359-inch design uncoated thickness, of same material and finish as deck; of profile indicated or required for application.
- F. Pour Stops and Girder Fillers: Steel sheet, minimum yield strength of 33,000 psi, of same material and finish as deck, and of thickness and profile recommended by SDI Publication No. 31 for overhang and slab depth.

- G. Weld Washers: Uncoated steel sheet, shaped to fit deck rib, 0.0747 inch thick, with factory-punched hole of 3/8-inch minimum diameter.
- H. Flat Sump Plates: Single-piece steel sheet, 0.0747 inch thick, of same material and finish as deck. For drains, cut holes in the field.
- I. Recessed Sump Pans: Single-piece steel sheet, 0.0747 inch thick, of same material and finish as deck, with 3-inch-wide flanges and sloped recessed pans of 1-1/2-inch minimum depth. For drains, cut holes in the field.
- J. Galvanizing Repair Paint: ASTM A 780, SSPC-Paint 20, or MIL-P-21035B, with dry film containing a minimum of 94 percent zinc dust by weight.
- K. Repair Paint: Manufacturer's standard rust-inhibitive primer of same color as primer.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine supporting frame and field conditions for compliance with requirements for installation tolerances and other conditions affecting performance.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL

- A. Install deck panels and accessories according to applicable specifications and commentary in SDI Publication No. 31, manufacturer's written instructions, and requirements in this Section.
- B. Install temporary shoring before placing deck panels if required to meet deflection limitations.
- C. Locate deck bundles to prevent overloading of supporting members.
- D. Place deck panels on supporting frame and adjust to final position with ends accurately aligned and bearing on supporting frame before being permanently fastened. Do not stretch or contract side-lap interlocks.
 - 1. Align cellular deck panels over full length of cell runs and align cells at ends of abutting panels.
- E. Place deck panels flat and square and fasten to supporting frame without warp or deflection.
- F. Cut and neatly fit deck panels and accessories around openings and other work projecting through or adjacent to deck.

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- G. Provide additional reinforcement and closure pieces at openings as required for strength, continuity of deck, and support of other work.
- H. Comply with AWS requirements and procedures for manual shielded metal arc welding, appearance and quality of welds, and methods used for correcting welding work.
- I. Mechanical fasteners may be used in lieu of welding to fasten deck. Locate mechanical fasteners and install according to deck manufacturer's written instructions.

3.3 ROOF-DECK INSTALLATION

- A. Fasten roof-deck panels to steel supporting members by arc spot (puddle) welds of the surface diameter indicated or arc seam welds with an equal perimeter that is not less than 1-1/2 inches long, and as follows:
 - 1. Weld Diameter: 3/4 inch, nominal.
 - 2. Weld Spacing: Weld edge and interior ribs of deck units with a minimum of two welds per deck unit at each support. Space welds as indicated on the drawings.
 - 3. Weld Washers: Install weld washers at each weld location.
- B. Side-Lap and Perimeter Edge Fastening: Fasten side laps and perimeter edges of panels between supports, at intervals not exceeding the lesser of 1/2 of the span or 18 inches, and as follows:
 - 1. Mechanically fasten with self-drilling, No. 10 diameter or larger, carbon-steel screws.
 - 2. Mechanically clinch or button punch.
 - 3. Fasten with a minimum of 1-1/2-inch-long welds.
- C. End Bearing: Install deck ends over supporting frame with a minimum end bearing of 1-1/2 inches, with end joints as follows:
 - 1. End Joints: Lapped 2 inches minimum or butted at Contractor's option.
- D. Roof Sump Pans and Sump Plates: Install over openings provided in roof deck and weld or mechanically fasten flanges to top of deck. Space welds or fasteners not more than 12 inches apart with at least one weld or fastener at each corner.
 - 1. Install reinforcing channels or zees in ribs to span between supports and weld or mechanically fasten.
- E. Miscellaneous Roof-Deck Accessories: Install ridge and valley plates, finish strips, end closures, and reinforcing channels according to deck manufacturer's written instructions. Weld or mechanically fasten to substrate to provide a complete deck installation.
 - 1. Weld cover plates at changes in direction of roof-deck panels unless otherwise indicated.

- F. Flexible Closure Strips: Install flexible closure strips over partitions, walls, and where indicated. Install with adhesive according to manufacturer's written instructions to ensure complete closure.

3.4 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.
- B. Field welds will be subject to inspection.
- C. Testing agency will report inspection results promptly and in writing to Contractor and Architect.
- D. Remove and replace work that does not comply with specified requirements.
- E. Additional inspecting, at Contractor's expense, will be performed to determine compliance of corrected work with specified requirements.

3.5 PROTECTION

- A. Galvanizing Repairs: Prepare and repair damaged galvanized coatings on both surfaces of deck with galvanized repair paint according to ASTM A 780 and manufacturer's written instructions.
- B. Repair Painting: Wire brush and clean rust spots, welds, and abraded areas on all surfaces of prime-painted deck immediately after installation, and apply repair paint.
 - 1. Apply repair paint, of same color as adjacent shop-primed deck, to bottom surfaces of deck exposed to view.
 - 2. Wire brushing, cleaning, and repair painting of bottom deck surfaces are included in Section 099113 "Exterior Painting" and Section 099123 "Interior Painting."
- C. Repair Painting: Wire brushing, cleaning, and repair painting of rust spots, welds, and abraded areas of both deck surfaces are included in Section 099113 "Exterior Painting" and Section 099123 "Interior Painting."
- D. Provide final protection and maintain conditions to ensure that steel deck is without damage or deterioration at time of Substantial Completion.

END OF SECTION 053100

SECTION 05 40 00 COLD-FORMED METAL FRAMING

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes requirements including but not limited to:
 - 1. Load bearing wall framing.
 - 2. Exterior non-load bearing wall framing.
 - 3. Floor joist framing.
 - 4. Roof rafter framing.
 - 5. Ceiling joist framing.
 - 6. Soffit framing.
 - 7. Accessories necessary for a complete installation.
- B. Related Sections:
- C. Related Sections:
 - 1. Section 03 30 00: Cast in Place Concrete.
 - 2. Section 05 40 00: Cold-Formed Steel Framing.
 - 3. Section 05 50 00: Metal Fabrications.
 - 4. Section 09 21 16: Gypsum Board Assemblies.
 - 5. Section 09 24 00: Cement Plastering.
 - 6. Section 09 90 00: Painting and Coating.

1.3 PERFORMANCE REQUIREMENTS

- A. Delegated Design: General Contractor shall engage a qualified professional engineer, licensed in the State of California, to design cold formed steel framing.
- B. Structural Performance - Delegated design engineer shall provide cold-formed steel framing designs capable of withstanding all code required design loads within limits and under conditions indicated on the construction documents and within this Specification:
 - 1. Design loads: Designs shall be capable of withstanding the worst case loading as indicated on the structural drawings, and/or as required by the locally adopted Building Code. The design shall cover the worst case loading in all instances.
 - 2. Coordinate the requirements on the structural and architectural Drawings with the requirements of this Section. If a conflict exists, notations on the structural drawings take precedence.
 - 3. The following document governs the Work, except where more restrictive items are specified:
 - a. AISI Design of Cold-Formed Steel Structural Members Wind Load:
 - 1) Minimum design loads for exterior and/or load bearing and/or soffit applications:
 - a) As required by code officials having jurisdiction.
 - b) Deflection: 1/600 for clear simple spans.
 - c) Deflection: 1/300 for cantilever conditions and roof parapets.
 - d) Gauge: 16 gauge minimum, unless noted otherwise.
 - 2) Minimum design loads for interior and/or exterior suspended furr-downs with

- a maximum vertical drop on either side of five feet (5') or greater:
 - a) As required by code officials having jurisdiction.
 - b) Deflection: 1/600 for clear simple spans.
 - c) Deflection: 1/300 for cantilever conditions and roof parapets.
 - d) Gauge: 20 gauge minimum, unless noted otherwise.
 - 4. It is a common practice for studs thinner than 20 gauge to be crimped and/or ribbed to increase the strength of the overall stud cross section for various loading applications. These studs are typically noted by manufacturer as "equivalent" to a thicker gauge. These "equivalent" type studs are not allowed in a vertically suspended application with greater than five feet (5') of vertical wall drop, 20 gauge is the minimum thickness allowed for these applications.
 - 5. Welding qualifications: Qualify welding processes and welding operators in accordance with AWS "Standard Qualification Procedure."
 - 6. Studs, tracks, channels, and other light gauge framing members shall conform to requirements of ASTM C955.
 - 7. Fire-rated assemblies: Where framing units are components of assemblies indicated for a fire-resistance rating, including those required for compliance with governing regulations, provide units that have been approved by governing authorities that have jurisdiction.
 - 8. Design framing systems to provide for movement of framing members located outside the insulated building envelope without damage or overstressing, sheathing failure, connection failure, undue strain on fasteners and anchors, or other detrimental effects when subject to a maximum ambient temperature change of 120 degrees F (67 degrees C).
 - 9. Design framing system to maintain clearances at openings, to allow for construction tolerances, and to accommodate live load deflection of primary building structure:
 - a. Upward and downward movement of 1-1/2 inches (38 mm).
 - 10. Design exterior non-load bearing wall framing to accommodate horizontal deflection without regard for contribution of sheathing materials.
- C. Cold Formed Steel Framing Design Standards:
- 1. Wall studs: AISI S211.
 - 2. Headers: AISI S212.
 - 3. Lateral design: AISI S213.

1.4 SUBMITTALS

- A. Product Data: Technical data for cold formed steel framing product and accessories including factory applied primers.
- B. Shop Drawings:
 - 1. Submit layout, spacings, sizes, thickness, and types of cold formed steel framing; fabrication; and fastening and anchorage details, including mechanical fasteners:
 - a. Indicate reinforcing channels, opening framing, supplemental framing, strapping, bracing, bridging, splices, accessories, connection details, and attachment to adjoining work.
 - b. Shall bear the seal of a Registered Professional Engineer, licensed in the State of California.
- C. Supplementary Design Details: The general design is presumed adequate to permit compliance with the specified performance. Provide engineering calculations and shop drawings to supplement the general design. Calculations shall bear the seal of a Registered Professional Engineer, licensed in the State of California. Calculations and shop drawings must show design will withstand wind loading commiserate with class and rating of the Project.

1.5 QUALITY ASSURANCE

- A. Regulatory Requirements:
 - 1. Welding qualifications:
 - a. Qualify procedures and personnel according to the following:
 - 1) AWS D1.3/D1.3M Structural Welding Code - Sheet Steel.
 - 2) CCFSS Technical Bulletin: "AISI Specification Provision for Screw Connections."
 - 2. Comply with AISI North American Specification for the Design of Cold Formed Steel Structural Members and Standard for Cold Formed Steel Framing - General Provisions:
 - a. AISI Specifications and Standards: Unless more stringent requirements are indicated, comply with AISI S100 and AISI S200.
 - 3. Fire resistance ratings: ASTM E119; testing by a UL. Identify products with appropriate markings of applicable testing agency. Indicate design designations from UL *Fire Resistance Directory*.
 - 4. Installer qualifications: Company specializing in the installation of cold formed metal framing components with minimum five (5) years' documented experience.
 - 5. Install system to provide for movement of components without damage, failure of joint seals, undue stress on fasteners, or other detrimental effects when subject to seasonal or cyclic day/night temperature ranges.
 - 6. Install system to accommodate construction tolerances, deflection of building structural members, and clearances of intended openings.
 - 7. Mill certificates signed by steel sheet producer indicating steel sheet complies with requirements, including uncoated steel thickness, yield strength, tensile strength, total elongation, chemical requirements, and galvanized-coating thickness.
- B. Professional Engineer Qualifications:
 - 1. A professional engineer who is legally qualified to practice in the State of California and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of cold formed metal framing that are similar to those indicated in material, design, and extent:
 - a. Engineering responsibility: Preparation of shop drawings, design calculations, and structural data.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Protect cold formed steel framing from corrosion, moisture staining, deformation, and other damage during delivery, storage, and handling.
- B. Store cold-formed metal framing, protect with a waterproof covering, and ventilate to avoid condensation.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Manufacturers are subject to compliance with requirements; provide products by one of the following:
 - 1. CEMCO.
 - 2. ClarkDietrich Building Systems.
 - 3. Consolidated Fabricators Corp.
 - 4. SCAFCO Corporation.
 - 5. Substitutions with Architect's approval, pursuant to conditions of Divisions 00 and 01.

2.2 LOAD BEARING WALL FRAMING

- A. Steel Studs:
 - 1. C-shaped steel studs, of web depths indicated, punched, with stiffened flanges:
 - a. Minimum base metal thickness: 0.0538 inch (1.37 mm), 0.0677 inch (1.72 mm), and 0.0966 inch (2.45 mm).
 - b. Flange width: 1-5/8 inches (41 mm).
 - c. Section properties: Refer to the Drawings.
- B. Steel Track:
 - 1. U-shaped steel track, of web depths indicated, unpunched, with straight flanges:
 - a. Minimum base metal thickness: 0.0538 inch (1.37 mm), 0.0677 inch (1.72 mm), and 0.0966 inch (2.45 mm).
 - b. Flange width: 1-1/4 inches (32 mm).
- C. Steel Box or Back-to-Back Headers:
 - 1. C-shape used to form header beams, of web depths indicated, unpunched, with stiffened flanges:
 - a. Minimum base metal thickness: 0.0538 inch (1.37 mm), 0.0677 inch (1.72 mm), and 0.0966 inch (2.45 mm).
 - b. Flange width: 1-5/8 inches (41 mm).
- D. Steel Single or Double L Headers:
 - 1. L-shapes used to form header beams, of web depths indicated:
 - a. Minimum base metal thickness: 0.0538 inch (1.37 mm), 0.0677 inch (1.72 mm), and 0.0966 inch (2.45 mm).
 - b. Top flange width: 1-5/8 inches (41 mm).
 - c. Section properties: Refer to the Drawings.

2.3 EXTERIOR NONLOAD BEARING WALL FRAMING

- A. Steel Studs:
 - 1. C-shaped steel studs, of web depths indicated, punched, with stiffened flanges:
 - a. Minimum base metal thickness: 0.0538 inch (1.37 mm), 0.0677 inch (1.72 mm), and 0.0966 inch (2.45 mm).
 - b. Flange width: 1-5/8 inches (41 mm).
 - c. Section properties: Refer to the Drawings.
- B. Steel Track:
 - 1. U-shaped steel track, of web depths indicated, unpunched, with unstiffened flanges, and as follows:
 - a. Minimum base metal thickness: 0.0538 inch (1.37 mm), 0.0677 inch (1.72 mm), and 0.0966 inch (2.45 mm).
 - b. Flange width: 1-1/4 inches (32 mm).
- C. Vertical Deflection Clips:
 - 1. Head clips, capable of accommodating upward and downward vertical displacement of primary structure through positive mechanical attachment to stud web:
 - a. Manufacturers are subject to compliance with requirements; provide products by one of the following:
 - 1) ClarkDietrich Building Systems.
 - 2) SCAFCO Corporation.
 - 3) Simpson Strong-Tie Co., Inc.
 - 4) Steeler, Inc.
 - 5) Substitutions with Architect's approval, pursuant to conditions of Divisions 00 and 01.

- D. Single Deflection Track:
 - 1. Single, deep leg, U-shaped steel track; unpunched, with unstiffened flanges, of web depth to contain studs while allowing free vertical movement, with flanges designed to support horizontal loads and transfer them to the primary structure:
 - a. Minimum base metal thickness: 0.0428 inch (1.09 mm), 0.0538 inch (1.37 mm), 0.0677 inch (1.72 mm), and 0.0966 inch (2.45 mm).
 - b. Flange width: One inch (25 mm) plus the design gap for one story structures and one inch (25 mm) plus twice the design gap for other applications.
- E. Double Deflection Tracks:
 - 1. Double, deep leg, U-shaped steel tracks, consisting of nested inner and outer tracks; unpunched, with unstiffened flanges:
 - a. Outer track - Of web depth to allow free vertical movement of inner track, with flanges designed to support horizontal loads and transfer them to the primary structure:
 - 1) Minimum base metal thickness: 0.0428 inch (1.09 mm), 0.0538 inch (1.37 mm), 0.0677 inch (1.72 mm), and 0.0966 inch (2.45 mm).
 - 2) Flange width: One inch (25 mm) plus the design gap for one story structures and one inch (25 mm) plus twice the design gap for other applications.
 - b. Inner track - of web depth indicated:
 - a. Minimum base metal thickness: 0.0428 inch (1.09 mm), 0.0538 inch (1.37 mm), 0.0677 inch (1.72 mm), and 0.0966 inch (2.45 mm).
 - b. Flange width: One inch (25 mm) plus the design gap for one story structures and one inch (25 mm) plus twice the design gap for other applications.
- F. Drift Clips: Bypass or head clips, capable of isolating wall stud from upward and downward vertical displacement and lateral drift of primary structure through positive mechanical attachment to stud web and structure.

2.4 CEILING JOIST FRAMING

- A. Steel Ceiling Joists:
 - 1. C-shaped steel sections, of web depths indicated, punched with standard holes, with stiffened flanges:
 - a. Minimum base metal thickness: 0.0428 inch (1.09 mm).
 - b. Flange width: Two inches (51 mm), minimum.

2.5 SOFFIT FRAMING

- A. Exterior Soffit Frame:
 - 1. C-shaped steel sections, of web depths indicated, with stiffened flanges:
 - a. Minimum base metal thickness: **0.0428 inch (1.09 mm) [0.0538 inch (1.37 mm)]**.
 - b. Flange width: 1-5/8 inches (41 mm) minimum.

2.6 FRAMING ACCESSORIES

- A. Fabricate steel framing accessories from steel sheet, ASTM A1003/A1003M, Structural Grade, Type H, metallic coated, of same grade and coating weight used for framing members.
- B. Provide accessories of appropriate thickness and configuration, unless otherwise indicated:
 - 1. Supplementary framing.
 - 2. Bracing, bridging, and solid blocking.
 - 3. Web stiffeners.

4. Anchor clips.
 5. End clips.
 6. Foundation clips.
 7. Gusset plates.
 8. Stud kickers and knee braces.
 9. Joist hangers and end closures.
 10. Hole reinforcing plates.
 11. Backer plates.
- C. Anchors, Clips, and Fasteners:
1. Steel shapes and clips: ASTM A36/A36M, zinc coated by hot dip process according to ASTM A123/A123M.
 2. Expansion anchors: Fabricated from corrosion resistant materials, with allowable load or strength design capacities calculated according to ICC-ES AC193 and ACI 318 greater than or equal to the design load, as determined by testing per ASTM E488 conducted by a qualified testing agency.
 3. Power actuated anchors: Fastener system of type suitable for application indicated, fabricated from corrosion resistant materials, with allowable load capacities calculated, greater than or equal to the design load, as determined by testing per ASTM E1190 conducted by a qualified testing agency.
 4. Mechanical fasteners:
 - a. ASTM C1513, corrosion resistant coated, self-drilling, self-tapping, steel drill screws:
 - 1) Head type: Low profile head beneath sheathing.
 5. Welding electrodes: Comply with AWS standards.
- D. Miscellaneous Materials:
1. Galvanizing repair paint: SSPC-Paint 20 or ASTM A780.
 2. Non-metallic, non-shrink grout: Premixed, non-metallic, non-corrosive, non-staining grout containing selected silica sands, portland cement, shrinkage compensating agents, and plasticizing and water reducing agents, complying with ASTM C1107/C1107M, with fluid consistency and 30-minute working time.
 3. Shims: Load bearing, high density multimonomer plastic, and non-leaching; or of cold formed steel of same grade and coating as framing members supported by shims.
 4. Sealer gaskets: Closed cell neoprene foam, 1/4 inch (6.4 mm) thick, selected from standard widths to match width of bottom track or rim track members.

2.7 FABRICATION

- A. Fabricate cold formed steel framing and accessories plumb, square, and true to line, and with connections securely fastened, according to referenced AISI specifications and standards, manufacturer written instructions, and specified requirements:
1. Fabricate framing assemblies using jigs or templates.
 2. Cut framing members by sawing or shearing; do not torch cut.
 3. Fasten cold formed steel framing members by welding, screw fastening, clinch fastening, pneumatic pin fastening, or riveting as standard with fabricator. Wire tying of framing members is not permitted:
 - a. Comply with AWS D1.3/D1.3M requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.
 - b. Locate mechanical fasteners and install according to shop drawings, with screw penetrating joined members by no fewer than three (3) exposed screw threads.
- B. Reinforce, stiffen, and brace framing assemblies to withstand handling, delivery, and erection stresses. Lift fabricated assemblies to prevent damage or permanent distortion.
- C. Fabrication Tolerances:

1. Fabricate assemblies level, plumb, and true to line to a maximum allowable tolerance variation of 1/8 inch in ten (10) feet (1:960) and as follows:
 - a. Spacing: Space individual framing members no more than plus or minus 1/8 inch (3 mm) from plan location. Cumulative error shall not exceed minimum fastening requirements of sheathing or other finishing materials.
 - b. Squareness: Fabricate each cold formed steel framing assembly to a maximum out of square tolerance of 1/8 inch (3 mm).

PART 3 EXECUTION

3.1 EXAMINATION

- A. Examine supporting substrates and abutting structural framing for compliance with requirements for installation tolerances and other conditions affecting performance of the work.

3.2 PREPARATION

- A. Before sprayed fire resistive materials are applied, attach continuous angles, supplementary framing, or tracks to structural members indicated to receive sprayed fire-resistive materials.
- B. After applying sprayed fire resistive materials, remove only as much as necessary to complete installation of cold formed framing without reducing thickness of fire resistive materials below required thickness to obtain fire resistance rating indicated. Protect remaining fire resistive materials from damage.
- C. Install load bearing shims or grout between the underside of load bearing wall bottom track and the top of foundation wall or slab at locations with a gap larger than 1/4 inch (6 mm) to ensure a uniform bearing surface on supporting concrete or masonry construction.
- D. Install sealer gaskets at the underside of wall bottom track or rim track and at the top of foundation wall or slab at stud or joist locations.

3.3 ERECTION

- A. General:
 1. Track anchors: Install anchors maximum four feet (4') on center; design anchors and spacing to carry live, dead, and wind loads.
 2. Track splices: Provide channel inserts or weld track splices.
 3. Erection: Install members plumb, level, and in a true plane.
 4. Fastenings: Make assembly rigid and secure, with welds free of voids and burnouts.
- B. Install metal framing systems in accordance with stud manufacturer's printed instructions.
- C. Runner Tracks:
 1. Install continuous tracks sized to match studs.
 2. Align tracks accurately to layout at base and tops of studs.
 3. Secure tracks as recommended by stud manufacturer, except do not exceed 24 inches on center for nail or power-driven fasteners, nor 16 inches on center for other types of attachment.
 4. Provide fasteners at corners and ends of tracks.
 5. Tracks shall be anchored to structural steel prior to installing sprayed on insulation.
 6. Provide deflection track (DT), at top of stud walls at floor or roof above, typically. Allow for 1/2-inch movement of primary structure. Do not attach studs directly to deflection track.

7. Vertical deflection clips: Provide manufacturer's standard bypass and head clips, capable of accommodating upward and downward vertical displacement of primary structure.
- D. Secure studs to top track and bottom runner track by means of approved self-drilling screws or welding at both inside and outside flanges of 14 gauge or heavier material. Screws and welds shall be of sufficient size to insure strength of connection. All welding shall comply with American Welding Society "Specification for Welding Sheet Steel in Structures."
- E. Set studs plumb, except as needed for diagonal bracing or required for non-plumb walls or warped surfaces and similar requirements.
- F. Where stud system abuts structural columns or walls, including masonry walls, anchor ends of stiffeners to supporting structure. Use Zee clips as specified above. Weld "Z" shaped clips to structural members as shown on drawings. Maximum two feet (2') on center vertical.
- G. Install supplementary framing, blocking, and bracing in the metal framing system wherever walls or partitions are indicated to support fixtures, equipment, services, casework, heavy trim and furnishings, and similar work requiring attachment to the wall or partition. Where type of supplementary support is not otherwise indicated, comply with the stud manufacturer's recommendations and industry standards in each case, considering the weight or loading resulting from the item supported.
- H. Frame wall openings with extra studs, equal to the number of studs interrupted by wall openings, placed at each side of wall openings. Install runner tracks and jack studs above and below wall openings. Anchor tracks to jamb studs with shoes or by welding, and space jack studs same as full-height studs of the wall. Secure stud system all around to wall opening frame in the manner indicated.
- I. Install bracing/bridging in accordance with manufacturer's instructions and design conditions.
- J. Touch up field welds and damaged galvanized coating, except touch up of field cut studs is not required.
- K. Frame both sides of expansion and control joints with separate studs; do not bridge the joint with components of stud system.
- L. Install horizontal stiffeners in stud system, space (vertical distance) at no more than 54 inches on center. Weld at each intersection.

3.4 JOIST INSTALLATION

- A. Install perimeter joist track sized to match joists. Align and securely anchor or fasten track to supporting structure at corners, ends, and spacings indicated on Shop Drawings.
- B. Install joists bearing on supporting frame, level, straight, and plumb; adjust to final position, brace, and reinforce. Fasten joists to both flanges of joist track:
 1. Install joists over supporting frame with a minimum end bearing of 1-1/2 inches (38 mm).
 2. Reinforce ends and bearing points of joists with web stiffeners, end clips, joist hangers, steel clip angles, or steel stud sections as indicated on shop drawings.
- C. Space joists not more than two inches (51 mm) from abutting walls:

1. Joist spacing: 16 inches (406 mm).
- D. Frame openings with built-up joist headers consisting of joist and joist track, or another combination of connected joists if indicated.
- E. Install joist reinforcement at interior supports with single, short length of joist section located directly over interior support, with lapped joists of equal length to joist reinforcement, or as indicated on shop drawings:
 1. Install web stiffeners to transfer axial loads of walls above.
- F. Install bridging at intervals indicated on shop drawings. Fasten bridging at each joist intersection as follows:
 1. Bridging: Combination of flat, taut, steel sheet straps of width and thickness indicated and joist track solid blocking of width and thickness indicated. Fasten flat straps to bottom flange of joists and secure solid blocking to joist webs.
- G. Secure joists to load bearing interior walls to prevent lateral movement of bottom flange.
- H. Install miscellaneous joist framing and connections, including web stiffeners, closure pieces, clip angles, continuous angles, hold down angles, anchors, and fasteners, to provide a complete and stable joist framing assembly.

END OF SECTION 05 40 00

SECTION 05 50 00 METAL FABRICATIONS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes requirements including but not limited to:
 - 1. Steel framing and supports.
 - 2. Shelf angles.
 - 3. Miscellaneous steel trim including steel angle corner guards, and steel edgings.
 - 4. Metal downspout boots.
 - 5. Roof anchor points.
 - 6. Roof hatches.
 - 7. Bicycle racks.
 - 8. Metal finishes.
 - 9. Accessories necessary for a coordinated and complete installation.
- B. Related Sections:
 - 1. Section 03 30 00: Cast in Place Concrete.
 - 2. Section 05 40 00: Cold-Formed Steel Framing.
 - 3. Section 09 21 16: Gypsum Board Assemblies.
 - 4. Section 09 90 00: Painting and Coating.

1.3 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Design ladders and countertop supports, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.
- B. Structural Performance of Roof Anchor Points. Provide anchor points suitable for support of 5,000 pounds breaking point (see structural drawings).
- C. Structural Performance of Ladders: Provide ladders and landings capable of withstanding the effects of loads and stresses within limits and under conditions specified in ANSI A14.3.
- D. Structural Performance:
 - 1. Countertops and vanities:
 - a. Provide countertop and vanity framing capable of withstanding the following structural loads without exceeding the allowable design working stress of the materials involved, including anchors and connections, or of exhibiting excessive deflections in any of the components making up the countertops and vanities:
 - 1) All deadloads.
 - 2) 250-pound live load placed on the countertop and vanity.
 - 3) Deflection at midspan: L/1000 times span or 1/8 inch, whichever is less.
- E. Thermal Movements:
 - 1. Provide exterior metal fabrications that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures by preventing buckling, opening of joints, overstressing of components, failure of connections, and

other detrimental effects. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss:

- a. Temperature change (range): 70 degrees F, ambient; 110 degrees F, material surfaces.

1.4 SUBMITTALS

- A. Product Data: Submit data for miscellaneous metal fabrications and paint, coatings, and grout accessories.
- B. Shop Drawings:
 1. Submit shop drawings detailing the fabrication and erection of each metal fabrication indicated. Include plans, elevations, sections, and details of metal fabrications and their connections. Show anchorage and accessory items:
 - a. For installed products indicated to comply with design loads, include structural analysis data, for information only, signed and sealed by the qualified professional engineer responsible for their preparation.
- C. Delegated Design Submittal: For installed products indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
- D. Welding Certificates.
- E. Paint Compatibility Certificates: Submit manufacturers of topcoats applied over shop primers, certifying that shop primers are compatible with topcoats.

1.5 QUALITY ASSURANCE

- A. Regulatory Requirements:
 1. Building Code: Comply with applicable provisions of the CBC 2022 California Building Code (CCR Title 24, Part 2, as adopted and amended by DSA).
 2. Welding:
 - a. Qualify procedures and personnel according to the following:
 - 1) AWS D1.1/D1.1M Structural Welding Code – Steel.
 - 2) AWS D1.2/D1.2M Structural Welding Code - Aluminum.
 - 3) AWS D1.3/D1.3M Structural Welding Code - Sheet Steel.
 - 4) AWS D1.6/D1.6M Structural Welding Code - Stainless Steel.
 - 5) Certify that each welder has satisfactorily passed AWS qualification tests for welding processes involved and, if pertinent, has undergone recertification.
- B. Fabricator/Installer Qualifications: A firm experienced in producing metal fabrications similar to those indicated for this Project for a minimum of five (5) years, with a record of successful in-service performance, with sufficient production capacity to produce required units without causing delay in the work.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Store metal fabrications in a dry, well ventilated, weathertight place. Deliver and handle to prevent any type of damage to the fabricated work.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Metal Surfaces: Provide materials with smooth, flat surfaces unless otherwise indicated. For metal fabrications exposed to view in the completed Work, provide materials without seam marks, roller marks, rolled trade names, or blemishes.
- B. Steel Plates, Shapes, and Bars: ASTM A36/A36M.
- C. Stainless Steel Sheet, Strip, and Plate: ASTM A240/A240M or ASTM A666, Type 304.
- D. Stainless Steel Bars and Shapes: ASTM A276, Type 304.
- E. Rolled Steel Floor Plate: ASTM A786/A786M, rolled from plate complying with ASTM A36/A36M or ASTM A283/A283M, Grade C or D.
- F. Rolled Stainless Steel Floor Plate: ASTM A793.
- G. Abrasive Surface Floor Plate:
 - 1. Steel plate with abrasive granules rolled into surface or with abrasive material metallurgically bonded to steel:
 - a. Manufacturers are subject to compliance with requirements; provide products by one of the following:
 - 1) IKG Industries, a division of Harsco Corporation.
 - 2) SlipNOT Metal Safety Flooring; W.S. Molnar Company.
- H. Steel Tubing: ASTM A500/A500M, cold formed steel tubing.
- I. Steel Pipe: ASTM A53/A53M, Standard Weight (Schedule 40) unless otherwise indicated.
- J. Zinc Coated Steel Wire Rope - ASTM A741:
 - 1. Wire rope fittings: Hot dip galvanized steel connectors with capability to sustain, without failure, a load equal to minimum breaking strength of wire rope with which they are used.
- K. Slotted Channel Framing:
 - 1. Cold formed metal box channels (struts) complying with MFMA-4:
 - a. Size of channels: 1-5/8 inch by 1-5/8 inch (41 mm by 41 mm).
 - b. Material: Galvanized steel, ASTM A653/A653M, commercial steel, Type B, with G90 (Z275) coating; 0.108-inch (2.8 mm) nominal thickness.
 - c. Cold formed metal channels: Flange edges returned toward web and with 9/16-inch (14.3 mm) wide slotted holes in webs at two inches (51 mm) o.c.
 - d. Width of channels: 1-5/8 inch (41 mm).
 - e. Depth of channels: Indicated on Drawings.
 - f. Metal and thickness: Galvanized steel complying with ASTM A653/A653M, structural quality, Grade 33 (Grade 230), with G90 (Z275) coating; 0.108-inch (2.8mm) nominal thickness.
 - g. Finish: Hot dip galvanized after fabrication.
- L. Aluminum Plate and Sheet: ASTM B209, Alloy 6061-T6.
- M. Aluminum Extrusions: ASTM B221, Alloy 6063-T6.
- N. Aluminum Alloy Rolled Tread Plate: ASTM B632/B 632M, Alloy 6061-T6.
- O. Aluminum Castings: ASTM B26/B26M, Alloy 443.0-F.
- P. Fasteners:

1. Unless otherwise indicated, provide Type 304 stainless steel fasteners for exterior use and zinc plated fasteners with coating complying with ASTM B633 or ASTM F1941, Class Fe/Zn 5, at exterior walls. Select fasteners for type, grade, and class required:
 - a. Provide stainless steel fasteners for fastening stainless steel.
 - b. Provide bronze fasteners for fastening bronze.
 - c. Steel bolts and nuts: Regular hexagon head bolts, ASTM A307, Grade A with hex nuts, ASTM A563 and, where indicated, flat washers.
 - d. Steel bolts and nuts: Regular hexagon head bolts, ASTM A325, Type 3 with hex nuts, ASTM A563, Grade C3 and, where indicated, flat washers.
 - e. Stainless steel bolts and nuts: Regular hexagon head annealed stainless steel bolts, ASTM F593 with hex nuts, ASTM F594 and, where indicated, flat washers; alloy.
 - f. Anchor bolts: ASTM F 1554, Grade 36, of dimensions indicated; with nuts, ASTM A563 and, where indicated, flat washers.
 - g. Hot dip galvanize or provide mechanically deposited zinc coating where item being fastened is indicated to be galvanized.
 - h. Anchors: Anchors capable of sustaining, without failure, a load equal to six times the load imposed when installed in unit masonry and four times the load imposed when installed in concrete, as determined by testing according to ASTM E488/E488M, conducted by a qualified independent testing agency.
 - i. Post installed anchors - per Drawings:
 - 1) Material for interior locations: Carbon steel components zinc plated to comply with ASTM B633 or ASTM F1941 Class Fe/Zn 5, unless otherwise indicated.
 - 2) Material for exterior locations and where stainless steel is indicated: ASTM F593 and nuts, ASTM F594.

Q. Miscellaneous Materials:

1. Shop primer for ferrous metal: Universal primer, organic zinc rich primer, complying with SSPC-Paint 20 and compatible with topcoat. Provide 10-99 (red) or 10-09 (gray) by Tnemec Company.
2. Universal shop primer: Fast curing, lead and chromate free, universal modified alkyd primer and compatible with topcoat. Use primer containing pigments that make it easily distinguishable from zinc rich primer.
3. Water based primer: Emulsion type, anticorrosive primer for mildly corrosive environments that is resistant to flash rusting when applied to cleaned steel and compatible with topcoat.
4. Shop primer for galvanized steel: Primer formulated for exterior use over zinc coated metal and compatible with finish paint systems indicated.
5. Galvanizing repair paint: High zinc dust content paint for reglazing welds in steel, complying with SSPC-Paint 20. Provide Tnemec-Zinc 90-97 by Tnemec Company.
6. Bituminous paint: Cold applied asphalt emulsion complying with SSPC-Paint 12, containing no asbestos fibers, or cold applied asphalt emulsion complying with ASTM D1187.
7. Non-shrink, nonmetallic grout: Factory packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C1107/C1107M. Provide grout specifically recommended by manufacturer for interior and exterior applications.
8. Concrete materials and properties: Composed of ASTM C150 Type I Portland cement, ASTM C33 sand and coarse aggregates and potable water to produce a low slump mix suitable for placement. Grade coarse aggregate from 1/8 inch with at least 95 percent passing a 3/8-inch sieve and not more than 10 percent passing a No. 8 sieve. Fill shall be proportioned to provide a minimum 28-day compressive strength of 3,000 psi (20 MPa).

2.2 FABRICATION

A. Shop Assembly:

1. Preassemble items in the shop to greatest extent possible. Disassemble units only as necessary for shipping and handling limitations. Use connections that maintain structural value of joined pieces. Clearly mark units for reassembly and coordinated installation:
 - a. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch (1 mm) unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.
 - b. Form bent metal corners to smallest radius possible without causing grain separation or otherwise impairing work.
 - c. Form exposed work with accurate angles and surfaces and straight edges.
 - d. Weld corners and seams continuously to comply with the following:
 - 1) Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 - 2) Obtain fusion without undercut or overlap.
 - 3) Remove welding flux immediately.
 - 4) At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.
 - e. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners or welds where possible. Where exposed fasteners are required, use Phillips flat head (countersunk) fasteners unless otherwise indicated. Locate joints where least conspicuous.
 - f. Fabricate seams and other connections that are exposed to weather in a manner to exclude water. Provide weep holes where water may accumulate.
 - g. Cut, reinforce, drill, and tap metal fabrications as indicated to receive finish hardware, screws, and similar items.
 - h. Provide for anchorage of type indicated; coordinate with supporting structure. Space anchoring devices to secure metal fabrications rigidly in place and to support indicated loads.
 - i. Where units are indicated to be cast into concrete or built into masonry, equip with integrally welded steel strap anchors, 1/8 inch by 1-1/2 inches (3.2 mm by 38 mm), with a minimum six-inch (150 mm) embedment and two-inch (50 mm) hook, not less than eight inches (200 mm) from ends and corners of units and 24 inches (600 mm) o.c., unless otherwise indicated.
- B. Miscellaneous Framing and Supports:
 1. Provide steel framing and supports necessary to complete the work and that are not a part of the structural framework, including, but not limited to, framing and supports for overhead lobby door frames, sliding doors, countertop and vanities, ceiling hung toilet compartments, tube framing for partial height walls, and mechanical and electrical equipment:
 - a. Fabricate units from steel shapes, plates, and bars of welded construction unless otherwise indicated. Fabricate to sizes, shapes, and profiles indicated and as necessary to receive adjacent construction. Cut, drill, and tap units to receive hardware, hangers, and similar items:
 - 1) Fabricate units from slotted channel framing where indicated.
 - 2) Furnish inserts for units installed after concrete is placed.
- C. Shelf Angles:
 1. Fabricate shelf angles from steel angles of sizes indicated and for attachment to concrete framing. Provide horizontally slotted holes to receive 3/4-inch (19 mm) bolts, spaced not more than six inches (150 mm) from ends and 24 inches (600 mm) o.c., unless otherwise indicated:
 - a. Provide mitered and welded units at corners.
 - b. Provide open joints in shelf angles at expansion and control joints. Make open joint approximately two inches (50 mm) larger than expansion or control joint.

- c. For cavity walls, provide vertical channel brackets to support angles from backup masonry and concrete.
- d. Galvanize and prime shelf angles located in exterior walls.
- e. Prime shelf angles located in exterior walls with zinc rich primer.
- f. Furnish wedge type concrete inserts, complete with fasteners, to attach shelf angles to cast-in-place concrete.

2.3 MISCELLANEOUS STEEL TRIM

- A. Miscellaneous Steel Trim:
 - 1. Unless otherwise indicated, fabricate units from structural steel shapes, plates, and bars of profiles shown with continuously welded joints and smooth exposed edges. Miter corners and use concealed field splices where possible:
 - a. Provide cutouts, fittings, and anchorages as needed to coordinate assembly and installation with other work:
 - 1) Provide with integrally welded steel strap anchors for embedding in concrete or masonry construction, spaced not more than six inches (150 mm) from each end, six inches (150 mm) from corners, and 24 inches (600 mm) o.c.
 - b. Cast in pit angles and edge angles: Provide edge angles, and pit angles, fabricated from angles of size as shown, or required, with welded on stud anchors spaced 24 inches (600 mm) on center. Provide pit and edge angles in as long lengths as possible. Miter and weld corners and provide splice plates for alignment between sections.
 - c. Galvanize miscellaneous steel trim.

2.4 METAL DOWNSPOUT BOOTS

- A. Downspout Boot:
 - 1. Provide downspout boots made from cast aluminum in heights indicated with inlets of size and shape to suit downspouts. Provide units with flanges and holes for countersunk anchor bolts:
 - a. Outlet: Vertical, to discharge into pipe.
 - b. Prime cast iron downspout boots with zinc rich primer.

2.5 BICYCLE RACKS

- A. Bicycle Rack:
 - 1. Fabricate from Schedule 40 steel pipe, fully welded together, to lengths indicated. AAA Ribbon Bike Rack Co. (basis of design):
 - a. Fabricate with NPS 3 (DN 80) top rails and end posts, NPS 1-1/2 (DN 40) bottom rails and intermediate posts not more than 72 inches (1800 mm) o.c., and NPS 3/4 (DN 20) vertical separators at approximately eight inches (200 mm) o.c.
 - b. Make top rails 36 inches (900 mm) above pavement/floor and bottom rails four inches (100 mm) above pavement/floor.
 - c. Fabricate end posts and intermediate posts with 1/4-inch (6.4-mm) thick steel baseplates for bolting to concrete slab. Drill end post baseplates at all four corners and intermediate-post baseplates at two opposite sides for 1/2-inch (12.7-mm) anchor bolts.
 - d. Galvanize bicycle racks after fabrication.

2.6 ROOF HATCH AND RAILING

- A. Roof Hatch:
 - 1. Model Numbers #E-2424-RAH-CM and E-3030-RAH-CM series as manufactured by ELMDOOR-STONEMAN Access Doors, City of Industries, CA 800-591-9181 or www.elmdoorstoneman.com. Or approved equal:

- a. 14-guage (A60) galvanized steel with radius corners and shall be fully welded and watertight construction.
 - b. Latching: Both inside and outside padlock hatch and handles.
 - c. Include automatic hold-open arm with vinyl grip and compression springs incased in telescoping tubes for smooth operations.
- B. Roof Hatch Safety Rails:
- 1. Manufactured by Safe-Pro. 1355 N Walton Walker Road, Dallas Texas 75211. (877) 723-3570. Provide complete system to match roof hatch:
 - a. Four-sided railing with safety hand grip rails. 1-1/2 inch OD .083 wall cold-rolled electric welded (CREW) steel.
 - b. Powder coated safety yellow.
 - c. Gravity self-closing with spring assist, non-collapsible full wrap-around 1-1/2-inch tubing. Heavy duty hinges, 5/8-inch hinge pin. Include back-cross rails and tube terminal end plugs.
 - d. Smooth saddle joint bolt-on with 3/8 inch by three-inch (3") bolts and 3/8-inch tubing connector nuts. ASTM 316 SS.

2.7 ROOF ANCHOR POINTS

- A. Roof Anchor Points:
- 1. Guardian Fall Protection Model CB-12 Anchor Point. Include anchor plate with multiple connection points:
 - a. Minimum breaking strength: 5,000 pounds.
 - b. Provide roof flashing cones.

2.8 FABRICATION TOLERANCES

- A. Squareness: 1/8 inch (3mm) maximum difference in diagonal measurements.
- B. Maximum Offset Between Faces: 1/16 inch (1.5mm).
- C. Maximum Misalignment of Adjacent Members: 1/16 inch (1.5mm).
- D. Maximum Bow: 1/8 inch (3mm) in 48 inches (1.2m).
- E. Maximum Deviation From Plane: 1/16 inch (1.5mm) in 48 inches (1.2m).

2.9 FINISHES

- A. Finish metal fabrications after assembly.
- B. Finish exposed surfaces to remove tool and die marks and stretch lines, and to blend into surrounding surface.

2.10 STEEL AND IRON FINISHES

- A. Galvanizing:
 - 1. Hot dip galvanize items as indicated to comply with ASTM A153/A153M for steel and iron hardware and with ASTM A123/A123M for other steel and iron products:
 - a. Do not quench or apply post galvanizing treatments that might interfere with paint adhesion.
- B. Preparation for Shop Priming Galvanized Items: After galvanizing, thoroughly clean railings of grease, dirt, oil, flux, and other foreign matter, and treat with metallic phosphate process.

- C. Shop prime iron and steel items not indicated to be galvanized unless they are to be embedded in concrete, sprayed-on fireproofing, or masonry, or unless otherwise indicated.
- D. Preparation for Shop Priming:
 - 1. Prepare surfaces to comply with requirements indicated below:
 - a. Exterior items: SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
 - b. Items indicated to receive zinc-rich primer: SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
 - c. Other items: SSPC-SP 3, "Power Tool Cleaning."
- E. Shop Priming:
 - 1. Apply shop primer to comply with SSPC-PA 1, "Paint Application Specification No. 1: Shop, Field, and Maintenance Painting of Steel," for shop painting:
 - a. Stripe paint corners, crevices, bolts, welds, and sharp edges.
- F. Stainless Steel Finishes:
 - 1. Remove tool and die marks and stretch lines, or blend into finish:
 - a. Grind and polish surfaces to produce uniform, directionally textured, polished finish indicated, free of cross scratches. Run grain with long dimension of each piece.
 - b. Bright, directional polish: No. 4 finish.
 - c. When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.

2.11 ALUMINUM FINISHES

- A. As-Fabricated Finish: AA-M12.
- B. Clear Anodic Finish - AAMA 611:
 - 1. Class I, Clear anodic finish:
 - a. AA-M12C22A41 (mechanical finish: non-specular as fabricated.
 - b. Chemical finish: Etched, medium matte.
 - c. Anodic coating: Architectural Class I, clear coating 0.018 mm or thicker, complying with AAMA 607.1.

PART 3 EXECUTION

3.1 FIELD CONDITIONS

- A. Field Measurements:
 - 1. Verify actual locations of walls and other construction contiguous with metal fabrications by field measurements before fabrication:
 - a. Established dimensions: Where field measurements cannot be made without delaying the work, establish dimensions and proceed with fabricating metal fabrications without field measurements. Coordinate wall and other contiguous construction to ensure that actual dimensions correspond to established dimensions.
 - b. Provide allowance for trimming and fitting at site.

3.2 COORDINATION

- A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' written recommendations to ensure that shop primers and topcoats are compatible with one another.
- B. Coordinate installation of metal fabrications that are anchored to or that receive other work.

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. Deliver such items to Project site in time for installation.

3.3 INSTALLATION, GENERAL

- A. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing metal fabrications. Set metal fabrications accurately in location, alignment, and elevation; with edges and surfaces level, plumb, true, and free of rack, and measured from established lines and levels.
- B. 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 surfaces of exterior units that have been hot dip galvanized after fabrication and are for bolted or screwed field connections.
- C. Field Welding:
 - 1. Comply with the following requirements:
 - a. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 - b. Obtain fusion without undercut or overlap.
 - c. Remove welding flux immediately.
 - d. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.
- D. Fastening to In-Place Construction: Provide anchorage devices and fasteners where metal fabrications are required to be fastened to in-place construction. Provide threaded fasteners for use with concrete and masonry inserts, toggle bolts, through bolts, lag screws, wood screws, and other connectors.
- E. Provide temporary bracing or anchors in formwork for items that are to be built into concrete, masonry, or similar construction.
- F. Corrosion Protection:
 - 1. Coat concealed surfaces of aluminum that come into contact with grout, concrete, masonry, wood, or dissimilar metals with the following:
 - a. Cast aluminum: Heavy coat of bituminous paint.
 - b. Extruded aluminum: Two (2) coats of clear lacquer.

3.4 INSTALLING MISCELLANEOUS FRAMING AND SUPPORTS

- A. Install framing and supports to comply with requirements of items being supported, including manufacturer's written instructions and requirements indicated on shop drawings.
- B. Anchor supports for overhead doors securely to, and rigidly brace from, building structure.

3.5 INSTALLING METAL BOLLARDS

- A. Fill metal capped bollards solidly with concrete and allow concrete to cure seven (7) days before installing:
 - 1. Do not fill removable bollards with concrete.

3.6 INSTALLING NOSINGS, TREADS, AND THRESHOLDS

- A. Center nosings on tread widths unless otherwise indicated.
- B. For nosings embedded in concrete steps or curbs, align nosings flush with riser faces and level with tread surfaces.
- C. Seal thresholds exposed to exterior with elastomeric sealant complying with Section 07 92 00: Joint Sealants to provide a watertight installation.

3.7 ERECTION TOLERANCES

- A. Maximum Variation from Plumb: 1/4 inch (6mm) per story, noncumulative.
- B. Maximum Offset from True Alignment: 1/4 inch (6mm).
- C. Maximum Out of Position: 1/4 inch (6mm).

3.8 ADJUSTING AND CLEANING

- A. Touchup Painting:
 - 1. Immediately after erection, clean field welds, bolted connections, and abraded areas. Paint uncoated and abraded areas with the same material as used for shop painting to comply with SSPC-PA 1 for touching up shop painted surfaces:
 - a. Apply by brush or spray to provide a minimum 2.0 mil (0.05 mm) dry film thickness.
- B. Touchup Painting: Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint are specified in Section 09 90 00: Painting and Coating.
- C. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A780/A780M.

END OF SECTION 05 50 00

SECTION 06 10 00 ROUGH CARPENTRY

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes rough carpentry, light hardware, and miscellaneous items of work not included in another Section. This Section also includes:
 - 1. Structural wood supports, grounds, backing, and blocking required for wood framed structures including but not limited to flooring, wall, roof and ceiling construction.
 - 2. Backing/blocking for millwork and casework items that are an integral part of wall, floor, and/or ceiling construction.
 - 3. Backing/Blocking for Mechanical-Plumbing-Electrical work and equipment.
 - 4. Plywood sheathing.
- B. Related Sections:
 - 1. Section 03 30 00: Cast-In-Place Concrete.
 - 2. Section 07 92 00: Joint Sealants.
 - 3. Section 09 21 16: Gypsum Board Assemblies.
 - 4. Section 10 28 13: Toilet Accessories.
- C. Reference Standards:
 - 1. The following references, codes, and standards are hereby made a part of this Section and carpentry work shall conform to applicable requirements therein except as otherwise specified herein or shown on the Drawings. Nothing contained in the Drawings or these Specifications shall be construed as permitting work that is contrary to code requirements:
 - a. Standard Grading and Dressing Rule #16, of the West Coast Lumber Inspection Bureau.
 - b. Grading Rules for Western Lumber of the Western Wood Products Association.
 - c. Standard Specifications for Grades of California Redwood Lumber of the Redwood Inspection Service.
 - d. American Wood Preservers Association (AWPA) Standard C 2-77 Lumber, Timbers, Bridge Ties and Mine Ties - Preservative Treatment by Pressure Processes.
 - e. American Wood Preservers Bureau (AWPB) Quality Control Standards.

1.3 QUALITY ASSURANCE

- A. Lumber and plywood shall be grade or quality marked by WWPA, WCLIB, APA, AWPB, or by other grading and inspection agencies acceptable to the Architect. Grade marks shall include the designation "S-DRY"(or "MC-15" as applies) where applicable. Grade and quality marks shall not be apparent on surfaces exposed in the finished work.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Store kiln dried materials in enclosed areas, protected from moisture and separated from contact with concrete or soil.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Temporary Construction: Clean lumber at Contractor's option, rough or smooth, as usage requires.
- B. Lumber Not Otherwise Specified or Noted:
 - 1. Douglas fir or larch, graded and grade-marked, according to Reference Standard 1.02 A or B, #1 grade:
 - a. Boards: Construction grade.
- C. Sill Plates (On Concrete): Construction grade light framing, pressure treated as hereinafter specified; as noted on Plans.
- D. Plywood for Walls and Roofs; As Noted On Plans:
 - 1. Unless glue type is otherwise specified, exterior plywood, interior plywood exposed to continuing moisture, and pressure treated plywood shall be fabricated with exterior glue. Plywood with interior glue shall be fully protected from soaking or continuing moisture at all times.
- E. Rough Hardware:
 - 1. Nails, spikes, bolts, screws, tacks, and framing connectors of standard manufacture as required. Hot dip galvanize items exposed to moisture or to exterior and those items that are in contact with wood pressure treated with waterborne salts:
 - a. Bolts and nuts: ASTM A307, Grade A.
 - b. Lag bolts: Fed. Spec. FF-B-561. Pre-drill per CBC.
 - c. Nails: Fed. Spec. FF-N-101, common unless otherwise noted or specified.
 - d. Joist hangers and framing connectors: Simpson or approved equal, unless otherwise noted.
 - e. Power driven fasteners: Hilti, Ramset, or approved equal, each use and fastener type subject to prior approval of Architect.
- F. Pressure Treatment (Decay and Termite Prevention):
 - 1. Pressure treat for decay and termite prevention, Douglas fir or larch wood materials that are embedded in or set against concrete.
 - 2. Treat in accordance with Reference Standard 1.02 E and quality mark as per Reference Standard 1.02 F.
 - 3. Treat with any of the following processes at Contractor option. Creosote type preservatives are not permitted:
 - a. Penta in an LPG carrier (Cellon) or Penta in Hydrocarbon Solvent-Type D (Dow Process) AWPB LP-4 quality marked.
 - b. Ammoniacal copper arsenate (ACA) or chromated copper arsenate (CCA) in a water carrier (AWPB LP-2 quality marked).
 - c. Disodium Octaborate Tetrahydrate (DOT) such as Advance Guard/Hi-bor by Osmose, Inc.
 - d. Members treated with waterborne salts shall be dried to a moisture content not exceeding 19 percent after treatment.
 - 4. Where possible, precut material before treatment.
 - 5. Holes and cutoffs and handling and storage shall be in accordance with AWPB M-4.
 - 6. Ensure that ferrous metal fastenings and items in contact with wood treated with waterborne salts are hot dip galvanized (1.25 oz. coating) where required by ICC reports.
- G. Building Paper and Felt: Kraft waterproof building paper or 15# unperforated asphalt saturated rag felt per CBC Standard 14-1.

- H. Framing Connectors: Simpson Strong Tie Corp., or equal.

2.2 MOISTURE CONTENT

- A. 19 percent maximum for two times thickness and less; 19 percent maximum for thickness greater than two times and less than four times; and 22 percent maximum for thickness greater than four times.

2.3 SIZES

- A. Surfaced to "DRY" sizes. Sizes noted are nominal unless shown as net.

2.4 SURFACING

- A. All wood materials exposed in the finished work shall have re-sawn surfaces of clean natural color unless noted or specified otherwise. Concealed framing lumber shall be S4S.

PART 3 EXECUTION

3.1 ERECTION AND INSTALLATION

- A. Framing: Conform to CBC where same covers points not indicated on Drawings. Properly lay out framing with pieces closely fitted, accurately plumbed, leveled and aligned, and rigidly secured in place.
- B. Except as specifically shown on structural drawings, cutting of all wood, etc. is limited to those cuts permitted by 2022 California Building Code (CBC).
- C. Bridging and Blocking: Conform to CBC. Provide two times blocking at intersections of finished surfaces for adequate bearing and at points where required to support fixtures, cabinets, hardware, and other equipment mounted on walls.
- D. Plywood (General): Unless more stringent requirements are indicated on the Drawings or required by code, application of plywood shall be in accordance with recommendations of the American Plywood Association.
- E. Connections and Fastenings: Conform to CBC. Unless otherwise specified or shown on the Drawings, conform to minimum nailing requirements of CBC. For bolted connections, provide washers under heads and nuts bearing on wood, and draw nuts tight. Retighten before closing in framing. Exercise care in nailing through exposed sheathing and siding and ensure that fasteners penetrate into framing members

END OF SECTION 06 10 00

SECTION 06 20 00 FINISH CARPENTRY AND MILLWORK

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Providing all finish carpentry items including, but not limited to:
 - a. Finish carpentry.
 - b. Millwork and cabinetry.
 - c. Solid Surface Countertop.
 - d. Plastic laminate.
 - e. Casework hardware.
 - f. Miscellaneous millwork.
 - 2. Installation of:
 - a. Finish hardware.
 - b. Plastic laminate faced wood doors.
- B. Related Sections:
 - 1. Section 05 50 00: Metal Fabrications.
 - 2. Section 06 10 00: Rough Carpentry.
 - 3. Section 08 71 00: Door Hardware.
 - 4. Section 09 21 16: Gypsum Board Assemblies.
- C. Reference Standards:
 - 1. Codes and references:
 - a. 2022 California Building Code Section 11B-309.
 - b. American Disabilities Act Design Guidelines (ADADG).
 - 2. American National Standards Institute:
 - a. ANSI A156.9 Cabinet Hardware.
 - b. ANSI A161.1 Woodwork Testing Standards.
 - c. ANSI A208.1 Mat-Formed Wood Particleboard.
 - 3. Woodwork Institute:
 - a. WI North American Architectural Woodwork Standards (current edition).
 - 4. National Electrical Manufacturers Association:
 - a. NEMA LD 3 High Pressure Decorative Laminates.

1.3 SUBMITTALS

- A. Product Data:
 - 1. Manufacturer's specifications and other data needed to prove compliance with specified requirements.
 - 2. Manufacturer's preprinted product information for all hardware proposed on the Project.
 - 3. Manufacturer's preprinted maintenance instructions for the casework hardware.
- B. Shop Drawings:
 - 1. Indicate size, material, and finish.
 - 2. Show locations and installation procedures, including hardware, sinks, service fixtures,

trim, and other pertinent data for each unit.

- C. Certification: Provide manufacturer's certification that casework has been fabricated and installed according to WI "Custom" Grade guidelines or better.
- D. Samples: Two (2) each, six-inch by six-inch by ¾-inch (6" x 6" x ¾") sample of specified particleboard core with grade stamp for use as verification of installed product.
- E. Closeout:
 - 1. Record drawings: Indicate revisions to original Drawings and shop drawings.
 - 2. Manufacturer contact names, addresses, and phone numbers.
 - 3. Finish material schedule: Names and color numbers of laminates and stains.
 - 4. Keys: Provide additional master key for each room and additional locksets totaling one percent (1%) of total Project for attic stock.

1.4 PERFORMANCE REQUIREMENTS

- A. Unless otherwise indicated, perform work in accordance with WI "Architectural Woodwork Standards," Custom Grade, except where specification exceeds those standards the more stringent shall govern.
- B. Fabricate millwork and cabinetry in accordance with ANSI A161.1, NEMA LD3, and general static load testing performed and certified by an independent testing agency covering the following areas of product performance, with these minimum results:
 - 1. Base cabinet construction/racking test: 800 pounds.
 - 2. Cabinet front joint loading test: 425 pounds.
 - 3. Wall cabinet static load test: 2,000 pounds.
 - 4. Drawer front joint loading test: 600 pounds.
 - 5. Drawer construction/static load test: 750pounds.
 - 6. Cabinet adjustable shelf support device/static load test: 300 pounds.
- C. Shelf Loading: Comply with loading/deflection standards of the Composite Panel Association.

1.5 QUALITY ASSURANCE

- A. Fabricator Qualifications: Shop that employs skilled workers who custom-fabricate products similar to those required for this Project and whose products have a record of successful in-service performance. Shop is a licensee of WI's Certified Compliance Program.
- B. Installer Qualifications: Licensee of WI's Certified Compliance Program.
- C. Quality Standard:
 - 1. Unless otherwise indicated, comply with WI's "Manual of Millwork" for grades of interior architectural woodwork indicated for construction, finishes, installation, and other requirements:
 - a. Before delivery to jobsite, millwork supplier:
 - 1) Licensees of WI shall issue a certified compliance certificate indicating millwork products being furnished for this Project, and certifying that these products and their installation, will fully meet requirements of grade or grades specified.
 - 2) Non-licensees of WI shall provide evidence that they have arranged for inspection by WI inspector after completion of fabrication and installation. If conditions are found to be compliant, inspector will issue Compliance Certificate indicating millwork products being furnished for this Project and

- certifying that these products and their installation will fully meet requirements of grade or grades specified.
- b. Each elevation of casework and each countertop shall bear certified compliance label.
 - c. Cabinet Design Series (CDS): CDS numbers on Drawings indicate typical designs.
- D. Certified Seismic Installation Program (CSIP):
- 1. Before wood or metal stud walls are closed up, provide a written Woodwork Institute CSIP report confirming that acceptable backing is provided in all locations required for casework installation or identifying those locations where backing is missing or improperly located:
 - a. Backing shall consist of a minimum of either three by six (3 x 6) flat Douglas Fir or 16-gage 50 KSI sheet metal.
 - 2. On completion of installation, provide a Woodwork Institute CSIP Certificate identifying the work covered and certifying that installation meets the requirements of the WI CSIP attachment details and schedules.
 - 3. All fees charged by the Woodwork Institute for their CSIP are the responsibility of the millwork installer and shall be included in their bid.
- E. Pre-Installation Conference:
- 1. See Section 01 31 00: Project Management and Coordination.

1.6 WARRANTY

- A. Warranty the work specified herein for five (5) years against becoming unserviceable or causing an objectionable appearance resulting from either defective or nonconforming materials and workmanship.
- B. Defects shall include but not be limited to the following:
 - 1. Rough or difficult operation, or loose or missing parts.
 - 2. Delamination of surfaces.
 - 3. Noticeable deterioration of finish.
 - 4. Warped or misaligned surfaces or telegraphing of subsurface imperfections.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Deliver completed laminate clad casework, countertops, and related products only after wet operations in building are completed. Store in ventilated place, protected from the weather, with relative humidity range of 20 to 50 percent.
- B. Protect finished surfaces from soiling and damage during handling and installation with a protective covering.

PART 2 PRODUCTS

2.1 MILLWORK MANUFACTURERS

- A. Woodwork Institute listed Accredited Millwork Companies, current roster and shall not preclude Contractor from using other manufacturers, provided they produce equivalent products of the type specified for the scope and size of the Project. Other manufacturers must have experience manufacturing products meeting or exceeding the specifications and must comply with the criteria performance set by the Woodwork Institute or as indicated in Part 1 of this Section and with Division 01 requirements regarding substitutions.

2.2 MILLWORK MATERIALS

- A. Plastic Laminate:
 - 1. High-pressure decorative laminate complying with NEMA LD3, and the following requirements:
 - a. Exterior color selection available:
 - 1) Architect to select from minimum of 250 selections available, including wood grain patterns and solid colors.
 - 2) Provide five (5) different colors available per project.
 - 3) If laminate has wood grain, direction of grain shall be vertical on door, end panels, fascia panels, and exposed backs; horizontal on drawer faces, aprons, and top rails.
 - 2. Laminate grades:
 - a. Exposed doors, finished end panels, and other vertical surfaces: GP28 (0.028 inch thick nominal)
 - b. Horizontal surfaces other than top: GP28 (0.028 inch thick nominal)
 - c. Cabinet liner: CL20 (0.020-inch nominal), white.
 - d. Work surfaces and countertops: GP50 (0.050-inch thick nominal) with BK20 (0.20-inch thick) backer sheet.
 - e. Backsplash: PH42 (0.042 inch nominal) with nominally balanced backer sheet.
 - 3. Adhesive: PVA water resistant adhesive. Contact adhesives not permitted.
 - 4. Pressure fused laminate:
 - a. NEMA LD3 VGL, and NEMA LD3 CLS, melamine resin impregnated, 120-gram PSM minimum, thermofused to core under pressure.
 - b. Color:
 - 1) Closed interiors, underside of wall cabinets: White.
 - 2) Exposed and semi-exposed open cabinets: Match exterior.
 - c. Provide balanced construction with same thermofused melamine. Unsurfaced coreboard or simple backers not allowed.
- B. Core Material:
 - 1. Particleboard: ANSI 208.1, Grade M-2-Exterior Glue.
 - 2. Medium-density fiberboard: ANSI A208.2, Grade MD.
 - 3. Plywood: Shop sanded, exterior grade veneer cored, hardwood faced, any species, with no defects affecting strength or utility. Overlay plywood not permitted. Plywood allowed at countertops and toe-base only.
 - 4. Water resistant treated plywood shall have 24-hour thickness swell factor of five percent (5%) or less and 24-hour water absorption factor of ten percent (10%) or less; P.S. 51, Type II or better.
 - 5. Cabinet components shall be of the following minimum core thicknesses:
 - a. Cabinet backs, drawer body, and drawer bottoms: ½-inch particleboard.
 - b. Door and drawer face, base, wall, and tall cabinet tops and bottoms, cabinet sides, drawer spreaders, cabinet back rear hangstrips, structural dividers, and exposed cabinet backs: ¾-inch particleboard.
 - c. Work surfaces and countertops: Minimum one-inch (1") particleboard or plywood, except use water resistant treated plywood core at counters with sinks.
 - d. Shelves: ¾-inch particleboard core for 30 inches long or less, one-inch (1") thick particleboard core for more than 30 inches long; 14-inch deep, unless otherwise noted. Provide vertical dividers for shelves over 36 inches long.
 - e. Cabinet toe-base: ¾-inch plywood. No particleboard within four inches (4") of floor.
- C. Countertops - WI Premium Grade: Where indicated on Drawings.
 - 1. Solid Surface:
 - a. Solid surfacing material thickness: ¾-inch (19 mm).
 - b. Backsplash to match countertops, min 4 inches unless otherwise indicated on

- Drawings.
- c. Colors, patterns, and finishes: Provide materials and products resulting in colors of solid surfacing material indicated on Drawings.
- 2. Quartz countertops:
 - a. Seams:
 - 1) Fabricate countertops without seams to the extent possible. When seams are necessary, fabricate countertops in sections indicated for joining in field, with sealant filled seams 1/16-inch (1.5 mm) in width.
 - b. Fittings: Drill countertops in shop for fittings and similar items.
 - c. Fabricate with four-inch (4") backsplashes. Sand minor scratches and stains with #400 then #600 sandpaper.
 - 3. Fabrication:
 - a. Fabricate tops in one piece, unless otherwise indicated. Comply with solid surfacing material manufacturer's written recommendations for adhesives, sealers, fabrication, and finishing:
 - 1) Fabricate tops with shop applied edges of materials and configuration indicated.
 - 2) Fabricate tops with loose backsplashes for field application.
 - b. Drill holes in countertops for plumbing fittings and soap dispensers in shop.
 - 4. Countertop construction tolerances:
 - a. Variation from plumb: For vertical lines and surfaces, do not exceed 1/16 inch in 48 inches (1.5 mm in 1,200 mm).
 - b. Variation from level: Do not exceed 1/8 inch in 96 inches (3 mm in 2,400 mm), 1/4-inch (6 mm) maximum.
 - c. Variation in joint width: Do not vary joint thickness more than 1/4 of nominal joint width.
 - d. Variation in plane at joints (lipping): Do not exceed 1/64-inch (0.4 mm) difference between planes of adjacent units.
 - e. Variation in line of edge at joints (lipping): Do not exceed 1/64-inch (0.4-mm) difference between edges of adjacent units, where edge line continues across joint.
- D. Countertops and Backsplashes:
- 1. Countertops: Where indicated on Drawings; provide countertops with rolled edges in as long as practical continuous lengths. Provide field glued splines at joints. No joints closer than 24 inches either side of sink cutout.
 - 2. Backsplash: Integral to countertop, four inches (4") high unless otherwise shown. Fabricate with single continuous sheet of laminate from front counter to top of splash with no joints from horizontal to vertical application. No joints shall occur at sink openings.
 - 3. At exposed countertop end corners, provide one-inch (1") radius, or similar safety treatment.
- E. Toe Spaces: Leave toe spaces unfinished for installation of resilient base, unless otherwise shown.
- F. End Panels and Filler Strips: Match adjacent case-piece.
- G. Edging:
- 1. Provide the following in accordance with "Edging Locations:"
 - a. Flat edge PVC: 0.020 inch. Solid, high-impact, purified, color-thru, acid resistant, machine-applied with hot melt adhesives.
 - b. Three-millimeter (3 mm) PVC: Solid, high-impact, purified, color-thru, acid resistant, pre-lamination primed edging, machine-applied with hot melt adhesives, and machine profiled to 1/8-inch radius.
 - 2. Edging locations:
 - a. Cabinet body edge, including door/drawer front spacer rail: Flat edge PVC, color

matched to door/drawer face or as selected.

- b. Forward edge of interior body components, interior dividers, shelf, and top edges of drawer body: Flat edge PVC to match cabinet interior surface color.
- c. Door/drawer-front edging: Three-millimeter (3 mm) PVC, color matched to standard laminates.

2.3 CABINET HARDWARE

- A. All hardware shall meet ANSI A156.9 and shall be subject to approval by the Architect. All keying shall match existing master key system and be approved by the Owner:
 - 1. Acceptable manufacturers:
 - a. Knappe & Vogt.
 - b. As specified herein, provide specified product, or Architect approved equal.
- B. Hinges:
 - 1. Heavy duty, five-knuckle 2-3/4-inch institutional type hinge shall meet ANSI/BHMA A156.9 Grade 1 requirements. Mill ground, hospital tip, Teflon coated tight pin feature with all edges eased. Hinge shall be full wrap around type of tempered steel 0.095 inch thick. Each hinge shall have minimum of nine (9) screws, #7, 5/8-inch FHMS to assure positive door attachment.
 - 2. One (1) pair per door to 48 inches height. 1-1/2 pair over 48 inches in height. Hinge shall accommodate 13/16 thick laminated door and allow 270-degree swing.
 - 3. Finish: US26D.
- C. Pulls: Wire design, four inches (4"), satin chrome, US26D finish.
- D. Sliding Door Hardware:
 - 1. Frameless 1/4-inch glass sliding doors; double track rolling door assembly.
 - 2. Framed 13/16-inch thick stile and rail sliding doors; top mounted track with dual roller hangers. Vertical adjustment for accurate alignment.
- E. Drawer Slides:
 - 1. Standard drawers: 3/4 extension, self-closing, white epoxy-coated, lever disconnect, positive in-stop/out-stop, nylon rollers, minimum 100-pound dynamic load rating at full extension.
 - 2. File drawers: Full extension, three-part progressive opening slide, precision steel ball bearing, minimum 100-pound dynamic load rating at full extension, zinc plated or epoxy coated at manufacturer's option.
 - 3. Provide body mounted molded rails for hanging file system for legal or letter size as indicated by manufacturer's model number. Cutting or machining of drawer body/face not permitted.
 - 4. Paper storage drawers: Full extension, self-closing, white epoxy-coated, lever disconnect, positive in-stop/out-stop, nylon rollers, minimum 150-pound dynamic load rating at full extension.
- F. Catches:
 - 1. Provide opening resistance in compliance with the Americans with Disabilities Act:
 - a. Provide top-mounted magnetic catch for base and wall cabinet door.
 - b. Provide two (2) at each tall cabinet door. Catch housing shall be molded in White.
- G. Adjustable Shelf Supports:
 - 1. Dual-pin design with anti-tip-up shelf restraints for both 3/4-inch and one-inch (1") shelves.
 - 2. Include keel to retard shelf slide-off, and slot for mechanical attachment of shelf to clip.
 - 3. Load rating shall be minimum 300 pounds each support without failure.

- H. Wardrobe Rod: 1-1/6-inch diameter plated steel rod, with captive sockets.
- I. Coat Hooks: Single and double prong, wall mount - satin aluminum.
- J. Locks: Five-disk tumbler cam-style with strike. Locks on cabinets in same room keyed alike. Provide two (2) keys per room where doors and drawers are scheduled to receive locks. Dull chrome finish. Lock core shall be removable with a control key, permitting Owner to change lock arrangements without tools.

2.4 SPECIALTY ITEMS

- A. Grommets:
 - 1. Approved Product/Manufacturer: Model No. EDP3 manufactured by Doug Mockett & Company, Inc. (basis of design), Manhattan Beach, CA; (800) 523-1269, or Architect approved equal.
 - 2. Size: 2-1/2 inches diameter with "Flip-Top"™ tab in cap.
 - 3. Colors: As selected by Architect from manufacturer's available colors.
 - 4. Number/location: Where electrical, telephone, and computer data wiring need to pass through tops whether shown or not.
- B. Keyboard Drawers (at all knee spaces):
 - 1. Approved product/manufacturer: No. SD-1 as manufactured by Knappe & Vogt; or Architect approved equal.
- C. Molded Personal Pencil Drawer: High-impact 100 Polystyrene with in-stop, out-stop, and self-closing features. Provide under top mounted 100-pound self-closing slides. Twelve (12) compartment drawer body, and slides, black. Provide where indicated on plans.
- D. Mailbox Label Holder: Brass, card size 1/2-inch by 2-3/16 inches. Provide one (1) at each opening.

2.5 SOLID STOCK

- A. Moisture Content: Percent of moisture in relation to over-dry weight shall be between eight percent (8%) and 13 percent at time of installation.
- B. Natural Finish Hardwood:
 - 1. Occasional knot permitted provided it is tight and smooth.
 - 2. Grain pattern: Rift-cut.
 - 3. Species: WI "Premium" Grade, white oak.
- C. Paint Grade Hardwood: Any species, including Parana Pine, except do not use oak, elm, or similar species that have coarse grain.

2.6 MISCELLANEOUS

- A. Utility Shelving: WI "Economy" grade.
- B. Clothes Rod: 1-1/2 inch diameter smooth wooden dowel by length required, with end supports and fasteners of type recommended to suit application.
- C. Telephone/MDF/IDF Board: Provide minimum four foot by eight foot by 3/4-inch (4' x 8' x 3/4") thick plywood for telephone/data punch down blocks and video equipment in accordance with Section 06 10 00: Rough Carpentry. Paint in accordance with Section 09 90 00: Painting and Coating.

2.7 MILLWORK FABRICATION

- A. Use the WI Custom Grade woodwork classification unless noted elsewhere complying with referenced quality standard.
- B. Fabricate casework, countertops, and related products to dimensions, profiles, and details shown on Drawings. Fabricate casework square, plumb, and true.
- C. Detailed Requirements for Cabinet Construction:
 - 1. Toe-base:
 - a. Continuous, ladder type platform with concealed fastening to cabinet bottom, level and secured to floor.
 - b. Toe-base at exposed cabinet end panels shall be recessed ¼-inch from face of finished end for flush installation of finished base material.
 - c. No cabinet sides-to-floor will be allowed.
 - 2. Cabinet top and bottom:
 - a. Solid sub-top shall be furnished for all base and tall cabinets.
 - b. At cabinets over 36-inches, bottoms and tops shall be mechanically joined by a fixed divider.
 - c. Assembly devices shall be concealed on bottom side of wall cabinets.
 - 3. Cabinet sides:
 - a. Doweled, and glued under pressure, or attached with fully concealed interlocking mechanical fasteners to sub-top and bottom.
 - b. Drill holes for adjustable shelves 1-1/4 inch on center.
 - 4. Cabinet backs:
 - a. Side bound, captured in grooves, recessed from cabinet rear, and securely fastened at top and bottom.
 - b. Hang rails shall be located at rear of cabinet back and fastened to cabinet sides. Provide minimum of two (2) at base, two (2) at wall, and three (3) at tall cabinets as instructed by casework manufacturer.
 - c. Provide removable back panels and closure panels for plumbing access at all sink cabinets, and where shown on Drawings.
 - 5. Exposed end corner and face frame attachment:
 - a. Butt joint, glued and finish nailed; or attached with fully concealed interlocked mechanical fasteners.
 - 6. Door and drawer fronts:
 - a. Drawer fronts and hinged doors shall overlay the cabinet body. Maintain a maximum 1/8-inch reveal between pairs of doors, between door and drawer front, or between multiple drawer fronts within the cabinet.
 - b. Where indicated, provide stile and rail doors with full 1/4-inch plate glass, hinged or sliding. Exposed lite-opening edges shall be trimmed and glazed with extruded glazing bead.
 - c. Where indicated, frameless sliding glass doors shall be 1/4-inch thick plate glass with ground and polished edges. Fit with anodized aluminum shoes and nylon rollers.
- D. Drawers:
 - 1. Drawer fronts: Apply to separate drawer body component sub-front.
 - 2. Drawer sides: Doweled to receive front and back, glued under pressure, machine squared.
 - 3. Drawer bottom: Set into front and sides, 1/4-inch deep groove with minimum 3/8-inch standing shoulder, continuously glued. Reinforce drawer bottoms with ½-inch by four-inch (4") front-to-back intermediate underbody stiffeners, mechanically fastened. One (1) at 24 inches, two (2) at 36 inches, and over.
 - 4. Paper storage drawers: Fitted with full width hood at back.
 - 5. Hanging file drawers shall be fabricated to accept letter size hanging folders

compatible with Pendaflex system.

- E. Vertical and Horizontal Dividers: As required by manufacturer for type and style of component.
- F. Door/Drawer Front Rail: As required by manufacturer for type and style of component, and hardware placement.
- G. Accessibility Requirements - 2022 California Building Code, Section 11B:
 - 1. The following special requirements shall be met, where specifically indicated on architectural Plans as "accessible" or by general note. Shall be in compliance with California title 24 access:
 - a. Countertop height: With or without cabinet below, not to exceed a height of 34 inches above finished floor (A.F.F.), at a surface depth of 24 inches.
 - b. Knee space clearance: Minimum 27 inches A.F.F. at apron, and 30 inches clear span width (11B-306.3).
 - c. Sink cabinet clearances: In addition to above, upper knee space frontal depth shall be no less than eight inches (8"), and lower toe frontal depth shall be no less than 11 inches, at a point nine inches (9") A.F.F., and as further described in 11B-306.
- H. Typical Desk or Counter Height at Knee Space Locations: 30 inches A.F.F.

PART 3 EXECUTION

3.1 JOB CONDITIONS

- A. Environmental Requirements:
 - 1. Do not install casework until permanent HVAC systems are operating and temperature and humidity have been stabilized for at least one (1) week:
 - a. Manufacturer/supplier shall advise Contractor of temperature and humidity requirements for architectural casework installation areas.
 - b. After installation, control temperature and humidity to maintain relative humidity between 25 and 55 percent.
- B. Conditions: Do not store or install casework in building until concrete, masonry, and drywall/plaster work is dry.

3.2 COORDINATION

- A. Coordinate the work of this Section with plumbing work specified in Division 22. Coordinate sink opening construction with sinks specified in Division 22 or as indicated on Drawings.
- B. Coordinate location of blocking in walls for installation and support of wall cabinets.

3.3 MILLWORK INSTALLATION

- A. Positioning: Place approximately level, plumb, and at right angles to adjacent work.
- B. Fitting: Where field cutting or trimming is necessary, perform in a neat, accurate, professional manner without damaging the products and adjacent work.
- C. Anchorage: Attach securely so the products will perform to their maximum ability without damage from inadequate fastenings.
- D. Fasten tops to frames with concealed clips, screws, and glue.

- E. Install simulated wood trim in locations shown on Drawings and in accordance with manufacturer's instructions.

3.4 EXISTING DOOR LAMINATE RESURFACING

- A. Resurfacing procedures shall be in accordance with the recommendations and instructions of the laminate and adhesive manufacturers.
- B. Acclimate laminate to the same environment as existing material at least 48 hours. Perform work in well-ventilated area, out of the way of construction dust and traffic to maintain clean adhesion.
- C. Clean the substrate with detergent or non-flammable solvent as instructed by laminate manufacturer to remove wax, grease, and polish deposits.
- D. Using a belt sander or sander instructed by manufacturer, sand entire surface to remove original finish. Remove sanding dust thoroughly.
- E. Coat the sanded surface and back of laminate with a uniform coating of contact adhesive. Allow to dry thoroughly prior to assembling. Assembling wet adhesive lines will trap solvent and may result in poor bonding. Follow the adhesive manufacturer's instructions.
- F. Index the laminate with the substrate. Make initial contact by smoothing with palms. Apply pressure using a "J" roller or rotary press. Allow to set as instructed by adhesive manufacturer to achieve full adhesion to maintain warranty. Trim with recommended tools.
- G. Apply laminate to door faces and exposed vertical edges. Apply edges before face. Paint top and bottom edges to color match facing.
- H. Coordinate hardware and vision lite cutouts with work of other Sections.

3.5 FINISH HARDWARE INSTALLATION

- A. The supplier will mark each item of hardware for location. Protect the markings until each item is installed. If any item is delivered to the job not properly marked, return it to the supplier for marking before attempting to install it.
- B. Check markings on hardware for proper location. Install and make necessary adjustments for proper working order. Any hardware damaged by improper adjustment or careless abuse will be replaced by Contractor at his expense.
- C. Provide clean, properly sized, and accurately placed mortises and drilled holes for all mortise hardware such as locksets and for cylindrical locks where specified only.
- D. Fit all surface-applied hardware accurately.
- E. After hardware is installed, protect exposed surfaces by use of heavy paper and masking tape and maintain until job completion.
- F. Remove all finish hardware except that which is primed for painting before painter's finish is applied. Permanently replace and re-adjust for proper function after painter's finish has dried hard.
- G. Millwork contractor shall be responsible for hardware on millwork.

3.6 PLASTIC LAMINATE FACED WOOD DOOR INSTALLATION

- A. Protect all doors during handling.
- B. Install doors in accordance with manufacturer's instructions.
- C. Install and adjust doors for smooth, quite operation.
- D. Refer to Section 08 81 00 Door Hardware where applicable.

END OF SECTION 06 20 00

SECTION 07 10 00 DAMPPROOFING AND WATERPROOFING

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Dampproofing and waterproofing system for masonry wall with brick veneer with rainscreen for masonry cavities:
 - 1. Masonry drainage mat.
 - 2. Weep vents.
- B. Related Sections:
 - 1. Section 03 30 00: Cast-In-Place Concrete.
 - 2. Section 04 22 00: Concrete Unit Masonry.

1.3 SUBMITALS

- A. Submit two (2) samples masonry mat, five inches by five inches (5" x 5") inches in size, and manufacturer's product datasheet. Label samples indicating thickness to be used.
- B. Submit two (2) samples weep vents, actual size and color, and manufacturer's product datasheet.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Store masonry drainage mat in clean, dry, sheltered area, off ground, until used. Protect packaging from direct, prolonged exposure to sun.
- B. Protect weep vents packaging from rain.

PART 2 PRODUCTS

2.1 MASONRY DRAINAGE MAT

- A. Manufacturer and Type: CavClear Masonry Mat as manufactured by Archovations, Inc., 701 Second Street, Hudson, WI 54016, (715) 381-5773.
- B. Description:
 - 1. Full-height air space maintenance and cavity drainage mat.
 - 2. The masonry drainage mat shall be specifically designed for masonry cavities to prevent mortar from making contact with the backup and ensure water management.
 - 3. The masonry drainage mat shall be fluid conducting, non-absorbent, mold and mildew resistant polymer mesh consisting of 100 percent recycled plastic with binder fibers.
 - 4. Masonry drainage mat is to be a non-woven textile product in random pattern and have voids no greater than 1/4 inch in diameter.
 - 5. Masonry mat is to be designed for substantially continuous installation behind the full-height of all masonry.
 - 6. Drainage mat thickness:
 - a. Select masonry mat thickness of 3/8 inch to allow no more than 3/8-inch tolerance

between the masonry mat and masonry wythe.

7. Sizes:
 - a. 16 inches by eight-foot (16" x 8') pieces.
 - b. Eight inches x eight-foot (8" x 8') pieces (when needed to accommodate other building components).

2.2 WEEP VENTS

- A. Manufacturer and Type: CavClear Weep Vents as manufactured by Archovations, Inc., 701 Second Street, Hudson, WI 54016, (715) 381-5773.
- B. Description:
 1. Non-woven mesh with notched bottom.
 2. Color selected by Project Architect to match mortar.
 3. Size: 3/8 inch by 2-1/2 inches high by 3-1/2 inches wide.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Install masonry drainage mat continuously throughout full-height of all exterior masonry cavities during construction of exterior wythe; follow manufacturer's installation instructions:
 1. Verify that air space width is no more than 3/8-inch greater than masonry mat thickness.
 2. Install horizontally between joint reinforcement.
 3. Stagger end joints in adjacent rows.
 4. Use multiple layers at bottom of wall and above through-wall flashings when air space depth exceeds masonry mat thickness by more than 3/8 inch.
 5. Extend extra mat at least to top of base flashing.
 6. Butt adjacent pieces to moderate contact.
 7. Fit to perimeter construction and penetrations without voids.
- B. Place weep vents in head joints at exterior wythe of cavity wall located immediately above ledges and flashing, spaced 24 inches on center, unless otherwise shown:
 1. Leave the side of the masonry units forming the vent space unbuttered and clear of mortar.
 2. Install with notched side down.
 3. Slide vent material into joint as the two masonry units forming the weep vent are placed.

END OF SECTION 07 10 00

SECTION 07 21 16 BATT INSULATION

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section is related to batt Insulation and includes information regarding the provision of fiberglass batt thermal insulation for exterior envelope assemblies.
- B. Reference Standards:
 - 1. Materials shall meet the property requirements of one or more of the following specifications as applicable to the specific product or end use:
 - a. American Society for Testing of Materials (ASTM):
 - 1) ASTM C423 Test Method for Sound Absorption Coefficient by the Reverberation Room Method.
 - 2) ASTM C518 Test Method for Steady State Thermal Transmission Properties by Means of the Heat Flow Meter.
 - 3) ASTM C665 Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing.
 - 4) ASTM C1320 Standard Practice for Installation of Mineral Fiber Batt and Blanket Thermal Insulation for Light Frame Construction.
 - 5) ASTM E84 Test Method for Surface Burning Characteristics of Building Materials.
 - 6) ASTM E119 Test Methods for Fire Tests of Building Construction and Materials.

1.3 SUBMITTALS

- A. Product Data: Submit data on product characteristics, performance criteria, and limitations, including installation instructions.

1.4 QUALITY ASSURANCE

- A. Sustainable Design:
 - 1. Provide products which have received the following certifications:
 - a. UL Certified Environmental Product Declaration in accordance with ISO 14025. Applies to EcoTouch® Faced and Unfaced Insulation.
 - b. UL Environment EcoLogo CCD-106, applies to EcoTouch® Faced and Unfaced Insulation.
 - c. GREENGUARD Indoor Air Quality Certified® and GREENGUARD Children & Schools CertifiedSM, applies to EcoTouch® Unfaced Batts and EcoTouch® Faced Batts and Rolls.
 - d. GREENGUARD Formaldehyde Free, applies to EcoTouch® Unfaced and EcoTouch® Faced Batts and Rolls.
 - e. Scientific Certification Systems SCS-MC-01025, SCS Certified minimum 65 percent recycled glass content (with at least 41 percent post-consumer recycled and the balance of pre-consumer recycled glass content), applies to EcoTouch® Unfaced Batts and Rolls.
 - f. Scientific Certification Systems SCS-MC-02676, SCS Certified minimum 58

percent recycled glass content (with at least 36 percent post-consumer recycled and the balance of pre-consumer recycled glass content), applies to EcoTouch® Faced Batts and Rolls.

- g. USDA Certified Biobased Products: EcoTouch® unfaced – 98 percent; EcoTouch® Kraft-faced – 57 percent; EcoTouch® FSK-faced – 78 percent.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials in manufacturer's original packaging.
- B. Store and protect products in accordance with manufacturer's instructions. Store in a dry indoors location. Protect insulation materials from moisture and soiling.
- C. Arrange storage of products to permit access for inspection. Periodically inspect to verify products are undamaged and are maintained in acceptable condition.
- D. Do not install insulation that has been damaged or wet; remove it from jobsite:
 - 1. An exception may be allowed in cases where Contractor is able to demonstrate that wet insulation when fully dried out (either before installation or afterward following exposure to system operating temperatures) will provide installed performance that is equivalent in respects to new, completely dry insulation. In such cases, consult the insulation manufacturer for technical assistance.

PART 2 PRODUCTS

2.1 BASIS OF DESIGN

- A. Thermal Insulation: EcoTouch® PINK® FIBERGLAS™ Insulation with PureFiber® Technology by Owens-Corning, Toledo, OH 43659; www.owenscorning.com.

2.2 MATERIALS

- A. EcoTouch® FS-25 Batt Insulation - ASTM C665, Type II (PSK facing), Class A and Type III (FSK facing), Class A preformed formaldehyde free glass fiber batt, poly/scrim/Kraft (PSK) or foil/scrim/Kraft (FSK) faced on one side:
 - 1. Flame spread less than 25, smoke developed index less than 50 per ASTM E84.
 - 2. ICC building construction classification: All types.
 - 3. Perm rating: 0.02 maximum per ASTM E96.
- B. Accessories:
 - 1. Provide accessories per insulating system manufacturer's recommendations, including the following:
 - a. Tape: Polyethylene self-adhering type for Kraft faced insulation and bright aluminum self-adhering type for foil faced insulation.
 - b. Insulation fasteners: Impale clip of galvanized steel; type recommended by insulation manufacturer for particular use intended.
 - c. Mechanical insulation fasteners: FM approved, corrosion resistant, size required to suit application.
 - d. Wire mesh: Galvanized steel, hexagonal wire mesh.
 - e. Spindle fasteners: Corrosion-resistant wire spindles.
 - f. Ventilation baffles: Formed plastic, metal, or cardboard sized to fit full width of rafter spaces.

2.3 PERFORMANCE CRITERIA

- A. Wood Frame Construction - Walls, R-Value - Per ASTM C518:
 - 1. R-21, 5-1/2-inch (139 mm) thickness, 15-inch (381 mm) or 23-inch (584 mm) width, 93-inch (2,362 mm) length at six-inch (6") studs.
 - 2. R-25, 15-inch (381 mm) or 23-inch (584 mm) width, 93-inch (2,362 mm) length at eight-inch (8") and 10-inch (10") studs.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Examine the areas and conditions under which work of this Section will be installed. Verify that adjacent materials are dry and ready to receive insulation. Verify mechanical and electrical services within walls have been tested and inspected.
- B. Provide written report listing conditions detrimental to performance of work in this Section. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Comply with manufacturer's installation instructions and ASTM C1320.
- B. Friction-fit blanket insulation in place, until the interior finish is applied. Install batts to fill entire stud cavity, with no gaps, voids, or areas of compression. If stud cavity is less than eight feet (8') in height, cut lengths to friction fit against floor and ceiling tracks. Walls with penetrations require that insulation be carefully cut to fit around outlets, junction boxes, and other irregularities:
 - 1. Do not install insulation on top of or within three inches (3") of recessed light fixtures unless the fixtures are approved for such use.
- C. Within exterior wall framing, install insulation between pipes and backside of sheathing. Cut or split insulation material as required to fit around wiring and plumbing.
- D. Where showers and bathtubs are located on exterior walls, install insulation and vapor retarder air barrier between units and exterior.
- E. If eave ventilation baffles are required, install ventilation baffles at eaves to hold insulation down from roof sheathing and provide positive ventilation from eave to attic space.
- F. Fluff insulation to full thickness for specified R-value before installation. Do not compress insulation in the cavity during installation, creating gaps or voids that could diminish thermal value.
- G. Trim insulation neatly to fit spaces. Fill miscellaneous gaps and voids with insulation.
- H. Fit insulation tight in spaces and tight to exterior side of mechanical and electrical services within the plane of insulation.
- I. For unfaced batt insulation, install with friction fit or retain in place with manufacturer's recommended fasteners or mesh.
- J. For batt insulation with factory-applied facing, install with vapor retarder membrane facing warm in the winter side of building spaces or as specified by local building code. Lap ends and side flanges of membrane over or between framing members. Tape to seal tears, cuts, or misalignments in membrane.

- K. Secure insulation in place using one of the following methods: Friction fit; staple or nail facing flanges in place as needed, tape in place, retain in place with spindle fasteners, retain in place with wire mesh secured to framing members.

3.3 PROTECTION

- A. Protect installed insulation from damage due to weather and physical abuse until protected by permanent construction.

END OF SECTION 07 21 16

SECTION 07 22 00 ROOF AND DECK INSULATION

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes roof insulation over the properly prepared deck substrate.
- B. Related Sections:
 - 1. Section 07 52 16: SBS Modified Bitumen Membrane Roofing.
- C. Reference Standards:
 - 1. American Society for Testing and materials (ASTM):
 - a. ASTM A653 Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvanized) by the Hot-Dip Process.
 - b. ASTM B29 Standard Specification for Refined Lead.
 - c. ASTM B32 Standard Specification for Solder Metal.
 - d. ASTM C165 Standard Test Method for Measuring Compressive Properties of Thermal Insulation.
 - e. ASTM C208 Standard Specification for Cellulosic Fiber Insulation Board.
 - f. ASTM C209 Standard Test Method for Cellulosic Fiber Insulating Board.
 - g. ASTM C272 Standard Test Method for Water Absorption of Core Materials for Structural Sandwich Constructions.
 - h. ASTM C518 Standard Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus.
 - i. ASTM C578 Standard Specification for Perlite Thermal Insulation Board.
 - j. ASTM C728 Standard Test Methods for Fire Test of Roof Coverings.
 - k. ASTM C1289 Standard Specification for Faced Rigid Polyisocyanurate Thermal Insulation.
 - l. ASTM C1396 Standard Specification for Gypsum Wallboard.
 - m. ASTM D5 Standard Test Method for Penetration of Bituminous Materials.
 - n. ASTM D36 Standard Test Method for Softening Point of Bitumen (Ring and Ball Apparatus).
 - o. ASTM D312 Standard Specification for Asphalt Used in Roofing.
 - p. ASTM D412 Standard Test Methods for Vulcanized Rubber and Thermoplastic Rubbers and Thermoplastic Elastomers-Tension.
 - q. ASTM D1621 Standard Test Method for Compressive Properties of Rigid Cellular Plastics.
 - r. ASTM D1622 Standard Test Method for Apparent Density of Rigid Cellular Plastics.
 - s. ASTM D1863 Standard Specification for Mineral Aggregate Used on Built-Up Roofs.
 - t. ASTM D2126 Standard Test Method for Response of Rigid Cellular Plastics to Thermal Humid Aging.
 - u. ASTM D2178 Standard Specification for Asphalt Glass Felts used in Roofing and Waterproofing.
 - v. ASTM D4601 Standard Specification for Asphalt-Coated Glass Fiber Base Sheet Used in Roofing.
 - w. ASTM D5147 Standard Sampling and Testing Modified Bituminous Sheet Material.

2. Cast Iron Soil Pipe Institute, Washington, D.C. (CISPI).
 - a. Factory Mutual Research (FM): Roof Assembly Classifications.
3. National Roofing Contractors Association (NRCA): Roofing and Waterproofing Manual.
4. Underwriters Laboratories, Inc. (UL): Fire Hazard Classifications.
5. Warnock Hersey (WH): Fire Hazard Classifications.
6. Sheet Metal and Air Conditioning Contractors National Association (SMACNA).
7. Steel Deck Institute, St. Louis, Missouri (SDI).
8. Southern Pine Inspection Bureau, Pensacola, Florida (SPIB).
9. Insulation Board, Polyisocyanurate (FS HH-I-1972).
10. Insulation Board, Thermal (Fiberboard) (FS LLL-1-535B).

1.3 SUBMITTALS

- A. Product Data: Provide manufacturer's specification data sheets for each product.
- B. Provide approval letters from insulation manufacturer for use of their insulation within this particular roofing system type.
- C. Provide a sample of each insulation type.
- D. Shop Drawings:
 1. Submit manufacturer's shop drawings indicating complete installation details of tapered insulation system, including identification of each insulation block, sequence of installation, layout, drain locations, roof slopes, thicknesses, crickets, and saddles.
 2. Shop drawing shall include outline of roof, location of drains, a complete board layout of tapered insulation components, thickness, and the average "R" value for the completed insulation system.
- E. Certification:
 1. Submit roof manufacturer's certification that insulation fasteners furnished are acceptable to roof manufacturer.
 2. Submit roof manufacturer's certification that insulation furnished is acceptable to roofing manufacturer as a component of roofing system and is eligible for roof manufacturer's system warranty.

1.4 QUALITY ASSURANCE

- A. Fire Classification, ASTM E108.
- B. Manufacturer's Certificate: Certify that roof system furnished is approved by Factory Mutual, Underwriters Laboratories, Warnock Hersey, or approved third party testing facility in accordance with ASTM E108, Class A for external fire, and meets local or nationally recognized building codes.
- C. Manufacturer's Certificate: Certify that the roof system is adhered properly to meet or exceed the requirements of FM 1-90.
- D. Pre-Installation Meeting: Refer to Division 07 (roofing specifications) for pre-installation meeting requirements.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products to site with seals and labels intact, in manufacturer's original containers, dry and undamaged.

- B. Store all insulation materials in a manner to protect them from the wind, sun, and moisture damage prior to and during installation. Any insulation that has been exposed to any moisture shall be removed from the Project site.
- C. Keep materials enclosed in a watertight, ventilated enclosure (i.e. tarpaulins).
- D. Store materials off the ground. Any warped, broken, or wet insulation boards shall be removed from the site.

PART 2 PRODUCTS

2.1 PRODUCTS, GENERAL

- A. Basis of Design: Materials, manufacturer's product designations, and/or manufacturer's names specified herein shall be regarded as the minimum standard of quality required for work of this Section. Comply with all manufacturer and contractor/fabricator quality and performance criteria specified in Part 1.
- B. Substitutions:
 - 1. Products proposed as equal to the products specified in this Section shall be submitted in accordance with bidding requirements and Division 01 provisions:
 - a. Proposals shall be accompanied by a copy of the manufacturer's standard specification section. That specification section shall be signed and sealed by a professional engineer licensed in the State of California. Substitution requests containing specifications without licensed engineer certification shall be rejected for non-conformance.
 - b. Include a list of three (3) projects of similar type and extent, located within a 100-mile radius from the location of the Project. In addition, the three (3) projects must be at least five (5) years old and be available for inspection by the Architect, Owner, or Owner's representative.
 - c. Equivalency of performance criteria, warranty terms, submittal procedures, and contractual terms will constitute the basis of acceptance.
 - d. The Owner's decision regarding substitutions will be considered final. Unauthorized substitutions will be rejected.

2.2 INSULATION MATERIALS

- A. Thermal Insulation Properties and Approved Insulation Boards:
 - 1. Rigid polyisocyanurate roof insulation; ASTM C1289:
 - a. Qualities: Rigid, closed cell polyisocyanurate foam core bonded to heavy duty glass fiber mat facers.
 - b. Thickness: Minimum 5.2 inches.
 - c. R-Value: Minimum 30.
 - d. Compliances: UL, WH, or FM listed under Roofing Systems; Federal Specification HH-I-1972, Class 1.
 - e. Acceptable products:
 - 1) ENRGY-3; Johns Manville.
 - 2) H-Shield; Hunter.
 - 3) EnergyGuard; GAF.
 - 4) Approved equivalent.
 - 2. Tapered polyisocyanurate roof insulation; ASTM C1289:
 - a. Qualities: Factory tapered, closed cell polyisocyanurate foam core bonded to heavy duty glass fiber mat facers.
 - b. Thickness: Minimum as needed for taper crickets for proper slope to drains, tapered design required as part of submittal process.

- c. Average R-Value: Minimum varies.
- d. Tapered Slope: One inch (1").
- e. Compliances: UL, WH, or FM listed under Roofing Systems; Federal Specification HH-I-1972, Class 1.
- f. Acceptable products:
 - 1) ENRGY 3; Johns Manville.
 - 2) EnergyGuard; GAF.
 - 3) H-Shield; Hunter.
 - 4) Approved equivalent.
- 3. High density fiberboard roof insulation; ASTM C208:
 - a. Qualities: Rigid, composed of interlocking fibers factory blended treated with asphalt on the top side.
 - b. Board size: Four feet by eight feet (4' x 8').
 - c. Thickness: Minimum 1/2 inch.
 - d. Compliances: UL, WH, FM listed under Roofing Systems; Federal Specification LLL-I-535-B.
 - e. Acceptable manufacturers:
 - 1) Blue Ridge; Celotex.
 - 2) Temple Inland.
 - 3) Georgia-Pacific.
 - 4) Approved equivalent.
- 4. Dens-deck prime roof board:
 - a. Qualities: Nonstructural glass mat faced, noncombustible, water-resistant treated gypsum core panel.
 - b. Board size: Four feet by eight feet (4'x8').
 - c. Thickness: 1/2 inch.
 - d. R-Value: .56.
 - e. Compliances: UL, WH, or FM listed under Roofing Systems.

2.3 RELATED MATERIALS

- A. Fiber Cant and Tapered Edge Strips:
 - 1. Preformed rigid insulation units of sizes/shapes indicated, matching insulation board or of perlite or organic fiberboard, as per the approved manufacturer:
 - a. Acceptable manufacturers:
 - 1) The Garland Company, Inc.
 - 2) Celotex.
 - 3) Johns Manville.
 - 4) GAF.
 - 5) Approved Equivalent.
- B. Protection Board: Pre-molded semi-rigid asphalt composition board 1/2 inch.
- C. Roof Board Joint Tape: Six inches (6") wide glass fiber mat with adhesive compatible with insulation board facers.
- D. Asphalt: ASTM D312, Type III Steep Asphalt.
- E. Roof Deck Insulation Adhesive:
 - 1. Insul-Lock E HR - dual-component, high rise foam adhesive with 45 percent rapidly renewable material content as recommended by insulation manufacturer and approved by FM indicated ratings:
 - a. Tensile strength (ASTM D412): 250 psi.
 - b. Density (ASTM D1875): 8.5 lbs./gal.
 - c. Viscosity (ASTM D2556): 22,000 to 60,000 cP.
 - d. Peel strength (ASTM D903): 17 lb/in.

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e. Flexibility (ASTM D816): Pass at -70 degrees F.

F. Fasteners:

1. Corrosion resistant screw fastener as recommended by roof membrane manufacturer:
 - a. Factory Mutual tested and approved with three inches (3") coated disc for I-90 rating; length required to penetrate metal deck one inch (1").

PART 3 EXECUTION

3.1 EXECUTION, GENERAL

A. Comply with requirements of Section 01 73 00: Execution.

3.2 INSPECTOR OF SURFACES

- A. Roofing contractor shall be responsible for preparing an adequate substrate to receive insulation:
1. Verify that work that penetrates roof deck has been completed.
 2. Verify that wood nailers are properly and securely installed.
 3. Examine surfaces for defects, rough spots, ridges, depressions, foreign material, moisture, and unevenness.
 4. Do not proceed until defects are corrected.
 5. Do not apply insulation until substrate is sufficiently dry.
 6. Broom clean substrate immediately prior to application.
 7. Use additional insulation to fill depressions and low spots that would otherwise cause ponding water.
 8. Verify that temporary roof has been completed.

3.3 INSTALLATION

- A. Base Layer(s) - Attachment with Mechanical Fasteners:
1. Approved insulation board shall be fully attached to the deck with an approved mechanical fastening system. As a minimum, the amount of fasteners shall be in accordance with manufacturer's recommendation for FM I-90 system. Otherwise, a minimum of one (1) fastener per two (2) square feet shall be installed.
 2. Filler pieces of insulation require at least two (2) fasteners per piece if size of insulation is less than four (4) square feet.
 3. Spacing pattern of fasteners shall be as per manufacturer's recommendations to meet the FM requirements. Placement of any fastener from edge of insulation board shall be a minimum of three inches (3"), and a maximum of six inches (6").
 4. Minimum penetration into deck shall be as recommended by the fastener manufacturer. There is a one inch (1") minimum for metal, wood, and structural concrete decks where not specified by the manufacturer. For gypsum and cement-wood fiber decks, penetration shall be determined from pull-out test results with a minimum penetration of 1-1/2 inches.
 5. Gypsum and Cementitious Wood Fiber Decks: Where the roof deck is visible from the building interior, Contractor shall ensure no penetration of fasteners through underside of the deck. Any holes or spalling caused by fastener installation shall be repaired by the roofing contractor. Where the new roof system thickness exceeds an amount so that a minimum of 1-1/2 of penetration cannot be achieved with an Olympic TB Fastener, or approved equivalent, then (and only then) toggle bolts may be used to secure installation to the deck.
 6. Tape joints of insulation as per manufacturer's requirements.
- B. Top Layer - Attachment with Insulation Adhesive Approved by FM:

ROOF AND DECK INSULATION

1. Ensure all surfaces are clean, dry, free of dirt, debris, oils, loose or embedded gravel, unadhered coatings, deteriorated membrane, and other contaminants that may inhibit adhesion.
2. Apply insulation adhesive directly to the substrate using a ribbon pattern with 1/4-inch to 1/2-inch wide beads 12 inches o.c., using either the manual applicator or an automatic applicator, at a rate of one (1) gallon per one hundred (150) square feet per cartridge.
3. Immediately place insulation boards into wet adhesive. Do not slide boards into place. Do not allow the adhesive to skin over before installing insulation boards.
4. Briefly step each board into place to ensure contact with the adhesive. Substrates with irregular surfaces may prevent the insulation board from making positive contact with the adhesive. Relief cuts or temporary weights may be required to ensure proper contact.
5. All boards shall be cut and fitted where the roof deck intersects a vertical surface. The boards shall be cut to fit a minimum of 1/4 inch away from the vertical surface.
6. Tape joints of insulation as per manufacturer's requirements.

3.4 CLEANING

- A. Remove debris and cartons from roof deck. Leave insulation clean and dry, ready to receive roofing membrane.

3.5 CONSTRUCTION WASTE MANAGEMENT

- A. Remove and properly dispose of waste products generated during installation. Comply with requirements of authorities having jurisdiction.

END OF SECTION 07 22 00

SECTION 07 25 00 WEATHER BARRIERS

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes requirements including but not limited to:
 - 1. Commercial weather barrier assemblies.
 - 2. Flexible flashing.
 - 3. Weather barrier flashing.
 - 4. Fluid-applied flashing.
 - 5. Weather barrier accessories.
 - 6. Drainage material.
- B. Related Sections:
 - 1. Section 04 22 00: Concrete Unit Masonry.
 - 2. Section 07 21 16: Batt Insulation.
 - 3. Section 07 46 46: Fiber-Cement Siding.

1.3 DEFINITIONS

- A. Weather Barrier:
 - 1. A combination of materials and accessories that do the following:
 - a. Prevents the accumulation of water as a water-resistive barrier.
 - b. Minimizes the air leakage into or out of the building envelope as a continuous air barrier.
 - c. Provides sufficient water vapor transmission to enable drying as a vapor-permeable membrane.
- B. Water-Resistive Barrier: A combination of materials and accessories that prevent the accumulation of water within the wall assembly.
- C. Continuous Air Barrier: The combination of interconnected materials, assemblies, and sealed joints and components of the building envelope that minimize air leakage into or out of the building envelope per ASHRAE 90.1 Section 5.4.3.1.
- D. Vapor Diffusion: A slow movement of individual water vapor molecules from regions of higher to lower water vapor concentration (higher to lower vapor pressure).
- E. Vapor Permeable Membrane: The property of having a water-vapor permeance rating of ten (10) perms (575 ng/Pa x s x sq. m) or greater, when tested in accordance with the desiccant method using Procedure A of ASTM E96. Vapor permeable material permits the passage of moisture vapor through vapor diffusion.

1.4 SUBMITTALS

- A. Product Data:
 - 1. Technical data for each type of product:
 - a. Building wrap: Submit data on air and water-vapor permeance based on testing according to referenced standards.

- B. Shop Drawings: Show details of weather barrier at terminations, openings, and penetrations. Show details of flexible flashing applications.
- C. Preconstruction Mockup:
 - 1. Owner will engage in a third-party testing program.
 - 2. Test reports: Prepared by a qualified testing agency for each mockup.
 - 3. Record drawings: As-built drawings showing changes as a result of the mockup and illustrated in the CCD approved by DSA if applicable.
- D. Manufacturer's Instructions: For installation of each product specified.
- E. Sample of manufacturer's warranty.
- F. Reports: Field test and inspection reports, as applicable.
- G. Installer's weather barrier manufacturer training certificate.

1.5 QUALITY ASSURANCE

- A. Qualifications:
 - 1. Installer: Company specializing in installing weather barriers with minimum five (5) years' experience and approved by manufacturer.
- B. Source Limitations: Provide weather barrier and accessory materials produced by single manufacturer.
- C. Pre-Installation Meetings: To be conducted onsite.

PART 2 PRODUCTS

2.1 WEATHER BARRIER

- A. Commercial Building Wrap - ASTM E2357 passed, Air Barrier Association of America (ABAA) evaluated air barrier assembly, and assembly water resistance per ASTM E331; with flame-spread and smoke-developed indexes of less than 25 and 450, respectively, when tested in accordance with ASTM E84; UV stabilized for nine (9) month exposure; and acceptable to authorities having jurisdiction:
 - 1. Basis of design product:
 - a. Subject to compliance with requirements, provide DuPont Safety & Construction E. I. du Pont de Nemours and Company; Tyvek® CommercialWrap® a comparable product by one of the following:
 - 1) Dow Chemical Company.
 - 2) Raven Industries, Inc.
 - 3) Approved equal.
 - 2. Performance characteristics:
 - a. Air permeance: Not more than 0.001 cfm/sq. ft. at 1.57 lbf/sq. ft. (0.005 L/s x sq. m at 75 Pa) when tested in accordance with ASTM E2178.
 - b. Water vapor permeance: Not less than 23 perms (1,300 ng/Pa x s x sq. m) per ASTM E96/E96M, Desiccant Method (Procedure A) or not less than 28 perms (1,600 ng/Pa x s x sq. m) per ASTM E96, Water Method (Procedure B).
 - c. Water penetration resistance: Hydrostatic head resistance greater than 7.7 feet (2.35 m) in accordance with AATTC TM127.
 - d. Drainability: 98 percent or greater when tested in accordance with ASTM E2273.
 - e. Weather barrier system to have a VOC content of 30 g/L or less.

2.2 WEATHER BARRIER FLASHING

- A. Conformable Weather Barrier Flashing - Composite flashing material composed of micro-creped, polyethylene laminate with a 100 percent butyl-based adhesive layer; AAMA 711 Class A (no primer), Level 3 thermal exposure, 176 degrees F (80 degrees C) for seven (7) days:
1. Basis of design product:
 - a. Subject to compliance with requirements, provide DuPont Safety & Construction FlexWrap™ NF or comparable product by Architect:
 - 1) Conformability: Able to create a seamless sill pan extending up the jambs without cuts, patches, or fasteners.
 - 2) ASTM E331 applies to water penetration testing of exterior windows, skylights, doors, and curtain walls.
 - 3) Water penetration: No leakage at 15 psf (720 Pa) per ASTM E331.
 - 4) Low temperature adhesion: Exceeds minimum value of 1.5 lb./in. (0.26N/mm) at 25 degrees F (-4 degrees C) as Class A (without primer use).
 - 5) Adhesion after water immersion: Exceeds minimum value of 1.5 lb./in. (0.26N/mm), after AAMA 800, Sections 2.4.1.3.1/2.4.1.4.3, Test B.
- B. Strip Flashing - Composite flashing material composed of spunbonded polyethylene laminate with 100 percent butyl-based, dual-sided, adhesive layer; AAMA 711, Class A (no primer), Level 3 thermal exposure, 176 degrees F (80 degrees C) for seven (7) days:
1. Basis of design product:
 - a. Subject to compliance with requirements, provide DuPont Safety & Construction StraightFlash™ or comparable product approved by Architect:
 - 1) ASTM E331 applies to water penetration testing of exterior windows, skylights, doors, and curtain walls.
 - 2) Water penetration: No leakage at 15 psf (720 Pa) per ASTM E331.
 - 3) Low temperature adhesion: Exceeds minimum value of 1.5 lb./in. (0.26N/mm) at 25 degrees F (-4 degrees C) as Class A without primer use.
 - 4) Adhesion after water immersion: Exceeds minimum value of 1.5 lb./in. (0.26N/mm), after AAMA 800, Sections 2.4.1.3.1/2.4.1.4.3, Test B.

2.3 FLUID-APPLIED FLASHING

- A. Fluid-Applied Flashing - Trowel or brush applied, non-water soluble, single component, silyl terminated polyether technology (STPE), vapor permeable, flashing material:
1. Basis of design product:
 - a. Subject to compliance with requirements, provide DuPont Safety & Construction E. I. du Pont de Nemours and Company; Tyvek® Fluid Applied Flashing & Joint Compound+ or comparable product approved by Architect:
 - 1) VOC content: ASTM C1250, less than two percent (2%) by weight and between 25 to 30 g/L.
 - 2) Water vapor transmission: ASTM E96, Method B, greater than 20 perms (1,100 ng/Pa x s x sq. m) at 25 mils (0.635 mm) thick.
 - 3) Minimum tensile strength: ASTM D412, 165 lb/sq. ft. (1,140 kPa).
 - 4) Minimum elongation at break: ASTM D412; 360 percent.

2.4 WEATHER BARRIER ACCESSORIES

- A. Building-Wrap Tape - Pressure-sensitive plastic tape recommended by weather barrier manufacturer for sealing joints and penetrations in commercial building wrap:
1. Basis of design product: DuPont Safety & Construction E. I. du Pont de Nemours and Company; Tyvek® Tape.

- B. Closed-Cell Polyurethane Foam Insulation - Low pressure, low expansion, single component polyurethane foam, with maximum flame-spread and smoke-developed indexes of 15 and 25, respectively, per ASTM E84:
 - 1. Basis of design product: DuPont Safety & Construction E. I. du Pont de Nemours and Company; DuPont™ Window & Door Foam.
 - 2. Pressure build-up: 0.0247 psi (0.170 kPa) maximum, AAMA 812.
 - 3. Deflection: 0.0050 inch (0.127 mm) maximum, AAMA 812.
- C. Fasteners with Self-Gasketing Washers - Commercial building wrap manufacturer's recommended pneumatically or hand-applied fasteners with 1-inch (25 mm) diameter, high-density polyethylene cap washers with UV inhibitors:
 - 1. Basis of design product: DuPont Safety & Construction E. I. du Pont de Nemours and Company; Tyvek® Wrap Caps.
- D. Primer for Flashings - Synthetic rubber-based product; spray applied. Strengthen adhesive bond at low temperature applications between weather products such as self-adhered flashing products, commercial building wraps, and common building sheathing materials:
 - 1. Basis of design product: DuPont Safety & Construction E. I. du Pont de Nemours and Company, DuPont™ Adhesive Primer.
 - 2. Peel adhesion test - Passes in accordance with ASTM D3330, Test Method F, for the following:
 - a. Peel Angles: 0, 25, 72, and 180 degrees.
 - b. Substrates: Concrete masonry units (CMU), exterior gypsum sheathing, oriented strand board (OSB), aluminum, and vinyl.
 - 3. Chemical compatibility: Pass; AAMA 713.
 - 4. Flame spread index: 5; ASTM E84.
 - 5. Smoke development index: 0; ASTM E84.
- E. Sealants: Provide sealants that comply with ASTM C920, elastomeric polymer sealant to maintain watertight conditions. Refer to Section 07 92 00: Joint Sealants.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Examine substrates, with installer present, for compliance with requirements.
- B. Verify that substrate and surface conditions are in accordance with commercial weather barrier manufacturer recommendations prior to installation:
 - 1. Verify that rough sill framing for doors and windows is sloped downwards towards the exterior and is level across width of the opening.
- C. Verify that surfaces to receive weather barrier flashing are clean, dry, and free of frost.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Direct water onto an acceptable weather barrier drainage plane with an unobstructed path to exterior of wall:
 - 1. Provide a drainage path for water intrusion through window and door attachment system that collects at window and door sills and directs water to the exterior or weather barrier.

3.3 COMMERCIAL BUILDING WRAP INSTALLATION

- A. General: Comply with weather barrier manufacturer's written instructions and warranty requirements.
- B. Cover exposed exterior surface of sheathing with weather barrier securely fastened to framing immediately after sheathing is installed:
 - 1. Maintain continuity of air and water barrier assemblies.
 - 2. Start weather barrier installation at a building corner, leaving 12 inches (300 mm) of weather barrier extended beyond corner to overlap.
 - 3. Install weather barrier horizontally starting at lower portion of wall surface.
 - 4. Provide minimum six inches (150 mm) overlap at horizontal and vertical wrap seams in a shingle manner to maintain continuous downward drainage plane and air and water barrier.
- C. Seams:
 - 1. Seal seams with building wrap tape per manufacturer's recommended installation instructions:
 - a. Shiplap horizontal seams in weather barrier to facilitate proper drainage.
- D. Fasteners:
 - 1. Use weather barrier manufacturer's recommended fasteners to secure weather barrier and install fasteners according weather barrier manufacturer's installation guidelines:
 - a. Do not use temporary fasteners to permanently attach weather barrier.
 - b. Do not place fasteners with gasketing washers where weather barrier flashing will be installed.
 - c. Install fasteners with gasketing washers through flashing where recommended by manufacturer.
- E. Openings:
 - 1. Completely cover openings with weather barrier, then cut weather barrier membrane to openings according to weather barrier manufacturer's installation guidelines:
 - a. Provide head and jamb flaps and seam overlaps to maintain continuous drainage.
 - b. Repair damage to weather barrier using method recommended by weather barrier manufacturer.
 - c. Install flashing according to weather barrier manufacturer's installation guidelines.

3.4 WEATHER BARRIER FLASHING INSTALLATION

- A. Installation:
 - 1. Remove wrinkles and bubbles, and reposition weather barrier as necessary to produce a uniform, smooth surface:
 - a. Ensure that ambient and substrate surface temperatures are acceptable in accordance with manufacturer instructions and recommendations.
 - b. Wipe surfaces to remove moisture, dirt, grease, and other debris that could interfere with adhesion.
 - c. Apply weather barrier manufacturer's recommended primer over concrete, masonry, and glass-mat gypsum wall sheathing substrates to receive weather barrier flashing.
 - d. Lap weather barrier flashing a minimum of two inches (50 mm) onto weather barrier.
 - e. Apply pressure over entire surface using roller or firm hand pressure.
- B. Rough Openings:
 - 1. Shiplap flashing with weather barrier in a shingle manner to maintain a continuous downward drainage plane and air and water barrier in accordance with manufacturer's written instructions:
 - a. Retain first option below for stud framing that is nominally four inches (100 mm)

- thick. Retain second option for stud framing that is nominally six inches (150 mm) thick.
 - b. Apply 9-inch (230 mm) wide conformable weather barrier flashing at door and window sills.
 - c. Ensure that sill flashing does not slope to the interior.
 - d. Install backer rod in joint between frame of opening product and flashed rough opening on the interior.
 - e. Apply sealant or closed-cell polyurethane foam insulation around entire opening/fenestration product to create air seal around interior perimeter of window openings in accordance with weather barrier manufacturer's instructions.
 - f. Weather barrier flashing selection and application methods are specific to type of opening product and rough opening configuration. When building envelope design requirements exceed ASTM E1677, 65 mph equivalent structural load, and 15 mph equivalent wind-driven rainwater infiltration resistance, use butyl-based DuPont™ "StraightFlash™" and wrap cap screws in subparagraphs below.
 - g. Around door and window openings, apply butyl-based flashing to flaps of weather barrier.
 - h. Use strip flashing with wrap cap screws to secure head flap of the windows.
- C. Penetrations:
- 1. Apply weather barrier manufacturer's recommended weather barrier flashing patches behind fastening plates, such as brick-tie base plates, metal-flashing clips, and metal channels:
 - a. Seal weather barrier around each penetration with weather barrier manufacturer's recommended self-adhered flashing product or sealant. Integrate products with flanges into the weather barrier.
- D. Terminations:
- 1. Provide minimum two inches (50 mm) overlap using strip flashing on adjoining roof and base of wall systems to maintain continuous downward drainage plane:
 - a. Secure weather barrier with fasteners and weather barrier flashing.

3.5 FLUID-APPLIED FLASHING INSTALLATION

- A. Before installing fluid-applied flashing, do the following:
- 1. Ensure drainage path is not blocked or disrupted. Do not install on walls that do not feature a continuous path for moisture drainage. Blocked or disrupted paths for drainage can result in excess moisture buildup in wall cavity. Do not install below grade.
 - 2. Remove surface dust, dirt, and loose mortar.
 - 3. Verify that surface is free of grease and other contaminants and that surface is smooth.
 - 4. Fill joints in concrete masonry units, and voids in cast-in-place concrete with trowel-applied fluid-applied flashing to ensure surface is flush and smooth.
 - 5. Allow masonry mortar and cast-in-place concrete a minimum of 24 hours to cure before installing fluid-applied flashing.
- B. Fluid-Applied Flashing Installation:
- 1. Using a trowel or brush, apply fluid-applied flashing around perimeter of window and door openings to a minimum thickness of 25 mils (0.635 mm):
 - a. Extend flashing a minimum of two inches (50 mm) onto exterior face of adjacent surface.
 - b. Inspect for gaps and pinholes in fluid-applied flashing and apply additional coats until no gaps and pinholes appear.
 - c. Joint applications - using a trowel or a brush, fill cracks and voids up to 1/4 inch (6 mm) in width:
 - 1) For joints and cracks between 1/4 inch and 1/2 inch (6 mm and 12 mm) wide,

- cover first with mesh tape.
- 2) For joints and cracks between 1/2 inch and 1 inch (12 mm and 24 mm) wide, cover first with butyl-based strip flashing.
- 3) Apply a bead, then trowel smooth.
- 4) Seam coverage should be a minimum of two inches (50 mm) wide and 15 to 20 mils (0.38 mm to 0.51 mm) thick.
- 5) Inspect for gaps and pinholes in fluid-applied flashing and apply additional coats until no gaps and pinholes appear.

3.6 DRAINAGE MATERIAL INSTALLATION

- A. Install drainage material with grooves or channels running vertically in compliance with manufacturer's written instructions.

3.7 FIELD QUALITY CONTROL

- A. Manufacturer's Field Service: Engage a factory authorized service representative to train installers and observe subject test wall areas and installations.
- B. Testing Agency: Engage a qualified third-party testing agency to perform tests and inspections.
- C. Test Area: Perform tests on one (1) bay at least 30 feet (9.15 m), by one story
- D. Field Quality Control Testing:
 - 1. Perform the following test on representative areas of structural-sealant-glazed curtain walls:
 - a. Air infiltration whole building: ASTM E779 at not more than 0.40 cfm/sf (2.00 L/s per sq. m) at 1.57 lb/sq. ft. (75 Pa), pursuant to local building codes.
 - b. Water penetration:
 - 1) ASTM E105 at a minimum uniform static-air-pressure differential of 0.67 times the static-air-pressure differential specified for laboratory testing in "Performance Requirements" article, but not less than 2.86 lbf/sq. ft. (137 Pa). No water penetration shall occur as defined in ASTM E1105:
 - a) Perform a minimum of two (2) tests in areas as directed by Architect.
- E. Prepare test and inspection reports.

3.8 CLEANING

- A. Immediately remove release paper and scrap from work area and dispose of material.

3.9 PROTECTION

- A. Protect installed weather barrier from the following:
 - 1. Damage from cladding, structure, or a component of the structure (e.g., window, door, or wall system).
 - 2. Contamination from building site chemicals, premature deterioration of building materials, or nonstandard use or application of products.
 - 3. Foreign objects or agents, including the use of materials incompatible with weather barrier products.
 - 4. UV exposure in excess of products' stated limits.

END OF SECTION 07 25 00

SECTION 07 46 47 EXTERIOR FIBER-CEMENT SIDING AND TRIM

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Furnish and install exterior fiber-cement siding, with all fasteners and attachments required to complete work.
- B. Related Sections:
 - 1. Section 05 50 00: Metal Fabrications.
 - 2. Section 06 10 00: Rough Carpentry.
 - 3. Section 07 25 00: Weather Barriers.
 - 4. Section 07 92 00: Joint Sealants.

1.3 SUBMITTALS

- A. Product Data:
 - 1. Manufacturer's specifications and other data needed to prove compliance with specified requirements.
 - 2. Manufacturer's installation instructions.
- B. Shop Drawings: Indicate size, material, and construction details. Show locations and installation procedure of each item. Include details of joints, attachments, and clearances.
- C. Certification: Manufacturers affidavit that materials used in Project contain no asbestos.
- D. Samples: Manufacturer's full range of colors, patterns, and textures for Architect's selection.

1.4 QUALITY ASSURANCE

- A. Installer Qualifications: An installer acceptable to manufacturer and Architect required for this Project.
- B. Source Limitations: Obtain from single source from single manufacturer.
- C. Mockups:
 - 1. Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for materials and execution:
 - a. Build mockup of typical wall area as shown on Drawings.
 - b. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
 - c. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.5 WARRANTY

- A. Warrant the work specified herein for 50 years against becoming unserviceable or causing an objectionable appearance resulting from both defective or nonconforming materials and workmanship.
- B. Defects shall include, but not be limited to:
 - 1. Cracking.
 - 2. Rotting.
 - 3. Delaminating.
 - 4. Damage due to moisture or termites.

PART 2 PRODUCTS

2.1 EXTERIOR FIBER-CEMENT SIDING

- A. Manufacturer (Basis of Design):
 - 1. Nichiha Corporation, 18-19 Nishiki 2-chrome Naka-ku, Nagoya, Aichi 460-8610, Japan.
 - 2. Nichiha USA, Inc., 6465 E. Johns Crossing, Suite 250, Johns Creek, GA. 30097 Office 770-805-9466, Fax 770-805-9467 www.nichiha.com
 - 3. Product designations: As listed below there are two (2) products noted. Refer to Drawings for location and product configuration.
- B. Designated Product One:
 - 1. Nichiha Vintage Wood Series. See Drawings for color designations.
 - 2. Thickness: 5/8 inch.
 - 3. Weight: 35.27 lbs./panel.
 - 4. Sheet Sizes: 18 inches high by six feet (6') or ten feet (10') long.
 - 5. Fiber cement panels manufactured from a pressed, stamped, and autoclaved mix of Portland cement, fly ash, silica, recycled rejects, and wood fiber bundles. With factory applied sealant gasket add to top and right panel edges; all joints contain a factory sealant.
 - 6. Panel profile along all four edges such that both horizontal and vertical joints between the installed panels are ship lapped.
 - 7. Non-combustibility: Product is non-combustible and shows no flame support or loss of integrity.
 - 8. Surface burning capabilities (when tested in accordance with ASTM E84):
 - a. Flame spread: 0.
 - b. Fuel contributed: 0.
 - c. Smoke developed: 5.
 - 9. Finish: Factory primed with long lasting, acrylic-based primer ready for field painting under Section 09 90 00: Painting and Coating, in color selected by Architect.
 - 10. Warranty: 50-Year Limited, Transferable, Product Warranty.
- C. Designated Product Two:
 - 1. Nichiha Sandstone Series. See Drawings for color designation.
 - 2. Thickness: 5/8 inch.
 - 3. Weight: 35.27 lbs./panel.
 - 4. Sheet Sizes: 18 inches high by six feet (6') or ten feet (10') long.
 - 5. Fiber cement panels manufactured from a pressed, stamped, and autoclaved mix of Portland cement, fly ash, silica, recycled rejects, and wood fiber bundles. With factory applied sealant gasket add to top and right panel edges; all joints contain a factory sealant.
 - 6. Panel profile along all four edges such that both horizontal and vertical joints between the installed panels are ship lapped.
 - 7. Non-combustibility: Product is non-combustible and shows no flame support or loss of integrity.

8. Surface burning capabilities (when tested in accordance with ASTM E84):
 - a. Flame spread: 0.
 - b. Fuel contributed: 0.
 - c. Smoke developed: 5.
9. Pattern: As shown on Drawings or selected by Architect from manufacturer's standard selection.
10. Finish: Factory primed with long lasting, acrylic-based primer ready for field painting under Section 09 90 00: Painting and Coating, in color selected by Architect.
11. Warranty: 50-Year Limited, Transferable, Product Warranty.

2.2 INSTALLATION COMPONENTS

- A. Ultimate Clip System:
 1. Starter track:
 - a. Horizontal panel installations - FA 700 – Ten-foot (10') long galvalume.
 - b. Vertical panel installations (ten-foot [10'] panels only) – FA 300T – six-foot-six-inches (6'6") long galvalume.
 2. Panel clips:
 - a. JEL 777 "Ultimate Clip" (10 mm rainscreen for 5/8-inch AWP) – 400 series stainless steel:
 - 1) Joint tab attachments included for six-foot (6') horizontal installations.
 3. Single flange sealant backer – FHK 1017 (10 mm) – 6.5-foot long fluorine coated galvalume.
 4. Double flange sealant backer – FH 1020 (10 mm) – ten-foot (10') long fluorine coated galvalume.
 5. Corrugated spacer – FS 1005 (5 mm), FS 1010 (10 mm) – four-feet (4') long.
 6. Finish clip (optional) – JE310 (5 mm).
- B. Aluminum Trim: Paint as specified in finish schedule.
- C. 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.
- D. Flashing: Flash all areas specified in manufacturer's instructions. Do not use raw aluminum flashing. Flashing must be galvanized, anodized, or PVC coated.
- E. Sealant: Sealant shall be polyurethane or hybrid and comply with ASTM C920.

PART 3 EXECUTION

3.1 EXTERIOR FIBER-CEMENT SIDING INSTALLATION

- A. Install siding over framing members in accordance with manufacturer's recommendations.
- B. Applying Siding:
 1. Start siding as recommended by manufacturer.
 2. Keep fasteners two inches (2") from corners of panel.
 3. Start at edge and work across.
 4. Follow caulk and paint requirements.
 5. Keep fasteners 3/8 inch from panel edges.
 6. Place fasteners two inches (2") in from all corners; do not nail into corners.

7. When caulking vertical panel joints, space panels in accordance with caulk manufacturer's required bead size.
 8. Use "Z" bar or similar type flashing for all horizontal joints.
- C. Grade Clearance:
1. Place minimum of six inches (6") clearance between bottom edge of panel/framing and concrete mow-strip.
- D. Roof Clearance: Leave two-inch (2") clearance between roofing and bottom edge of siding.
- E. Nailing:
1. Use corrosion resistant nails (galvanized or stainless steel) in type and size recommended by manufacturer.
 2. Fasteners must be corrosion resistant, galvanized or stainless steel. Electro-galvanized nails are not acceptable due to premature corrosion. Hot-dipped galvanized nails, such as the Maze® brand or that of an equivalent brand or recommended.
- F. Pneumatic Fastening:
1. Siding can be hand nailed or fastened with the use of a pneumatic tool. Set air pressure so that the fastener is driven snug with the panel surface.
 2. Use a flush mount attachment on pneumatic tool. This will help control the depth that the nail is driven. This will be especially helpful when more than one pneumatic tool is being used off the same compressor.
 3. Do not staple.
 4. Drive fasteners perpendicular to siding and framing.
 5. Fastener heads should fit snug against siding.
 6. Do not over-drive nail heads or drive nails at an angle.
 7. If nail is countersunk, caulk nail hole and add a nail.

3.2 FINISHING

- A. Patching: Dents, chips, and cracks can be filled with a cementitious patching compound.
- B. Caulking: A high quality, paintable latex caulk complying with ASTM C834. Caulking should be applied in accordance with caulking manufacturer's written application instructions. Leave 1/8-inch gap at trim and caulk.
- C. Painting: As specified in Section 09 90 00: Painting and Coating.

3.3 CLEANING

- A. Remove debris and clean siding in accordance with manufacturer's written instructions.

END OF SECTION 07 46 47

SECTION 07 52 16 SBS MODIFIED BITUMINOUS MEMBRANE ROOFING

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Modified bituminous membrane roofing.
 - 2. Nails and fasteners.
 - 3. Roofing walkway pads.
 - 4. Coping and flashing: For areas immediately adjacent to roofing membrane.
- B. Scope of Work:
 - 1. Deck type:
 - a. Metal/ wood/ concrete/ lightweight concrete:
 - 1) Install insulation per insulation section.
 - 2) Install as top insulation layer: 1/2-inch DensDeck Prime. Tape all joints.
 - 2. Torch apply SBS-modified torch base sheet, 120 mil – HPR Torch Base Sheet
 - 3. Torch apply SBS-modified torch cap sheet, 135 mil – Stressply IV Mineral.
 - 4. Torch apply SBS-modified flashing ply in all flashing areas -- HPR Torch Base Sheet – extending the flashing base ply six inches (6") onto the roof field. Torch apply SBS-modified flashing cap sheet in all flashing areas -- Stressply IV Mineral – extending nine inches (9") onto the roof field.
 - 5. Spray or roll apply Title 24, reflective white coating at two (2) gallons per square – Pyramic. No moisture on roof prior to application. Power wash the roof prior to the coating.
 - 6. Install walk pads leading to equipment from roof hatch.
 - 7. No pitch pockets on roof. Lead flash all penetrations. Roofing contractor to supply and install all lead flashings. Install umbrella cover for all flashings.
 - 8. Flashing details:
 - a. All flashing plies to be terminated with a termination bar set in butyl tape and fastened every six inches (6") o.c. Caulk above the termination bar.
 - b. All flashings to be terminated with a termination bar set in butyl tape. Termination bar to be fastened every six inches (6") o.c. with caulking above the termination bar.
 - c. At any metal curb flashings or parapet walls, install 1/2-inch DensDeck Prime board prior to flashing application.
 - d. All sheet metal to be installed with ANSI SPRI ES-1 compliant metal.
 - 9. Install new lead flashings at all penetration. Umbrella cover required for the lead flashing. No pitch pockets.
 - 10. Place all conduits, pipes, and any other utility lines on rubber blocks as needed.
 - 11. Raise all units to six-inch to eight-inch (6"-8") flashing height above top of roof surface. Build new wood curbs as needed.
 - 12. Contractor to be responsible for any ponding water. Contractor to ensure positive drainage.
- C. Related Sections:
 - 1. Section 05 31 00: Steel Decking.
 - 2. Section 06 10 00: Rough Carpentry.
 - 3. Section 07 62 00: Sheet Metal Flashing and Trim.

- D. Reference Standards:
1. American Society of Civil Engineers (ASCE):
 - a. ASCE 7 Minimum Design Loads for Buildings and Other Structures.
 2. American Society for Testing and Materials (ASTM):
 - a. ASTM D451 Standard Test Method for Sieve Analysis of Granular Mineral Surfacing for Asphalt Roofing Products.
 - b. ASTM D1079 Standard Terminology Relating, to Roofing, Waterproofing and Bituminous Materials.
 - c. ASTM D1227 Standard Specification for Emulsified Asphalt Used as a Protective Coating for Roofing.
 - d. ASTM D1863 Standard Specification for Mineral Aggregate Used as a Protective Coating for Roofing.
 - e. ASTM D2824 Standard Specification for Aluminum-Pigmented Asphalt Roof Coating.
 - f. ASTM D4586 Standard Specification for Asphalt Roof Cement, Asbestos-Free.
 - g. ASTM D5147 Standard Test Method for Sampling and Testing Modified Bituminous Sheet Materials.
 - h. ASTM D6162 Standard Specification for Styrene Butadiene Styrene (SBS) Modified Bituminous Sheet Materials Using a Combination of Polyester and Glass Fiber Reinforcements.
 - i. ASTM D6163 Standard Specification for Styrene Butadiene Styrene (SBS) Modified Bituminous Sheet Materials Using Glass Fiber Reinforcements.
 - j. ASTM E108 Standard Test Methods for Fire Test of Roof Coverings.
 3. Factory Mutual Research (FM) Roof Assembly Classifications.
 4. National Roofing Contractors Association (NRCA) Roofing and Waterproofing Manual.
 5. Underwriters Laboratories, Inc. (UL) Fire Hazard Classifications.
 6. Warnock Hersey (WH) Fire Hazard Classifications.

1.3 SUBMITTALS

- A. Product Data:
1. Submit manufacturer product data for all products necessary for completion of roofing system and as specified including manufacturer's technical product data, installation instructions, and recommendations for each type of roofing product required. Include data substantiating that materials comply with minimum specified requirements.
- B. Test Data and Certifications:
1. Submit independent test data according to ASTM D5147 Standard Test Methods for Sampling and Testing Modified Bituminous Sheet Material, substantiating that materials comply with specified requirements.
 2. Submit independent test data that indicates the cap sheet complies with CRCC and Title 24 requirements.
 3. Submit certification that the roof system furnished is approved by Factory Mutual, Underwriters Laboratories, or Warnock Hersey for external fire E-108 Class IA and that the roof system is adhered properly to meet or exceed 1-90.
 4. Submit copy of ISO 9001 certified compliance.
- C. Calculations:
1. Submit engineered wind-uplift calculations, stamped by a registered California engineer, that membrane manufacturer warranting wind uplift speeds of up to 85 mph for all components of field assembly and perimeter flashing systems.
- D. Manufacturer Qualifications:
1. Submit list of facilities where the proposed material has been used in a similar roofing system as that which is specified and within a 100-mile radius from the location of the specified job. Include a minimum of three (3) projects at least three (3) years old and

- that are available for the District to inspect.
2. Submit manufacturer's inspector qualifications with certification to perform inspections signed by an officer of the company for this specific Project. Also, show evidence that roofing manufacturer has five (5) years of experience performing daily site inspections during construction and preparing daily inspection reports with a full time employee of that manufacturer. Contact information will be required for verification.
- E. Installer Qualifications.
- F. Samples:
1. Submit samples of each product being proposed for use. Provide a wet sample of the membrane adhesive and provide third party testing for zero VOC membrane adhesive.
- G. Warranty:
1. Submit unexecuted manufacturer's 30-year high-performance edge-to-edge no dollar limit (NDL) warranty covering labor and materials for all components of the roofing system required against leaks, edge to edge (perimeter metal) and deck up (all base sheets, flashing components, and insulation. Warranty covers metal coping, counter flashing, and edge metal where applicable, insulation, base ply, cap, coating, lead flashings, and any and all miscellaneous roof flashings.
- H. Shop Drawings:
1. Submit manufacturer engineered stamped shop drawings, layouts, and coordinated details.

1.4 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Roofing system manufacturer shall have a minimum of 30 years' experience in manufacturing bitumen roofing products in the United States and be ISO 9001 certified. Manufacturer must have local references and have five (5) years' experience in daily site inspections and daily inspection reports forwarded to manufacturer.
- B. Installer Qualifications: Installer (roofer) shall be specializing in modified bituminous roof application with minimum ten (10) years' experience and who is currently approved (within the last three [3] years) by the roofing system manufacturer as qualified to install manufacturer's roofing materials.
- C. Installer's Field Supervision: Require installer to maintain a full-time supervisor/foreman on jobsite during all phases of bituminous sheet roofing work and at any time roofing work is in progress; proper supervision of workmen shall be maintained. In addition, a minimum two (2) hour fire watch is required on each day that torch applied membranes are installed. A copy of the specification shall be in the possession of the supervisor/foremen and on the roof at all times.
- D. It shall be the General Contractor/roof contractor's responsibility to respond immediately to correction of roof leakage during construction. If the roof contractor does not respond within 24 hours, District has the right to hire a qualified roof contractor and back charge the original General Contractor/roof contractor.
- E. Pre-Application Roofing Conference:
1. Before scheduled commencement of modified bitumen roof system installation and associated work, meet at Project site with installer of each component of associated work, installers of deck or substrate construction to receive roofing work, installers of rooftop units and other work in the around roofing must precede or follow roofing work (including mechanical work if any), the District, roofing system manufacturer's

representative, and other representatives directly concerned with performance of the work, including (where applicable) the District's insurers, test agencies, and governing authorities:

a. Objectives to include:

- 1) Review foreseeable methods and procedures related to roofing work.
- 2) Tour representative areas of roofing substrates (decks), inspect, accept, or identify any deficiencies of substrate, roof drains, curbs, penetrations and other preparatory work performed by other trades.
- 3) Review structural loading limitations of deck and inspect deck for loss of flatness and for required attachment.
- 4) Review roofing system requirements (Drawings, Specifications, and other Contract Documents).
- 5) Review approved submittals and shop drawings.
- 6) Review and finalize construction schedule related to roofing work and verify availability of material, 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 (if not mandatory requirement).
- 9) Record (Contractor) discussion of conference including decisions and agreements (or disagreements) reached and furnish copy of record to each party attending. If substantial disagreements exist at conclusion of conference, determine how disagreements will be resolved and set date for reconvening conference.
- 10) Review notification procedures for weather or non-working days.

F. Manufacturer's Duties To District:

1. During the installation of the roofing, the manufacturer will provide the following:
 - a. Keep District informed as to the progress and quality of the work as observed.
 - b. Jobsite inspections a minimum of five (5) days a week. Daily inspection reports sent to the District representatives and Contractor each day.
 - c. Report in writing any failure or refusal of Contractor to correct unacceptable practices called to Contractor's attention.
 - d. Confirm after completion of the Project that no application procedures are in conflict with the specifications other than those that may have been previously reported and corrected.
 - e. A qualified roofing inspector to conduct inspections of the roofing installation on the Project.
2. Upon completion of the Project, the manufacturer will provide the following:
 - a. Provide warranty to District at no additional charge.
 - b. Provide a minimum of two (2) inspections annually of the roof during the warranty period. Notify the District prior to any inspections. Provide a written report of findings and schedule of work and or repairs, if any should be necessary, within ten (10) days of inspection.
 - c. Provide all future necessary work and or repairs at no cost to the District. Manufacturer to acknowledge this requirement with a signed document from an officer of the company.

1.5 WARRANTY

- A. Roofing contractor will provide a minimum of a five (5) year no limit warranty to the membrane manufacturer with a copy directly to District.
- B. Manufacturer will provide manufacturer's 30-year high-performance edge-to-edge no dollar

limit (NDL) warranty covering 100 percent labor and materials for all components installed by roofing contractor.

- C. Membrane manufacture will provide a minimum of two (2) inspections annually for the roof for the entire warranty period and will provide all work necessary for warranty at no cost to the District.
- D. Single source warranty from the manufacturer covering all membranes, coatings, and specified perimeter roof flashings in other sections that meet ANSI SPRI ES I code requirements.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products to site with seals and labels intact, in manufacturer's original containers, dry, and undamaged. Any damaged material to be noted at delivery and returned at no cost to the District.
- B. Store and handle roofing sheets in a dry, well-ventilated, weather-tight place to ensure no possibility of significant moisture exposure. Store rolls of felt and other sheet materials on pallets or other raised surface. Stand all roll materials on end. Cover roll goods with a canvas tarpaulin or other breathable material (not polyethylene).
- C. Do not leave unused materials on the roof overnight or when roofing work is not in progress unless protected from weather and other moisture sources.

PART 2 PRODUCTS

2.1 GENERAL

- A. The design is based upon roofing systems engineered and manufactured by The Garland Company or approved equal:
 - 1. The Garland Company
3800 East 91st Street
Cleveland, Ohio 44105
Miles Taylor
310-367-7655
- B. Basis of Design:
 - 1. Materials, manufacturer's product designations, and/or manufacturer's names specified herein shall be regarded as the minimum standard of quality required for work of this Section:
 - a. Substitutions: Refer to General Conditions.

2.2 DESCRIPTION

- A. Modified bituminous roofing materials:
 - 1. Torch grade base sheet – high performance roofing (HPR) torch base sheet fully adhered to approved torchable substrate with roofer's torches.
 - 2. All flashings will include one (1) ply of SBS torch grade base sheet – HPR Torch Base sheet and one (1) ply of SBS torch modified membrane.
 - 3. The modified membrane cap sheet.
 - 4. Flashing bond - mastic

2.3 SHEET MATERIALS - PERFORMANCE CHARACTERISTICS

- A. Styrene-Butadiene-Styrene (SBS) Roofing Membrane:
 - 1. ASTM D6163 Type III Grade G.
 - 2. Tensile strength (ASTM D5147):
 - a. 2 in/min. @ 73.41+/- 3.6°F MD 310 lbf/in CMD 310 lbf/in.
 - b. 50 mm/min. @ 23 +/- 3°C MD 54.25 kNm CMD 54.25 kNm.
 - 3. Tear strength (ASTM D5147):
 - a. 2 in/min. @ 73.41+/- 3.6°F MD510lbf CMD 510 lbf.
 - b. 50 mm/min. @ 23 +/- 3°C MD 2269N CMD 22269 N.
 - 4. Elongation at maximum tensile (ASTM D5147):
 - a. 2 in/min. @ 73.4+/- 3.6°F MD 6.0% CMD 6.0%.
 - b. 50 mm/min. @ 23 +/- 3°C.
 - 5. Low temperature flexibility (ASTM D5147): Passes -40 degrees F (-23 degrees C).
- B. High Performance Roofing (HPR) Torch Base Sheet:
 - 1. Tensile strength (ASTM D5147):
 - a. 2 in/min. @ 73.4+/- 3.6°F MD 210 lbf/in.
 - 2. Tear strength (ASTM D5147):
 - a. 2 in/mn. @ 73.4+/- 3.6°F MD 250 lbf.
 - 3. Elongation at maximum tensile (ASTM D5147):
 - a. 2 in/min. @ 73.4+/- 3.6°F MD 4.0%.

2.4 SURFACINGS

- A. White water based acrylic, low VOC, reflective roof coating applied at two (2) gallons per square:
 - 1. Elongation: 250% min.
 - 2. Emittance: 94%.
 - 3. SRI: 101.

2.5 RELATED MATERIALS

- A. Nails and Fasteners: Non-ferrous metal or galvanized steel, except that hard copper nails shall be used with copper; aluminum or stainless steel nails shall be used with aluminum; and stainless steel nails shall be used with stainless steel, r addition plates should be used. Fasteners shall be self-clinching type of penetrating type as recommended by the manufacturer of the deck material. Nails and fasteners shall be flush-driven through flat metal discs of not less than one-inch (1") diameter. Omit metal discs when one-piece composite nails or fasteners with heads not less than one-inch (1") diameter are used.
- B. Walkway Pads: As recommended and furnished by the membrane manufacturer set in approved adhesive to control foot traffic on rooftop surface and give a durable system compliant non-slip walkway.
- C. Walkway Pad Adhesive: Adhesive used to adhere approved walk way pads as recommended and furnished by the membrane manufacturer.
- D. Coping Cap Metal: 22-gauge, galvanized, Kynar coated coping cap sheet metal. Must meet ANSI SPRI ES I code requirement and be manufactured and warranted by membrane manufacturer.
- E. Butyl Tape: 100 percent solids, asbestos free and compressive tape designed to seal as recommended and furnished by the membrane manufacturer.
- F. Four (4) pound lead Jacks with umbrella covers for flashing penetrations.

PART 3 EXECUTION

3.1 PROJECT CONDITIONS

- A. Weather Condition Limitations: Do not apply roofing membrane during inclement weather or when a 40 percent change of precipitation is expected.
- B. Do not apply roofing insulation or membrane to damp deck surface.
- C. Do not expose materials vulnerable to water or sun damage in quantities greater than can be weatherproofed during same day.
- D. Proceed with roofing work only when existing and forecasted weather conditions will permit unit of work to be installed in accordance with manufacturer's recommendations and warranty requirements.
- E. All slopes greater than 2:12 require back-nailing to prevent slippage of the ply sheets. Use ring or spiral-shank one-inch (1") cap nails, or screws and plates at a rate of one (1) fastener per ply (including the membrane) at each insulation stop. When slope exceeds 2:12, install all plies parallel to the slope (strapping) to facilitate back nailing. Install four (4) additional fasteners at the upper edge of the membrane when strapping the plies.

3.2 SEQUENCING AND SCHEDULING

- A. Sequence installation of modified bituminous sheet roofing with related units of work specified in other Sections to ensure that roof assemblies including roof accessories, flashing, trim, and joint sealers are protected against damage from effects of weather, corrosion, and adjacent construction activity.
- B. All work must be fully completed on each day. Phased construction will not be acceptable.

3.3 EXAMINATION

- A. Examine substrate surfaces to receive modified bitumen sheet roofing system and associated work and conditions under which roofing will be installed. Do not proceed with roofing until unsatisfactory conditions have been corrected in a manner acceptable to roof system manufacturer and installer.

3.4 GENERAL INSTALLATION REQUIREMENTS

- A. Cooperate with manufacturer, inspection, and test agencies engaged or required to perform services in connection with installing the roof system.
- B. Insurance/Code Compliance: Where required, install and test the roofing system to comply with governing regulation and specified insurance requirements.
- C. Protect other work from spillage of roofing materials and prevent materials from entering or clogging drains and conductors. Replace or restore other work damaged by installations of the modified bituminous roofing system work.
- D. Coordinate installing roofing system components so that insulation and roofing plies are not exposed to precipitation or left exposed overnight. Provide cut-offs at end of each day's work to cover exposed ply sheets and insulation with two (2) plies of #15 organic roofing felt with joints and edges sealed with roofing cement and other jointly agreed upon tie-in detail. Remove cut-offs immediately before resuming work.

- E. Substrate Joint Penetrations: Prevent bitumen from penetrating substrate joints, entering building, or damaging roofing system components.
- F. Apply roofing materials as specified herein unless recommended otherwise by manufacturer's instructions. Keep roofing materials dry before and during application. Do not permit phased construction. Complete application of roofing plies, modified sheet and flashing in a continuous operation. Begin and apply only as much roofing in one day as can be completed that same day.
- G. Cut-Offs: At end of each day's roofing installation, protect exposed edge of incomplete work, including ply sheets and insulation. Provide temporary covering of two (2) one-ply torch smooth roofing membrane with joints and edges sealed or other jointly agreed upon tie-in detail.
- H. A minimum two (2) hour fire watch to remain daily after installation of last torch applied membrane for each day that torch-applied membranes are installed.
- I. Keep an ABC rated fire extinguisher in a location per OSHA requirements where all workers are aware of its location and how to operate it properly.

3.5 MEMBRANE INSTALLATION

- A. Torch System:
 - 1. Install one (1) layer of SBS Torch Base sheet to a properly prepared substrate. Shingle in proper direction to shed water on each area of roofing.
 - 2. Using a roofing torch, heat the surface of the coiled portion until the burn-off backer melts away. At this point, the material is hot enough to lay into the substrate. Progressively unroll the sheet, while heating and press down with your foot to insure a proper bond.
 - 3. After the major portion of the roll is bonded, re-roll the first six feet (6') and bond it in a similar fashion.
 - 4. Repeat this operation with subsequent rolls with side laps or four inches (4") and end laps of eight inches (8").
 - 5. Give each lap a finishing touch by passing the torch along the joint and spreading the melted bitumen evenly with a rounded trowel to insure a smooth, tight seal.
 - 6. Extend underlayment two inches (2") beyond top edges of cants at wall and projection bases.
 - 7. Install base flashing ply to all perimeter and projections details.

3.6 FLASHING MEMBRANE INSTALLATION (GENERAL)

- A. Torch System:
 - 1. All curb, wall, and parapet flashings shall be sealed on a daily basis. No condition should exist that will permit moisture entering behind, around, or under the roof or flashing membrane.
 - 2. Prepare all walls, penetrations, and expansion joints to be flashed with asphalt primer at the rate of 100 square feet per gallon. Allow primer to dry tack free.
 - 3. All flashing plies will be adhered with a roofer's torch. The modified membrane will be used as the flashing and will be nailed off eight inches (8") o.c. at all vertical surfaces.
 - 4. The entire sheet of flashing membrane must be solidly adhered to the substrate.
 - 5. Seal all vertical laps of flashing membrane with a three-course application of Flashing Bond and fiberglass mesh.
 - 6. Counter flashing, cap flashings, expansion joints, and similar work to be coordinated with modified bitumen roofing work are specified in other sections.
 - 7. Roof accessories, miscellaneous sheet metal accessory items, including piping vents and other devices, to be coordinated with the roofing system work in other Sections.

8. Pitch pockets are not allowed.

3.7 APPLICATION OF SURFACING

- A. Prior to installation of surface, obtain approval from manufacturer as to work completed. Roof besides mastic can be coated immediately upon approval of punch list items.
- B. Coat roof field and flashing with Title 24, white coating at two (2) gallons per square. Apply the coating in two (2) passes. Each coat applied at one (1) gallon per square cross directionally.

3.8 CLEANING

- A. Remove drippage of bitumen from all walls, windows, floors, ladders, and finished surfaces.
- B. In areas where finished surfaces are soiled by asphalt or any other sources of soiling caused by work of this Section, consult manufacturer of surfaces for cleaning advice and conform to their instructions.

3.9 FINAL INSPECTION

- A. At completion of roofing installation and associated work, meet with installer, installer of associated work, District, roofing system manufacturer's representative, and other representatives directly concerned with performance of roofing system.
- B. Inspect roof surface areas of the building, inspect perimeter building edges, as well as flashing of roof penetrations, walls, curbs, and other equipment. List all items requiring correction or completion and furnish copy of list to each party attending.
- C. The District reserves the right to request a thermographic scan of the roof during final inspection to determine if any damp or wet materials have been installed. The thermographic scan shall be provided by Contractor at no additional cost to the District.
- D. If core cuts verify the presence of damp or wet materials, Contractor shall be required to replace the damaged areas at his own expense.
- E. Repair or replace (as required) deteriorated or defective work found at time of above inspection to a condition free of damage and deterioration at time of Substantial Completion and according to warranty requirements.
- F. Contractor is to notify the District upon completion of corrections.
- G. Following the final inspection, acceptance will be made in writing by the material manufacturer.

END OF SECTION 07 52 16

SECTION 07 62 00 SHEET METAL FLASHING AND TRIM

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. It is the intent of this Section that the work shall:
 - 1. Conform to all applicable DSA and building code requirements.
 - 2. Include all shop and field formed sheet metal work shown on Drawings, or required, including, but not limited to:
 - a. Roof penetration sleeves, collars, hood, and umbrella counterflashing.
 - b. Metal counterflashing.
 - c. Expansion joint.
 - d. Metal perimeter edge.
 - e. Gutters, downspouts, splash blocks and splash pans.
 - f. One-way roof moisture relief vents.
 - g. Metal gravity vents.
 - h. Metal heat exhaust vents.
 - i. Sanitary vent pipes.
 - j. Pipe box.
 - k. Copings, trim, and miscellaneous sheet metal accessories.
- B. Related Sections:
 - 1. Section 05 50 00: Metal Fabrications.
 - 2. Section 07 92 00: Joint Sealants.
 - 3. Division 22: Plumbing.
 - 4. Division 23: Heating, Ventilating & Air Conditioning (HVAC).
- C. Reference Standards:
 - 1. ASTM International (ASTM):
 - a. A653 Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
 - b. B32 Standard Specification for Solder Metal.
 - c. C1107 Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink).
 - 2. National Association of Architectural Metal Manufacturers (NAAMM).
 - 3. National Roofing Contractors Association (NRCA) Roofing and Waterproofing Manual.
 - 4. Sheet Metal and Air Conditioning Contractors National Association, Inc. (SMACNA) Architectural Sheet Metal Manual.

1.3 SUBMITTALS

- A. Product Data:
 - 1. Manufacturer's specifications and other data needed to prove compliance with specified requirements.
 - 2. Manufacturer's installation instructions.
- B. Shop Drawings: Indicating sizes, configurations, and details of attachment to related and adjacent work, materials, and finishes.

- C. Samples:
 - 1. Full range of finish colors for Architect's selection.
 - 2. 12-inch long sample of each specified item with approved finish.
 - 3. Provide full size mockup of all shop built assemblies.

1.4 QUALITY ASSURANCE

- A. Single Source Responsibility: Fabricator and installer of roof related flashing and accessories shall be the same as the membrane roof installer.
- B. Comply with governing codes and regulations of authorities having jurisdiction.
- C. Installation Conference

1.5 WARRANTY

- A. Manufacturer's Product Warranty:
 - 1. Manufacturer's standard 20-year Kynar 500 or Hylar 5000 finish warranty signed by the manufacturer, with guarantee covering any failure of the fluoropolymer finish during the warranty period.
 - 2. Failure is defined to include, but is not limited to, deterioration of finish, such as fading, discoloring, peeling, cracking, corroding, etc.
 - 3. Correction may include repair or replacement of failed product.
- B. Roofing Contractor's Warranty:
 - 1. Contractor shall warrant the sheet metal work and related work to be free from defects in workmanship and materials, and that the metal flashings will be and remain watertight, for a period of five (5) years from date of Substantial Completion.
 - 2. Defects shall include, but not be limited to:
 - a. Leaking water or bitumen within building or construction.
 - b. Becoming loose from substrate.
 - c. Loose or missing parts.
 - d. Finish failure as defined above.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, handle, and store materials in accordance with manufacturer's instructions.
- B. Handle and store materials and equipment in such a manner as to avoid damage.
- C. No storage of materials shall be permitted on roof areas other than those materials that are to be installed the same day. Any exception must be in written form. Do not place materials or equipment in such a manner as to overload structure.

PART 2 PRODUCTS

2.1 APPROVED MANUFACTURERS

- A. Manufacturers named within specification are approved for use on the Project providing:
 - 1. Their products meet or exceed the specifications.
 - 2. Company has a minimum of five (5) years' experience manufacturing products of the type specified.
 - 3. Products have been tested in conjunction with roofing membrane system as an assembly and as such has obtained the same approval and rating as the roofing membrane system.

- 4. Products are approved for use by the roofing membrane manufacturer.
- B. Substitutions shall be in accordance with Division 01 requirements regarding substitutions.

2.2 SHEET METAL MATERIALS

- A. General Requirements: Roofing sheet metal system shall have been tested in conjunction with roofing membrane system as an assembly and have the same approval and rating as the roofing membrane system.
- B. Prefinished Aluminum Sheet:
 - 1. Precoated type, aluminum conforming to Fed. Spec. QQ-A-250, ASTM B209.
 - 2. Finish: Kynar 500, color as selected by Architect from manufacturer's standard colors.
 - 3. Thickness: Minimum 0.040 inch, except as otherwise indicated.
- C. Sheet Lead: Four (4) pound minimum for use at roof drains and soil stacks.
- D. Stainless Steel: Type 302/304 Soft Temper, No. 2D finish. Minimum thickness 24 gauge, except as otherwise noted.

2.3 FASTENERS

- A. Same metal as flashing/sheet metal or other noncorrosive metal or as noted below.
- B. Exposed fasteners shall be self-sealing and gasketed for weathertight installation (ZAC type).
- C. Match finish of exposed heads with material being fastened.
- D. Mechanical Fasteners:
 - 1. Nails: Stainless steel ring shank, minimum 1-1/2 inch in length with 1/2-inch diameter head.
 - 2. Washers: Steel washers with bonded rubber sealing gasket.
 - 3. Screws: Self-tapping sheet metal type of stainless steel or compatible with material being fastened, with hooded integral EPDM washers (ZAC type).
 - 4. Rivets: Stainless steel and cadmium plated material, closed end type of sizes recommended by sheet metal manufacturer to suit application.
- E. Clips: Continuous cleat (coping/fascia). Minimum 20-gauge, G-90 galvanized, stainless steel, or aluminum. Match material of coping/fascia and provide one (1) gauge heavier.

2.4 RELATED MATERIALS

- A. Solder: ASTM B32, alloy grade 58, 50 percent tin, 50 percent lead.
- B. Flux:
 - 1. Phosphoric acid type, manufacturer's standard:
 - a. For use with steel or copper: Rosin flux.
 - b. For use with stainless steel: Acid-chloride type flux, except use rosin flux over tinned surfaces.
- C. Underlayment:
 - 1. 48 mil minimum, non-reinforced, homogeneous, waterproof, impermeable elastomeric sheeting manufactured by Nervastral, Inc. or Lexus Co.

- D. Adhesives: Type recommended by flashing sheet manufacturer seaming and adhesive application of flashing sheet to ensure adhesion and watertightness.
- E. Metal Accessories: Sheet metal clips, straps, anchoring devices, clamps, and similar accessories required for the complete installation of work, matching or compatible with material being installed, non-corrosive, and size and gauge recommended by installer to suit application and performance.
- F. Sealant:
 - 1. Type A:
 - a. Type: One-part, non-sag, moisture-curing polyurethane sealant.
 - b. Approved products/manufacturers:
 - 1) Chem-Calk 900, manufactured by Bostik Construction Products Division.
 - 2) Vulkem 921, manufactured by Mameco International, Inc.
 - 3) Dynatrol I, manufactured by Pecora Corporation.
 - 4) NP 1, manufactured by Sonneborn Building Products.
 - 5) Approved equal.
 - 2. Type B:
 - a. Type: One-part, neutral-curing, medium-modulus silicone sealant for sealing metal to metal surfaces, i.e. metal edge, cover plates, etc.
 - b. Approved products/manufacturers:
 - 1) Chem-Calk 1200, manufactured by Bostik Construction Products Division.
 - 2) 795 Silicone Building Sealant, manufactured by Dow Corning Corporation.
 - 3) 895 Silicone, manufactured by Pecora Corporation.
 - 4) Omniseal, manufactured by Sonneborn Building Products
 - 5) Spectrem 2, manufactured by Tremco Incorporated.
 - 6) Approved equal.
- G. Grout - Pitch Pans:
 - 1. Type: Quick-setting, non-shrink, non-metallic, high strength formula complying with ASTM C1107.
 - 2. Approved products/manufacturers:
 - a. Sure Grip High Performance Grout, manufactured by Dayton Superior Corporation.
 - b. Premier Quick-Trim, manufactured by L & M Construction Chemicals, Inc.
 - c. Masterflow, manufactured by Master Builders, Inc.
 - d. Sonnogrout 10K, manufactured by Sonneborn Building Products.
 - e. Approved equal.
- H. Pitch Pan Filler:
 - 1. Type: Pourable polyurethane sealer, approved by roofing system manufacturer.
 - 2. Approved products/manufacturers:
 - a. Quick Pitch Sealer, manufactured by U.S. Intec.
 - b. SPM Pourable Sealer, manufactured by Johns Manville.
 - c. Approved equal.
- I. Termination Bar:
 - 1. Material: Extruded aluminum bar with flat profile.
 - 2. Size: 1/8-inch thick by one-inch (1") wide with factory punched 1/4-inch by 3/8-inch oval holes spaced six inches (6") on center.
 - 3. Approved product/manufacturers:
 - a. TB 125, manufactured by TruFast Corp.
 - b. Approved equal.
- J. Pipe Hangers and Supports
- K. Splash Blocks: Concrete type, of size and profiles indicated; minimum 3,000 psi

compressive strength at 28 days, with minimum five percent (5%) air entrainment. Use at locations where roof drainage dumps on ground.

- L. Splash Pans: 22-gauge stainless steel, of size and profiles indicated. Use at locations where roof drainage discharges over adjoining, lower roof level(s).
- M. One-Way Moisture Relief Vents: Shall be fabricated from spun aluminum as recommended by roofing manufacturer.

2.5 FABRICATION

- A. Except as otherwise indicated, fabricate work in accordance with SMACNA Architectural Sheet Metal Manual and other recognized industry practices and reviewed shop drawings. Form all flashings, receivers, and counterflashings in accordance with standards set forth in the NRCA roofing manual and SMACNA.
- B. Comply with manufacturer's installation instructions and recommendations.
- C. Unless noted otherwise, fabricate perimeter edge/fascia, scuppers, gutters, downspouts, copings, counterflashings, wind clips, and trim from pre-finished aluminum sheet steel.
- D. Shop fabricate work to greatest extent possible. Fabricate inside and outside corners for metal edges, counterflashing, and coping caps of equal length – minimum two-foot (2') lengths.
- E. Fabricate items to size and dimensions as indicated on the Drawings. Limit single-piece lengths to ten feet (10').
- F. Fabricate for waterproof and weather-resistant performance; with expansion provisions for running work sufficient to permanently prevent leakage, damage, or deterioration of the work.
- G. Integrate flashing in a manner consistent with detailing. Form work to fit substrates.
- H. Make angle bends and folds for interlocking metal with full regard for expansion and contraction to avoid buckling or fullness in metal after installation.
- I. Fabricate items with straight lines, sharp angles, smooth curves, and true levels. Avoid tool marks, buckling, and oil canning.
- J. Fold back edges on concealed side of exposed edge to form hem.
- K. Unless noted otherwise, lap joints minimum one inch (1"). Rivet and solder joints on parts that are to be permanently and rigidly assembled.
- L. Seams:
 - 1. Wherever possible, fabricate non-moving seams in sheet metal with flat-lock seams and end joints.
 - 2. Pre-finished galvanized steel: Seal pre-finished metal seams with rivets and silicone sealant.
 - 3. Metal other than aluminum: Tin edges to be seamed, form seams, and solder.
- M. On Kynar 500 or Hylar 5000 pre-finished metal, surface sand metal flanges prior to applying any primers. Prime all metal in contact with bituminous material.

- N. Back-paint all concealed metal surfaces with bituminous paint where expected to be in contact with cementitious materials or dissimilar metals.
- O. Expansion Provisions: Where lapped or bayonet type expansion provisions in work cannot be used or would not be sufficiently waterproof or weatherproof, form expansion joints of intermeshing hooked flanges, not less than one-inch (1") deep filled with mastic sealant concealed within joints.

2.6 FABRICATED ITEMS

- A. Metal Flashings (Minimum ten-foot [10'] lengths):
 - 1. Through wall receiver tray: Minimum 24-gauge stainless steel, through wall receivers shall not extend past the face of the exterior veneer more than 3/4 inch.
 - 2. Counterflashing: Minimum 24-gauge stainless steel.
- B. Wind Clips: Minimum 24-gauge stainless steel (or match material of counterflashing), one-inch (1") wide by length to engage counterflashing a minimum of 1/2 inch. To be installed at all wall flashings and at curb flashing lengths longer than five feet (5').
- C. Roof Penetrations:
 - 1. Umbrella counterflashing: Two-piece construction of minimum 24-gauge stainless steel, fabricated in accordance with Drawings or Project requirements.
 - 2. Pitch pans:
 - a. 24-gauge stainless steel.
 - b. Fabricate to provide installed minimum clear inside perimeter dimension of two inches (2") on each side of penetrating element.
 - c. Fabricate pans to at least six inches (6") above the finished roof membrane and with 1/4-inch hem at top edge and with four-inch (4") flanges. Round all corners of flange.
 - d. Fabricate metal bonnets for all pans, no exceptions. Fabricate bonnets with metal compatible with metal to which bonnet is to be attached. On beams and other steel, weld in place bonnets fabricated from 1/4-inch steel plate. Draw band bonnets fabricated from 22-gauge stainless steel may be used on circular projections.
- D. Metal Edge:
 - 1. Minimum 0.040-inch thick pre-finished aluminum formed in maximum ten-foot (10') lengths, with six-inch (6") wide cover plates of same profile, four-inch (4") flange, maximum seven-inch (7") fascia, 3/4-inch gravel stop.
 - 2. Provide expansion slip joints at maximum 20 feet on center.
 - 3. Shop fabricate all interior and exterior corners. Fabricate exterior corners with 18-inch minimum to four-foot (4') maximum legs. Lap, rivet, and seal prior to delivery to jobsite.
 - 4. Fabricate to sizes and dimensions as indicated on Drawings with a minimum one-inch (1") coverage past top of wall. Refer to SMACNA Fig. 2-5A.
 - 5. Provide mock-up for Architect's approval prior to fabrication.
- E. Continuous Cleats: Continuous strips, same material and profile, minimum one (1) gauge heavier of item to which cleats attach.
- F. Vent Hoods, Sleeves, Penetration Flashings, and Accessories: Minimum 24-gauge stainless steel, or as shown or directed otherwise.
- G. Angle Termination Bar: Aluminum pressure bar 1/8 inch by one inch (1").
- H. Vent Pipe Flashing: Four (4) pound lead. Provide proper size to fold down inside of pipe a

minimum of one inch (1").

- I. Roof Drain Flashing: Four (4) pound lead, minimum 30 inches by 30 inches.
- J. Coping:
 - 1. Minimum 0.040-inch thick pre-finished aluminum, with six-inch (6") wide cover plates of same profile.
 - 2. Fabricate as outlined in SMACNA; Refer to Figure 3-4 A.
 - 3. Provide tapered substrate to slope to one (1) side, and cover with waterproof membrane.
 - 4. Install with continuous cleat one (1) side and fasten other side.
- K. Gutters/Downspouts/Collector Heads:
 - 1. Gutters and downspouts: Minimum 0.040-inch thick pre-finished aluminum formed in maximum ten-foot (10') lengths, with six-inch (6") wide cover plates. Minimum five-inch by six-inch (5" x 6") box gutter (verify size meets rainfall data per SMACNA).
 - 2. Gutter/downspout straps: Minimum 0.040-inch thick pre-finished (match color) aluminum. Hem both sides.
 - 3. Gutter supports: Minimum 0.040-inch thick pre-finished (match color) aluminum hemmed around 1/8-inch galvanized bent steel bracket.
 - 4. Gutter screen: Stainless steel 1/4-inch diamond wire screen enclosed in a pre-finished frame.
 - 5. Collector heads: Minimum 0.040-inch thick pre-finished (match color) aluminum. As outlined in SMACNA; Refer to Figure 1-25F and Figure 1-28 with alternate Section A-A.
- L. Pipe Box Cover: 24-gauge stainless steel.
- M. Heat Exhaust Curbs and Hoods: 22-gauge stainless steel.
- N. Expansion Joint Cover: Minimum 24-gauge stainless steel (provide pre-finished metal at perimeter edge end termination.)

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify substrates are smooth and clean to extent required to perform sheet metal work.
- B. Verify roof openings, curbs, pipes, sleeves, ducts, or vents through roof are solidly set in place.
- C. Verify that reglets, nailers, cants, and blocking to receive sheet metal are in place and free of concrete and soil.
- D. Do not start work until conditions are satisfactory.

3.2 PREPARATION

- A. Field measure site conditions prior to fabrication work.
- B. Install starter and edge strips and cleats before starting installation.

3.3 INSTALLATION

- A. Install sheet metal with lines, arises, and angles sharp and true, and plane surfaces free from objectionable wave, warp, or buckle. Exposed edges of sheet metal shall be folded back to form 1/4-inch hem on concealed side from view. Finished work shall be free from water retention and leakage under all weather conditions. Pre-fabricated corners or transitions are required at changes in direction, elevation, or plane and at intersections. Locate field joints not less than 12 inches, nor more than three feet (3') from actual corner. Laps shall be one inch (1"), riveted and soldered at following locations:
 - 1. Pre-fabricated corners.
 - 2. Transitions.
 - 3. Changes in direction, elevation, and plane.
 - 4. At intersections.
- B. Anchor units of work securely in place to prevent damage or distortion from wind or buckling. Provide for thermal expansion of metal units; conceal fasteners wherever possible; and set units true to line and level as indicated. Install work with laps, joints, and seams that are permanently watertight and weatherproof.
- C. Install fabricated sheet metal items in accordance with manufacturer's installation instructions and recommendations and with SMACNA Architectural Sheet Metal Manual.
- D. Separations: Provide for separation of metal from dissimilar metal or corrosive substrates by coating concealed surfaces with zinc chromate, bituminous coating, or other permanent separation at locations of contact as recommended by manufacturer or fabricator. Do not use materials that are incompatible with roofing system.
- E. Continuous Cleat: At exposed edges of perimeter edge, fascias, cap flashings, and where required, attach continuous cleat at six inches (6") on center with appropriate fasteners.
- F. Gravel Guard/Fascia:
 - 1. Install with expansion joints ten feet (10') o.c., 1/2-inch expansion leeway, with cover plate.
 - 2. Set in asphalt mastic and fasten into nailer at three inches (3") o.c. staggered.
 - 3. Buff sand Kynar surface of flange and prime.
 - 4. Strip in flange with specified stripping plies set in hot bitumen extending three inches (3") from outer edge of flange to at least three inches (3") inward towards gravel stop. Provide finish stripping ply of modified bitumen base ply in hot bitumen extending six inches (6") from the outer edge of the flange and butt base of gravel stop.
- G. Counterflashing:
 - 1. Do not use surface mount counterflashing except as noted in Drawings.
 - 2. Set in through wall with receiver and spring lock counterflashing, as detailed in Drawings and to NRCA roofing manual, SMACNA standards.
 - 3. Coordinate installation of through-wall flashing with the masonry contractor.
 - 4. Seal through-wall in conjunction with masonry wall waterproofing.
 - 5. Install wind clips 30 inches o.c. at all counterflashing over five feet (5') in length.
- H. Pitch Pans, Metal Flanges:
 - 1. Apply mastic under pitch pan or metal flashing flange at least 1/2 pound per linear foot.
 - 2. Prime all metal flanges with asphalt primer prior to flashing installation.
 - 3. Clean all projections enclosed in pitch pans in any manner suitable and coated with a rust inhibitive coating as approved by the Architect. Coating shall be allowed to dry prior to pitch pan fill.
 - 4. Fill base of pitch pans with grout or cementitious binder and allow to cure.
 - 5. Top Finish Fill: Self-leveling, one-part urethane; at least two inches (2") to top of pitch pan sides.
 - 6. Strip in pitch pan flanges with two (2) strips of specified stripping plies set in hot

bitumen extending three inches (3") from the outer edge of the flange to at least three inches (3") inward toward base of pitch pan. Provide finish stripping ply of SBS modified bitumen membrane in hot bitumen extending six inches (6") from the outer edge of the flange and butt to base of pitch pan.

- I. Sanitary Vent Stacks:
 - 1. Prime top and bottom flanges of lead flashing sleeve. Set flange in uniform troweling of plastic roof cement. Prime top side of flange to receive strip-in membrane.
 - 2. Fold lead sleeve down inside of pipe a minimum of one inch (1"). Apply a continuous bead of sealant on inside of pipe prior to folding lead sleeve.
- J. Roof Drains:
 - 1. After membrane installation, prime bottom of lead flashing sheet and set in uniform bed of plastic roof cement at specified locations.
 - 2. Extend lead flashing into drain bowl or pipe a minimum of two inches (2") and over top of piping/bowl connection, if possible. Apply a continuous bead of specified Type A sealant, at intersection of pipe and drain bowl.
 - 3. If drain bowl and pipe connection is contaminated with bituminous material, strip-in area with three-coursing of plastic roof cement and fabric.
 - 4. Prime top of lead flashing sheet to receive strip-in membrane.
- K. Gutters/Downspouts:
 - 1. Install gutters as detailed.
 - 2. Install downspouts plumb and level and attached to columns or wall with straps located at top and bottom of downspout and maximum ten feet (10') on center.
 - 3. Install splash pad or block under discharge port of downspouts. Install splash pan over a protection (walkway) pad for downspouts located at roof level.
 - 4. End caps, downspout outlets, gutter and downspout straps, support brackets, and joint fasteners to be manufactured to suit profile and dimension of gutter and downspout.
 - 5. Install all anchoring devices as outlined in SMACNA.
 - 6. Expansion joints: Lap or butt type per SMACNA, locate every 50 linear feet.
- L. Expansion Joint:
 - 1. Construct wood curbs as shown on Drawings and as outlined in the NRCA and SMACNA manuals.
 - 2. Install underlayment, form envelope, and secure underlayment to curb. Fill envelope with compressible insulation.
 - 3. Securely fasten expansion joint cover to curb with grommetted fasteners spaced six inches (6") on center.
 - 4. Taper expansion joint down at the metal edge.
- M. Coping:
 - 1. Install wood nailers as shown on Drawings.
 - 2. Install metal cleats with appropriate fasteners spaced six inches (6") on center.
 - 3. Install underlayment over the wood substrate. Lap ends minimum of six inches (6") and secure membrane in place. Seal laps with appropriate adhesive.
 - 4. Install metal coping allowing 1/2-inch spaces between segments. Lock coping onto cleat and install appropriate fasteners through the interior fascia spaced 24 inches on center in enlarged holes.
 - 5. Install cover plate centered over coping joint in continuous beads of specified Type B sealant, placed approximately one inch (1") from cover edges. Refer to SMACNA for alternate joints as required by length.
 - 6. Install appropriate fastener through neoprene washer and cover plate between coping segments.
 - 7. Accommodate building wall expansion joints by terminating coping joints and cleats either side of expansion joint. Do not run coping or cleats continuous across joints.

Install coping cover plate to span across joint and lap coping on each side of joint a minimum of four inches (4"). Fasten cover plate on one (1) side of joint only (provide wall flashing membrane up and over parapet wall in accordance with manufacturer's detail).

3.4 CLEANING AND PROTECTION

- A. Remove flux and residual acid immediately by neutralizing with baking soda and washing with clean water. Leave work clean of stains.
- B. Remove scraps and debris and leave work area clean.
- C. Clean exposed metal surfaces, removing substances that might cause corrosion of metal or deterioration of finishes. Paint areas where finish is damaged on pre-finished metal by painting with a compatible paint in color to match undamaged finish.
- D. Prime soldered area of phosphatized metal after cleaning to prevent rusting.
- E. Paint metal flashings that have been soiled with bitumen with aluminized paint.
- F. Clean other work damaged or soiled by work of this Section.
- G. Protect finished work from damage.

END OF SECTION 07 62 00

SECTION 07 72 33 ROOF HATCHES

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Work Includes:
 - 1. Provide factory-fabricated roof hatches for ladder access.
 - 2. Provide factory-fabricated fixed hatch railing system.
 - 3. Provide factory-fabricated ladder safety posts.
- B. Related Sections:
 - 1. Section 05 50 00: Metal Fabrications.
 - 2. Section 06 10 00: Rough Carpentry.
 - 3. Section 07 62 00: Sheet Metal Flashing and Trim.

1.3 SUBMITTALS

- A. Product Data: Submit manufacturer's product data.
- B. Shop Drawings: Submit shop drawings including profiles, accessories, location, adjacent construction interface, and dimensions.
- C. Warranty: Submit executed copy of manufacturer's standard warranty.

1.4 QUALITY ASSURANCE

- A. Manufacturer: A minimum of five (5) years' experience manufacturing similar products.
- B. Installer: A minimum of two (2) years' experience installing similar products.
- C. Manufacturer's Quality System: Registered to ISO 9001 Quality Standards including in-house engineering for product design activities.

1.5 WARRANTY

- A. Manufacturer's Warranty: Provide manufacturer's standard warranty. Materials shall be free of defects in material and workmanship for a period of five (5) years from the date of purchase. Should a part fail to function in normal use within this period, manufacturer shall furnish a new part at no charge.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products in manufacturer's original packaging. Store materials in a dry, protected, well-vented area. Inspect product upon receipt and report damaged material immediately to delivering carrier and note such damage on the carrier's freight bill of lading.

PART 2 PRODUCTS

2.1 MANUFACTURER

- A. Manufacturer:
 - 1. The BILCO Company, New Haven, CT.
 - 2. Milcor, Grand Rapids, MI.
 - 3. Approved equal.

2.2 ROOF HATCH

- A. Basis of Design: Bilco Type S-50.
- B. Furnish and install where indicated on plans metal roof hatch Type S, size width: 36 inches (914mm) by length: 30 inches (762mm). Length denotes hinge side. The roof hatch shall be single leaf. The roof hatch shall be pre-assembled from the manufacturer.
- C. Performance Characteristics:
 - 1. Cover shall be reinforced to support a minimum live load of 40 psf (195kg/m²) with a maximum deflection of 1/150th of the span and a 140 psf (684 kg/m²) wind uplift for aluminum (Type S-50) roof hatches.
 - 2. Operation of the cover shall be smooth and easy with controlled operation throughout the entire arc of opening and closing.
 - 3. Operation of the cover shall not be affected by temperature.
 - 4. Entire hatch shall be weather tight with fully welded corner joints on cover and curb.
- D. Cover: Shall be 11-gauge (2.3mm) aluminum with a three-inch (76mm) beaded flange with formed reinforcing members. Cover shall have a heavy extruded EPDM rubber gasket that is bonded to the cover interior to assure a continuous seal when compressed to the top surface of the curb.
- E. Cover Insulation: Shall be fiberglass of one-inch (25mm) thickness, fully covered and protected by a metal liner 18-gauge (1mm) aluminum.
- F. Curb: Shall be 12 inches (305mm) in height and of 11-gauge (2.3mm) aluminum. The curb shall be formed with a 3-1/2-inch (89mm) flange with 7/16-inch (11.1mm) holes provided for securing to the roof deck. The curb shall be equipped with an integral metal capflashing of the same gauge and material as the curb, fully welded at the corners, that features the Bil-Clip® flashing system, including stamped tabs, six inches (153mm) on center, to be bent inward to hold single ply roofing membrane securely in place.
- G. Curb Insulation: Shall be rigid, high-density fiberboard of one-inch (25mm) thickness on outside of curb.
- H. Lifting Mechanisms: Manufacturer shall provide compression spring operators enclosed in telescopic tubes to provide, smooth, easy, and controlled cover operation throughout the entire arc of opening and closing. The upper tube shall be the outer tube to prevent accumulation of moisture, grit, and debris inside the lower tube assembly. The lower tube shall interlock with a flanged support shoe for aluminum construction, welded to the curb assembly.
- I. Hardware:
 - 1. Heavy pintle hinges shall be provided.
 - 2. Cover shall be equipped with a spring latch with interior and exterior turn handles.
 - 3. Roof hatch shall be equipped with interior and exterior padlock hasps.
 - 4. The latch strike shall be a stamped component bolted to the curb assembly.
 - 5. Cover shall automatically lock in the open position with a rigid hold open arm equipped

- with a one-inch (25mm) diameter red vinyl grip handle to permit easy release for closing.
- 6. Compression spring tubes shall be an anti-corrosive composite material and all other hardware shall be zinc plated and chromate sealed.
- 7. Cover hardware shall be bolted into heavy gauge channel reinforcing welded to the underside of the cover and concealed within the insulation space.
- J. Finishes: Factory finish shall be mill finish aluminum.
- K. Accessories:
 - 1. At each roof hatch provide the following:
 - a. Hatch Rail System.
 - b. Ladder Safety Post.

2.3 HATCH RAIL SYSTEM

- A. Furnish and install where indicated on plans hatch rail system Model RL2-S. The hatch rail system shall be field assembled and installed per the manufacturer's instructions.
- B. Performance Characteristics:
 - 1. High visibility safety yellow powder coat paint finish.
 - 2. Hatch rail system shall attach to the capflashing of the roof hatch and shall not penetrate any roofing material.
 - 3. Hatch rail system shall satisfy the requirements of OSHA 29 CFR 1910.23 and shall meet OSHA strength requirements with a factor of safety of two (2).
 - 4. Corrosion resistant construction with a five (5) year warranty.
 - 5. Hinged gate shall ensure continuous barrier around the roof hatch.
 - 6. Self-closing gate hinge and positive latching system provided with hatch rail system.
- C. Posts and Rails: 1-1/4-inch (32mm) 6061 T6 schedule 40 aluminum pipe.
- D. Hardware: Mounting brackets shall be 3/8-inch (9mm) thick extruded aluminum. Pivoting post guides with compression fittings and latching mechanism shall be cast aluminum. Self-closing hinges and all fasteners shall be type 316 stainless steel.

2.4 LADDER SAFETY POST

- A. Furnish and install where indicated on plans ladder safety post Model LU-1. The ladder safety post shall be pre-assembled from the manufacturer.
- B. Performance Characteristics:
 - 1. Tubular post shall lock automatically when fully extended.
 - 2. Safety post shall have controlled upward and downward movement.
 - 3. Release lever shall disengage the post to allow it to be returned to its lowered position.
 - 4. Post shall have adjustable mounting brackets to fit ladder rung spacing up to 14 inches (356mm) on center and clamp brackets to accommodate ladder rungs up to 1-3/4 inch (44mm) in diameter.
- C. Post: Shall be manufactured of high strength square tubing. A pull up loop shall be provided at the upper end of the post to facilitate raising the post.
- D. Material of Construction: Steel.
- E. Balancing Spring: A stainless steel spring balancing mechanism shall be provided to provide smooth, easy, controlled operation when raising and lowering the safety post.

- F. Hardware: All mounting hardware shall be Type 316 stainless steel.
- G. Finishes: Factory finish shall be yellow powder coat steel.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Examine substrates and openings for compliance with requirements for installation tolerances and other conditions affecting performance. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Install products in strict accordance with manufacturer's instructions and approved submittals. Locate units level, plumb, and in proper alignment with adjacent work:
 - 1. Test units for proper function and adjust until proper operation is achieved.
 - 2. Repair finishes damaged during installation.
 - 3. Restore finishes so no evidence remains of corrective work.

3.3 ADJUSTING AND CLEANING

- A. Clean exposed surfaces using methods acceptable to the manufacturer that will not damage finish.

END OF SECTION 07 72 33

SECTION 07 92 00 JOINT SEALANTS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes requirements including but not limited to:
 - 1. Control and expansion joints on exposed interior and exterior surfaces.
 - 2. Perimeter joints between wall surfaces and frames of interior and exterior doors and openings.
 - 3. Joints between plumbing fixtures and adjoining walls, floors, and counters.
 - 4. Joints indicated or as necessary.
 - 5. Accessories necessary for a complete installation.
- B. Related Sections:
 - 1. Section 03 30 00: Cast-In-Place Concrete
 - 2. Section 05 50 00: Metal Fabrications.
 - 3. Section 08 11 13: Hollow Metal Doors and Frames.
 - 4. Section 08 14 16: Flush Wood Doors.
 - 5. Section 08 80 00: Glazing.
 - 6. Section 09 90 00: Painting and Coating.

1.3 SUBMITTALS

- A. Product Data:
 - 1. Technical data for each joint sealant product. Data to indicate elasticity and durability of each joint sealant product. Submit written certification from manufacturers of sealants attesting products are suitable for use indicated, verified through in-house testing laboratory:
 - a. Written certification from manufacturers of joint sealants attesting that products comply with specification requirements and suitable for use indicated verified through manufacturers testing laboratory within the past 36 months or since most recent reformulation, whichever is most recent:
 - 1) Complete instructions for handling, storage, mixing, priming, installation, curing, and protection of each type of sealant.
 - 2) Manufacturer's letter, clearly indicating proposed lot numbers of each sealant supplied and expiration date sequence.
 - 2. Recycled Content:
 - a. Indicate recycled content; indicate percentage of pre-consumer and postconsumer recycled content per unit of product.
 - b. Indicate relative dollar value of recycled content product to total dollar value of product included in Project.
 - c. If recycled content product is part of an assembly, indicate the percentage of recycled content product in the assembly by weight.
 - d. If recycled content product is part of an assembly, indicate relative dollar value of recycled content product to total dollar value of assembly.
 - 3. Local/regional materials:
 - a. Sourcing location(s): Indicate location of extraction, harvesting, and recovery; indicate distance between extraction, harvesting, and recovery and the Project site.

- b. Manufacturing location(s): Indicate location of manufacturing facility; indicate distance between manufacturing facility and the Project site.
 - c. Product value: Indicate dollar value of product containing local/regional materials; include materials cost only.
 - d. Product component(s) value: Where product components are sourced or manufactured in separate locations, provide location information for each component. Indicate the percentage by weight of each component per unit of product.
 - 4. VOC data: Submit manufacturer's product data for sealants. Indicate VOC limits of the product. Submit MSDS highlighting VOC limits.
 - 5. Submit environmental data in accordance with Table 1 of ASTM E2129 for products provided under work of this Section.
- B. Samples:
 - 1. Provide color samples from full manufacturer's full range for each type of sealant specified for Architect's review.
- C. Certificates and Reports:
 - 1. Product Certificates: Manufacturer's product certificate for each kind of joint sealant and accessory.
 - 2. Sealant, Waterproofing, and Restoration Institute (SWRI) Validation Certificate: For each sealant specified to be validated by SWRI's Sealant Validation Program.
 - 3. Product test reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, indicating that sealants comply with requirements.
 - 4. Preconstruction compatibility and adhesion test reports:
 - a. From sealant manufacturer, indicating the following:
 - 1) Materials forming joint substrates and sealant backings have been tested for compatibility and adhesion with sealants.
 - 2) Interpretation of test results and written recommendations for primers and substrate preparation needed for adhesion.
 - 5. Preconstruction field adhesion test reports: Indicate which sealants and joint preparation methods resulted in optimum adhesion to joint substrates based on testing specified.
 - 6. Field adhesion test reports: For each sealant application tested.

1.4 QUALITY ASSURANCE

- A. Installer Qualifications:
 - 1. Firm having minimum five (5) years' documented experience and specializes in the installation of sealants:
 - a. Exposed sealant work (sealants used for air and weatherseals external at perimeter, metal panel to panel joints) shall be performed by a single (i.e. one) firm specializing in the installation of sealants who has successfully produced work comparable to Project.
 - b. Concealed sealant work (sealants that are internal to skylights and providing an air seal) shall be the responsibility of the subcontractor providing erection of the respective system.
- B. Source Limitations: Obtain each type of joint sealant from a single manufacturer.
- C. Product Testing:
 - 1. Test joint sealants using a qualified testing agency:
 - a. Testing agency qualifications: An independent testing agency qualified according to ASTM C1021 to conduct the testing indicated.
 - b. Test according to SWRI Sealant Validation Program for compliance with requirements specified by reference to ASTM C920 for adhesion and cohesion

under cyclic movement, adhesion in peel, and indentation hardness.

- D. Environmental Requirements:
 - 1. Toxicity/IEQ:
 - a. Comply with applicable regulations regarding toxic and hazardous materials:
 - 1) VOC content of interior sealants - sealants and sealant primers complying with limits for VOC content for SCAQMD when calculated according to 40 CFR 59, Subpart D (EPA Method 24):
 - a) Sealants: 250 g/L.
 - b) Sealant primers for nonporous substrates: 250 g/L.
 - c) Sealant primers for porous substrates: 775 g/L.
 - b. Sealants containing aromatic solvents, fibrous talc, formaldehyde, halogenated solvents, mercury, lead, cadmium, chromium and their compounds, are not permitted.

1.5 WARRANTY

- A. Written warranty, signed by installer agreeing to repair or replace elastomeric joint sealant work that has failed to provide a weathertight system within specified warranty period:
 - 1. Warranty period: Five (5) years from date of Substantial Completion.
- B. Written warranties (weatherseal and stain resistance), signed by sealant manufacturer agreeing to furnish joint sealants to repair or replace those that fail to provide airtight and watertight joints, or fail in adhesion, cohesion, abrasion resistance, stain resistance, weather resistance, durability, or appear to deteriorate in manner not specified in the manufacturer's data as an inherent quality of the material within specified warranty period:
 - 1. Warranty period: Five (5) years from date of Substantial Completion.
- C. Warranties specified exclude deterioration or failure of sealants from:
 - 1. Movement of the structure caused by structural settlement or errors attributable to design or construction resulting in stresses on the sealant exceeding sealant manufacturer's written specifications for sealant elongation and compression.
 - 2. Disintegration of joint substrates from natural causes exceeding design specifications.
 - 3. Mechanical damage caused by individuals, tools, or outside agents.
 - 4. Changes in sealant appearance caused by accumulation of dirt or other atmospheric contaminants.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to site in original unopened containers or bundles with labels indicating manufacturer, product name and designation, color, expiration date, pot life, curing time, and mixing instructions for multicomponent materials.
- B. Store and handle materials in compliance with manufacturer's written instructions to prevent deterioration or damage due to moisture, high or low temperatures, contaminants, or other causes.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Compatibility: Provide joint sealants, backings, and related materials compatible with one another and with joint substrates under conditions of service and application, as stated by sealant manufacturer's published data, and as substantiated by the manufacturer for each application through testing.

- B. Liquid Applied Sealants: Comply with ASTM C920 and requirements indicated for each liquid applied sealant specified, including those referencing ASTM C920 classifications for type, grade, class, and uses related to exposure and joint substrates.
- C. Stain Test Response Characteristics: For sealants in contact with porous substrates, provide nonstaining products that have undergone testing according to ASTM C1248 and do not stain porous joint substrates.
- D. Suitability for Contact with Food: Where sealants are indicated for joints that will come in repeated contact with food, provide products that comply with 21 CFR 177.2600.
- E. Colors: For fully concealed joints, provide standard color of sealant that has the best overall performance characteristics for the application shown. For exposed joints, submit color samples to Architect for approval, from manufacturer's full line of standard colors.
- F. Manufacturer's Representative: Use sealant produced by manufacturer who agrees to send a qualified technical representative to site upon request for the purpose of rendering advice concerning the recommended installation of manufacturer's materials.
- G. Sealants: Self-leveling compounds for horizontal joints in pavements and non-sag compounds elsewhere except as shown or specified.
- H. Silicone Sealant:
 - 1. Comply with ASTM C920, Type M, Grade NS, Class 25; use NT, M, A and O:
 - a. Use: Typical joints between masonry, metals, glass, and plastics (two-part silicone sealants).
 - b. Properties:
 - 1) Performance: Non-stain, non-bleed, non-streaking to sealed and adjacent substrates. The minimum pli value after seven (7) day immersion shall not be less than 13 when tested in strict accordance with ASTM C794 Adhesion and Peel.
 - 2) Cure system and oil content: Neutral cure system specifically manufactured with controlled oil content to eliminate oil migration into sealed substrates and residue rundown over and onto adjacent substrates.
 - c. Product and manufacturer: Dow Corning; 756 Silicone Building Sealant - HP with Additive.
- I. Silicone Sealant:
 - 1. ASTM C920, Type S, Grade NS, Class 50, for Use NT:
 - a. Use: Typical joints between masonry, metals, glass, and plastics (single component sealants).
 - b. Properties:
 - 1) Performance: Non-stain, non-bleed, non-streaking to sealed and adjacent substrates.
 - 2) Cure system and oil content: Neutral cure system specifically manufactured with controlled oil content to eliminate oil migration into sealed substrates and residue rundown over and onto adjacent substrates.
 - c. Product and manufacturer:
 - 1) BASF Building Systems; Omniseal 50.
 - 2) Dow Corning Corporation; 756 SMS, 791, 795, 995 as applicable.
 - 3) GE Advanced Materials, Silicones; SilGlaze II SCS2800, SilPruf NB SCS9000, SilPruf SCS2000, or UltraPruf II SCS2900 as applicable.
 - 4) Pecora Corporation, as applicable.
 - 5) Sika Corporation, Construction Products Division; SikaSil-C995.
 - 6) Tremco, as applicable.

7) Comparable product.

J. Polyurethane Sealants:

1. ASTM C920, Type M, Grade NS, Class 25; use NT, M, A and O:
 - a. Use: Typical Wall and floor joints (two-part polyurethane sealants). Use at concrete joints.
 - b. Properties:
 - 1) Performance: Non-stain, non-bleed, non-streaking to sealed and adjacent substrates.
 - c. Products and manufacturers:
 - 1) BASF Building Systems; Sonolastic NP-2.
 - 2) Pecora Corporation; Dynatred.
 - 3) Sika Corporation, Construction Products Division; Sikaflex 2c NS or Sikaflex 2c NS TG as applicable.
 - 4) Tremco, as applicable.
 - 5) Comparable product.

K. Two-Part Polyurethane Sealants:

1. ASTM C920, Type M, Grade NS, Class 50; use NT, M, A and O:
 - a. Use: Typical Wall and floor joints (two-part polyurethane sealants).
 - b. Properties:
 - 1) Performance: Non-stain, non-bleed, non-streaking to sealed and adjacent substrates. The minimum pli value after seven (7) day immersion shall not be less than 13 when tested in strict accordance with ASTM C794 Adhesion in Peel.
 - c. Products and manufacturers:
 - 1) BASF Construction Chemicals; NP 2.
 - 2) Pecora Corporation, as applicable.
 - 3) Schnee-Morehead, Inc.; Permathane SM 7200.
 - 4) Sika Corporation, Inc.; Sikaflex - 2c NS TG.
 - 5) Tremco, as applicable.
 - 6) Comparable product.

L. Mildew Resistant Silicone Sealant:

1. ASTM C920, Type S, Grade NS, Class 25, Use NT, Substrate uses G, A, and O; and containing fungicide for mildew resistance; acid curing:
 - a. Use: One-part mildew-resistant silicone, formulated with fungicide for sealing interior joints of nonporous substrates around ceramic tile, plumbing fixtures, and showers.
 - b. Products - provide one of the following:
 - 1) BASF Building Systems; Omnipus.
 - 2) Dow Corning; 786 Mildew Resistant Silicone Sealant.
 - 3) GE Silicones; Sanitary SCS 1700.
 - 4) Pecora Corporation, as applicable.
 - 5) Sika Corporation, Inc., as applicable.
 - 6) Tremco, as applicable.
 - 7) Comparable product.

M. Latex Sealant:

1. Non-elastomeric, one-part, non-sag, paintable latex sealant that is recommended for exposed applications on the interior. Complying with ASTM C834, Type OP (opaque sealants):
 - a. Products are subject to compliance with requirements; provide one of the following:
 - 1) BASF; Sonolastic Sonolac.
 - 2) Pecora Corporation; AC-20 + Silicone.
 - 3) Sika Corporation, Inc., as applicable.

- 4) Tremco, as applicable.
- 5) Comparable product.

N. Acoustical Joint Sealant:

1. Non-sag, paintable, non-staining latex sealant complying with ASTM C834. Product effectively reduces airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies according to ASTM E90:
 - a. Products are subject to compliance with requirements; provide one of the following:
 - 1) BASF, as applicable.
 - 2) Pecora Corporation; AC-20 FTR or AIS-919.
 - 3) Sika Corporation, Inc., as applicable.
 - 4) Tremco, as applicable.
 - 5) USG Corporation; SHEETROCK Acoustical Sealant.
 - 6) Comparable product.

O. Sealant Backing:

1. Provide sealant backings that are non-staining, compatible with joint substrates, sealants, primers, and joint fillers, and approved for applications indicated by sealant manufacturer based on field experience and laboratory testing:
 - a. Cylindrical sealant backings: Preformed, compressible, resilient, non-staining, non-waxing, non-extruding backings of flexible plastic foam complying with ASTM C1330, and of type indicated below. Select shape and density of cylindrical sealant backings in consultation with the manufacturer for proper performance in specific condition of use in each case.
 - b. Type C - closed cell polyethylene foam material with surface skin, nonabsorbent to liquid water and gas, non-outgassing in unruptured state; provide one of the following:
 - 1) BASF, as applicable.
 - 2) HBR Closed Cell Backer Rod; Nomaco, Inc.
 - 3) Pecora Corporation, as applicable.
 - 4) Sonolastic Closed-Cell Backer-Rod; BASF Construction Chemicals.
 - 5) Tremco, as applicable.
 - 6) Comparable product.

P. Window Glazing:

1. Product Description: Ready to use glazing compound that may be used for face glazing wood or metal sash on existing windows. It is a knife-grade consistency allows for smooth, easy applications. Stick tightly to glass and sash and resists sagging, shrinking and cracking. Follow manufacturers suggested uses.
2. This product is NOT to be used on plastic windowpanes, porcelainized steel insulating panels or any insulated glass units with organic seals, stained or leaded glass. Any window pain over 48 inches in any direction.
3. Listed manufacturer:
 - a. Dap 33 Glazing compound.
 - b. Approved equal.

Q. Miscellaneous Materials:

1. Primer: Material recommended, as verified through compatibility and adhesion testing, by joint sealant manufacturer for the substrates indicated to be sealed.
2. Cleaners for nonporous surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials, free of oily residues or other substances capable of staining or harming joint substrates and adjacent nonporous surfaces in any way and formulated to promote optimum adhesion of sealants with joint substrates.
3. Masking tape: Non-staining, non-absorbent material compatible with joint sealants and that will not stain nor mar the finish of surface adjacent to joints to which it is applied.

4. Cork joint filler: Resilient and non-extruding, ASTM D1752, Type II.
5. Bond breaker tape: Polyethylene, TFE fluorocarbon, or plastic tape recommended by sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint filler materials or joint surfaces at back of joint where such adhesion would result in sealant failure. Provide self-adhesive tape where applicable.

PART 3 EXECUTION

3.1 PROJECT CONDITIONS

- A. Environmental Limitations:
 1. Do not proceed with installation of joint sealants under the following conditions:
 - a. When ambient and substrate temperature conditions are outside limits permitted by joint sealant manufacturer or are below 40 degrees F (4.4 degrees C).
 - b. When joint substrates are wet. Should joints or backing materials become wet, remove and replace backing material with new.
- B. Joint Width Conditions: Do not proceed with installation of joint sealants where joint widths are less than those allowed by joint sealant manufacturer for applications indicated.
- C. Joint Substrate Conditions: Do not proceed with installation of joint sealants until contaminants capable of interfering with adhesion are removed from joint substrates.

3.2 EXAMINATION

- A. Examine joints indicated to receive joint sealants for compliance with requirements for joint configuration, installation tolerances, and conditions affecting sealant performance. Proceed with installation after unsatisfactory conditions have been corrected.

3.3 PREPARATION

- A. Surface Cleaning of Joints:
 1. Clean out joints immediately before installing joint sealants to comply with the recommendations of joint sealant manufacturer and requirements:
 - a. Remove foreign material from joint substrates interfering with adhesion of joint sealant, including dust, paints (except for permanent, protective coatings tested and approved for sealant adhesion and compatibility by sealant manufacturer), existing joint sealants, oil, grease, water, surface dirt, and frost.
 - b. Clean concrete, masonry, unglazed surfaces of tile, and similar porous joint substrate surfaces by brushing, grinding, blast cleaning, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealants. Remove loose particles remaining from above cleaning operations by vacuuming or blowing out joints with oil free compressed air.
 - c. Remove laitance and form-release agents from concrete.
 - d. Clean metal, glass, porcelain enamel, glazed surfaces of tile, and other nonporous surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants.
- B. Joint Priming (Elastomeric Sealants Only): Prime joint substrates where recommended in writing by joint sealant manufacturer, based on prior testing and experience. Apply primer to comply with joint sealant manufacturer's written instructions. Confine primers to areas of joint sealant bond; do not allow spillage or migration onto adjoining surfaces.
- C. Masking Tape: Use masking tape where required to prevent contact of sealant with

adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

3.4 INSTALLATION

- A. Silicone Glazing Sealants: Refer to Section 08 80 00: Glazing.
- B. Comply with joint sealant manufacturer's written installation instructions for products and applications indicated, unless more stringent requirements apply.
- C. Installation Standard: Comply with recommendations in ASTM C1193 for use of joint sealants applicable to materials, applications, and conditions indicated.
- D. Sealant Backings:
 - 1. Install sealant backings to support sealants during application and at position necessary to produce cross sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability:
 - a. Do not leave gaps between ends of sealant backings. Trim for tight fit around obstructions or elements penetrating the joint.
 - b. Do not stretch, twist, puncture, or tear sealant backings.
 - c. Remove absorbent sealant backings that become wet before sealant application and replace with dry sealant backings.
 - d. Install bond breaker tape behind sealants where backings are not used between sealants and back of joints.
- E. Weeps and Vents: Install weeps and vents into joints at the same time sealants are being installed. Locate weeps and vents spaced recommended by sealant manufacturer and the window and curtain wall fabricator and erector. Do not install weeps and vents at outside building corners. Do not install vents at horizontal joints immediately below shelf angles, sills, and through wall flashings.
- F. Sealants:
 - 1. Install sealants by proven techniques resulting in sealants directly contacting and fully wetting joint substrates, completely filling recesses provided for each joint configuration, and providing uniform, cross sectional shapes and depths relative to joint widths that allow optimum sealant movement capability. Install sealants at same time sealant backings are installed:
 - a. Apply sealants in depth in accordance with manufacturer's recommendations and recommended general proportions and limitations.
 - b. Apply elastomeric sealants, in joints not subject to traffic or abrasion, to a depth equal to 50 percent of the joint width, but not less than 1/4 inch (6 mm) and not more than 1/2 inch (13 mm).
 - c. Apply non-elastomeric sealants to a depth approximately equal to the joint width.
- G. Tooling of Non-Sag Sealants:
 - 1. Immediately after sealant application and before skinning or curing begins, tool sealants to form smooth, uniform, beads to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint. Remove excess sealants from surfaces adjacent to joint. Do not use tooling agents that discolor sealants or adjacent surfaces. Tool exposed surfaces of sealants to the profile shown, or if none is shown, tool slightly concave:
 - a. Use masking tape to protect adjacent surfaces of recessed tooled joints.
 - b. Provide a slight wash on horizontal joints where horizontal and vertical surfaces meet.
 - c. Against rough surfaces or in joints of uneven widths avoid the appearance of

excess sealant or compound by locating the compound or sealant well back into joint wherever possible.

- H. Installation of Preformed Silicone Sealant System:
 - 1. Apply masking tape to each side of joint, outside of area to be covered by sealant system.
 - 2. Apply silicone sealant to each side of joint to produce a bead of size complying with preformed silicone sealant system manufacturer's written instructions and covering a bonding area of not less than 3/8 inch (10 mm). Hold edge of sealant bead 1/4 inch (6 mm) inside masking tape.
 - 3. Within 10 minutes of sealant application, press silicone extrusion into sealant to wet extrusion and substrate. Use a roller to apply consistent pressure and ensure uniform contact between sealant and both extrusion and substrate.
 - 4. Complete installation of sealant system in horizontal joints before installing in vertical joints. Lap vertical joints over horizontal joints. At ends of joints, cut silicone extrusion with a razor knife.
- I. Installation of Preformed Foam Sealants: Install each length of sealant immediately after removing protective wrapping. Do not pull or stretch material. Produce seal continuity at ends, turns, and intersections of joints. For applications at low ambient temperatures, apply heat to sealant in compliance with sealant manufacturer's written instructions.
- J. Acoustical Sealant Installation: At sound rated assemblies and elsewhere as indicated, seal construction at perimeters, behind control joints, and at openings and penetrations with a continuous bead of acoustical sealant. Install acoustical sealant at both faces of partitions at perimeters and through penetrations. Comply with ASTM C919 and with manufacturer written recommendations.

3.5 FIELD QUALITY CONTROL

- A. Field Adhesion Testing:
 - 1. Field test exterior wall joint sealant adhesion to joint substrates:
 - a. Extent of testing - test completed and cured sealant joints:
 - 1) Perform ten (10) tests for the first 1,000 feet (300 m) of joint length for each kind of sealant and joint substrate.
 - 2) Perform one (1) test for each 1,000 feet (300 m) of joint length thereafter or one (1) test per each floor per elevation.
 - 2. Test method: Test joint sealants according to Method A, Field Applied Sealant Joint Hand Pull Tab, in Appendix X1 in ASTM C1193 or Method A, Tail Procedure, in ASTM C1521. For joints with dissimilar substrates, verify adhesion to each substrate separately; extend cut along one side, verifying adhesion to opposite side. Repeat procedure for opposite side.
 - 3. Inspect tested joints and report on the following:
 - a. Whether sealants filled joint cavities and are free of voids.
 - b. Whether sealant dimensions and configurations comply with specified requirements.
 - c. Whether sealants in joints connected to pulled out portion failed to adhere to joint substrates or tore cohesively. Include data on pull distance used to test each kind of product and joint substrate. Compare these results to determine if adhesion passes sealant manufacturer field adhesion hand pull test criteria.
 - 4. Record test results in a field adhesion test log. Include dates when sealants were installed, names of persons who installed sealants, test dates, test locations, whether joints were primed, adhesion results and percent elongations, sealant fill, sealant configuration, and sealant dimensions.
 - 5. Repair sealants pulled from test area by applying new sealants following same procedures used originally to seal joints. Ensure original sealant surfaces are clean

and new sealant contacts original sealant.

- B. Evaluation of Field Adhesion Test Results: Sealants not evidencing adhesive failure from testing or noncompliance with indicated requirements will be considered satisfactory. Remove sealants that fail to adhere to joint substrates during testing or to comply with other requirements. Retest failed applications until test results prove sealants comply with indicated requirements.

3.6 SITE ENVIRONMENTAL PROCEDURES

- A. Indoor Air Quality: Provide temporary ventilation during work. Coordinate interior application of sealants with interior finishes schedule.

3.7 CLEANING AND PROTECTION

- A. Clean off excess sealants or sealant smears adjacent to joints as work progresses by methods and with cleaning materials approved in writing by manufacturers of joint sealants and of products in which joints occur.
- B. Protect joint sealants during and after curing from contact with contaminating substances and from damage so sealants are without deterioration or damage at time of Substantial Completion. If, despite protection, damage or deterioration occurs, cut out and remove damaged or deteriorated joint sealants immediately so installations with repaired areas are indistinguishable from the original work.

END OF SECTION 07 92 00

SECTION 08 11 13 HOLLOW METAL DOORS AND FRAMES

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Provide items shown on the Drawings and specified, including, but not limited to the following:
 - 1. Standard and fire rated steel doors.
 - 2. Steel frames for doors, sidelites, transoms, and windows.
 - 3. Louvers and vision lites in steel doors, if shown or required.
 - 4. Sound rated steel doors.
 - 5. Thermally rated steel doors.
- B. Related Sections:
 - 1. Section 05 40 00: Cold-Formed Metal Framing.
 - 2. Section 07 92 00: Joint Sealants.
 - 3. Section 08 80 00: Glazing.
 - 4. Section 09 21 16: Gypsum Board Assemblies.
 - 5. Section 09 90 00: Painting and Coating.
- C. Reference Standards:
 - 1. ASTM International (ASTM)
 - a. A653 Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
 - b. A924 Standard Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process.
 - c. A1008 Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability.
 - d. A1011 Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability.
 - e. C1363 Standard Test Method for the Thermal Performance of Building Assemblies by Means of a Hot Box Apparatus.
 - f. E283 Standard Test Method for Determining the rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen.
 - g. E413 Standard Classification for Rating Sound Insulation.
 - 2. Hollow Metal Manufacturers Association (HMMA):
 - a. HMMA 802 Manufacturing of Hollow Metal Doors and Frames.
 - b. HMMA 810 Hollow Metal Doors.
 - c. HMMA 830 Hardware Preparation and Locations for Hollow Metal Doors and Frames.
 - d. HMMA 840 Installation and Storage of Hollow Metal Doors and Frames.
 - e. HMMA 850 Fire Rated Hollow Metal Doors & Frames.
 - f. HMMA 890 Technical Summary of Hollow Metal by HMMA.
 - 3. National Fire Protection Association (NFPA):
 - a. 80 Fire Doors and Fire Windows.
 - b. 252 Fire Tests of Door Assemblies.

4. Steel Door Institute – Current Standards: Technical Data Series.
5. Underwriters Laboratories Inc. (UL):
 - a. Building Materials Directory.
 - b. Listing and Labeling.
 - c. 10B and 10C Fire Tests of Door Assemblies.
 - d. 1784 Air Leakage Tests of Door Assemblies.
6. Intertek Testing, Services (Warnock Hersey, Inc. (WHI): Listing and Labeling.

1.3 SUBMITTALS

- A. Product Data:
 1. Manufacturer's standard details and catalog data demonstrating compliance with specifications and referenced standards.
 2. Manufacturer's installation instructions.
- B. Shop Drawings:
 1. Indicate complete schedule in detail for each steel door and frame using the same reference number for details and openings as those on the contract Drawings. If any door is not by the steel door manufacturer, only the door opening number should be shown along with the type of door (wood, plastic laminate faced, etc.):
 - a. Show details of construction, installation, connections, anchors, hardware reinforcement, hardware preparation, louvers, and floor and threshold clearances.
- C. Samples are required from non-Steel Door Institute members:
 1. 12-inch by 12-inch sample of a fire-rated and non-rated door, cut from corner of door, showing door construction.
 2. 12-inch by 12-inch sample of each type of door louver specified or required, showing louver construction.
 3. Six-inch (6") long sample of a fire-rated, non-rated frame, and each type of glass stop specified or required, showing corner and construction.
- D. Certificates: Manufacturer's certification that oversized openings are in compliance with specifications.

1.4 QUALITY ASSURANCE

- A. Manufacturer Qualifications: If other than a manufacturer listed under Paragraph 2.1 is proposed for use on the Project, it shall be a company specializing in the manufacturer of steel doors and frames of the type specified for this Project with a minimum of five (5) years' experience.
- B. All steel doors and frames shall be by a single manufacturer, shop drawings to be submitted with manufacturer's insignia, which is being supplied.
- C. Furnish steel doors and frames to meet current ANSI/Steel Door Standards.
- D. ANSI A250.13 Testing and Rating of Sever Windstorm Resistant Components for Swing Door Assemblies.
- E. ASTM E330, Standard Test Method for Structural Performance of Exterior Windows, Curtain Walls and Doors by Uniform Static Air Pressure Difference.
- F. Comply with ASTM E283 Standard Test Method for Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen.

G. Regulatory Requirements:

1. Fire-Rated Assemblies:

- a. Fire-rated door, panel, frame, and fire window construction shall conform to NFPA 252, or UL 10B, as applicable, and acceptable to the code of authorities having jurisdiction.
- b. Fire-rated door construction:
 - 1) Notwithstanding any other requirements of this Section, provide gauge of metal, method of construction, hardware preparation, reinforcement, and placement, glass opening size, and other specifics required to obtain the specified or required label. The label shall contain the fire resistance rating (20-minute, 45-minute, 1-hour, 1-1/2-hour, 3-hour, etc.) and the designation (A, B, C, D, or E); doors with B Label shall be 1-1/2 hour.
 - 2) Fire-rated doors used in a stairway enclosure, shall be so constructed so that the maximum transmitted temperature shall not exceed 450 degrees F above ambient temperature at the end of 30 minutes of the Standard Fire Exposure Test and shall be so noted on the label.
- c. Fire-rated openings:
 - 1) Conform to NFPA 80 for fire-rated class shown or required by code of authorities having jurisdiction:
 - a) Units shall be identical to assemblies whose fire resistance characteristics have been determined in accordance with requirements specified above, and shall be labeled and listed by UL, WHI, or other inspection and testing agency acceptable to the code of authorities having jurisdiction.
 - b) Fire-rated steel doors, panels, frames, and fire windows shall bear permanent labels attesting to fire resistance. At stairway enclosures, provide units listed for 450 degree F maximum temperature rise rating for 30 minutes of exposure.
 - c) Oversized openings shall be constructed in accordance with all applicable requirements for labeled door construction.
 - d) Fire rated door assemblies with gaps in excess of 1/8 inch between door and frame will not comply with NFPA 80.
 - e) Locate label on hinge side of doors and frames so that when door is closed, label is not visible.
 - f) Caution shall be taken to ensure that labels are not removed, damaged, or painted over.
 - g) Glass panes shall not exceed sizes allowed whether indicated or not on the Drawings.

H. Wind Loads: Provide hollow metal and door hardware assemblies approved by DSA, including anchorage, capable of withstanding wind load design pressures that are calculated for this Project by a registered Architect or Engineer and is part of the construction documents per CBC.

I. Accessibility Requirements:

1. Comply with applicable requirements:
 - a. Americans with Disability Act of 1990, as amended: 2010 ADA Standards.
 - b. 2022 California Building Code (CBC). CCR Title 24, Part 2, as adopted and amended by DSA.

J. Pre-Installation Conference.

1.5 WARRANTY

A. Warrant the work specified herein for one (1) year against becoming unserviceable or causing an objectionable appearance resulting from either defective or non-conforming

materials and workmanship.

- B. Defects shall include, but not be limited to:
 - 1. Use of incorrect materials in opening.
 - 2. Incorrect labeled components installed within opening.
 - 3. Noisy, rough, or difficult operation.
 - 4. Failure to meet specified quality assurance requirements.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver and store products in accordance with manufacturer's instructions, and as follows:
 - 1. In manufacturer's original, clearly labeled, undamaged containers or wrappers.
 - 2. Containers or wrappers shall list the name of the manufacturer and product.
- B. Deliver materials to allow for minimum storage time at the Project site. Coordinate delivery with the scheduled time of installation.
- C. Protect products from moisture, construction traffic, and damage:
 - 1. Store under cover in a clean, dry place, protected from weather and abuse.
 - 2. Store in a manner that will prevent rust or damage.
 - 3. Store doors in a vertical position, spaced with blocking to permit air circulation.
 - 4. Do not use non-vented plastic or canvas shelters.
 - 5. Should containers or wrappers become wet, remove immediately.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers listed below whose products meet or exceed the specifications are approved for use on the Project. Other manufacturers must comply with Manufacturer Qualifications, must manufacture equivalent products to those specified, regarding substitutions to be considered:
 - 1. CECO Door Products, Brentwood, TN; (615) 661-5030.
 - 2. Curries Company, Mason City, IA; (515) 423-1334.
 - 3. Pioneer Industries, Inc., Kewanee, IL; (309) 856-6000.
 - 4. Republic Builders Products Company, McKenzie, TN; (800) 733-3667.
 - 5. Steelcraft Mfg. Co., Cincinnati, OH; (513) 745-6400.
 - 6. Stiles Co.
 - 7. Approved equal.

2.2 MATERIALS, GENERAL

- A. Steel requirements, all frames to be manufactured of commercial quality, stretcher leveled flatness, cold rolled steel per ASTM A1008 general requirements. Internal reinforcing may be manufactured of hot rolled pickled and oiled steel per ASTM A1011. Exterior frames and interior frames where shown on approved Drawings or required in damp, moist, humid, and wet areas, i.e., toilets, locker rooms, showers, etc., to be manufactured of commercial quality, stretcher leveled flatness, cold rolled steel and galvanized to A-60 minimum coating weight standard per ASTM A653 and A924, with coating weight of not less than 0.60 ounce per square foot (0.30 ounce per square foot per side).

2.3 FRAME FABRICATION

- A. Minimum Gauges:

1. Interior openings:
 - a. Less than four feet (4') width: 16 gauge.
 - b. Four feet (4') in width and greater: 14 gauge.
2. Exterior openings: 14 gauge

B. Design and Construction:

1. Frames shall be custom made, welded units with integral trim of sizes and shapes shown on approved shop drawings. Hinge jambs that butt adjacent 100-degree walls shall have at least four-inch (4") wide frame face to assure the door trim will not strike the wall prior to the door opening at least 100 degrees. Frame profile shall match wall thickness where practical, i.e., 4-3/4-inch at four-inch (4") CMU, 6-3/4-inch at six-inch (6") CMU, and 8-3/4-inch at eight-inch (8") CMU. At masonry wall openings, fabricate frames to suite masonry opening with two-inch (2") head member.
2. Frames shall be strong and rigid, neat in appearance, square, true, and free of defects, warp, and buckle. Molded members shall be clean cut, straight, and of uniform profile throughout their length.
3. Jamb depths, trim, profile, and backbends shall be as shown on approved shop drawings.
4. Corner joints, including face and inside corners, shall have contact edges closed tight, with trim faces mitered and continuously welded, and stops butted. The use of gussets shall not be permitted. Face of frame shall be ground smooth. Knockdown (KD) frames are not permitted.
5. Minimum depth of stops shall be 5/8 inch, except at fire windows where minimum depth of stops shall be 3/4 inch.
6. Frames for multiple openings shall have mullion and rail members that are closed tubular shapes having no visible seams or joints. Joints between faces of abutting members shall be securely welded and finished smooth. Mullions shall be key locked removable type. Keys shall be master keyed to Owner's Best system.
7. High frequency hinge reinforcement: Provide high frequency hinge reinforcements at door openings 48-inch and wider with mortise/butt type hinges only at top hinge location to deter against hinge reinforcement sag.
8. Continuous hinge reinforcement: Provide welded continuous 12-gage strap for continuous hinges specified in hardware sets in Division 08 Openings.
9. Provide countersunk flat or oval-head exposed screws and bolts for exposed fasteners unless otherwise indicated for removable stops; provide security head screws at exterior locations.
10. Provide A60 galvanized coating at frames in restrooms and locker rooms with showers/Jacuzzi, clean areas such as kitchen rooms.
11. Electrical knock out boxes:
 - a. Factory weld 18-gage electrical knock out boxes to frame for electrical hardware preps; included but not limited to electric thru wire hinges, electrical raceways, door position switches, electric strikes, jamb mount card readers, and magnetic locks as noted in door hardware sets in Division 08 Openings:
 - 1) Electrical knock out boxes are required at door position switches, electric strikes, card readers, and middle hinge locations.
 - 2) Provide electrical knock out boxes with 3/4-inch knockouts.
 - 3) Conduit to be coordinated and installed in field from middle hinge box and strike box to door position box.
 - 4) Electrical knock out boxes to comply with NFPA requirements and fit electrical door hardware as specified in hardware sets in Division 08 Openings.
 - 5) Electrical knock out boxes for continuous hinges should be located in the center of the vertical dimension on the hinge jamb.
 - 6) Provide field installed conduit for standardized plug connectors to accommodate up to twelve (12) wires as required for electrified door hardware specified in hardware sets in Division 08 Openings. Provide

sufficient number of concealed wires to accommodate electric function of specified hardware. Wire nut connections are not acceptable.

12. Hardware reinforcements:
 - a. Frames shall be mortised, reinforced, drilled, and tapped at factory for fully template mortised hardware in accordance with approved hardware schedule and templates provided by Section 08 71 00: Door Hardware. Where surface-mounted hardware is to be applied, frames shall have reinforcing plates only.
 - b. Minimum thickness of hardware reinforcing plates shall be as follows:
 - 1) Hinge and pivot reinforcements (1-1/4-inch x 10-inch minimum size): Seven (7) gauge.
 - 2) Strike reinforcements: 12-gauge stiffeners.
 - 3) Flush bolt reinforcements: 12-gauge.
 - 4) Closer reinforcements: 12-gauge.
 - 5) Reinforcements for surface-mounted hardware, hold-open arms, and surface panic devices: 12-gauge.
13. Floor anchors: Minimum 14-gauge, securely welded inside each jamb, with holes for floor anchorage.
14. Jamb anchors:
 - a. Frames for installation in masonry walls shall be provided with adjustable jamb anchors of the T-strap type. Anchors shall be not less than 16-gauge steel. The number of anchors provided at each jamb shall be as follows:
 - 1) Frames up to seven-feet-six-inches (7'-6") in height: Three (3) anchors.
 - 2) Frames seven-feet-six-inches (7'-6") to eight feet (8') in height: Four (4) anchors.
 - 3) Frames over eight feet (8') in height: One (1) anchor for each two feet (2') or fraction thereof in height.
 - b. Frames for installation in wood or metal stud partitions shall be provided with steel anchors of suitable approved design, not less than 16-gauge thickness, securely welded inside each jamb as follows:
 - 1) Frames up to seven feet six inches (7'-6") in height: Four (4) anchors.
 - 2) Frames seven feet six inches (7'-6") to eight feet (8') in height: Five (5) anchors.
 - 3) Frames over eight feet (8') in height: Four (4) anchors plus one (1) additional for each two feet (2') or fraction thereof over eight feet (8').
 - c. Frames to be anchored to previously placed concrete, masonry, or structural steel shall be provided with anchors of suitable design as shown on approved shop drawings.
15. Dust cover boxes: Shall be of not less than 26-gauge steel and shall be provided at all mortised hardware items. Eight-inch (8") CMU walls with face brick shall have dual offset jamb anchors.
16. Steel spreader: Shall be provided on all frames, temporarily attached to bottoms of both jambs for bracing during shipping and handling.
17. Loose glazing stops: Shall be of cold rolled steel, not less than 20 gauge, butted at corner joints and secured to the frame with countersunk cadmium or zinc-plated screws. Loose stops at exterior frames shall be placed on the interior side of the frames.
18. Unless otherwise noted on Drawings, ALL doors coat inside of frame profile with corrosion resistant coating to minimum thickness of 1/16 inch.

- C. Frame Color: Field painted under Section 09 90 00: Painting and Coating to match face of door unless otherwise indicated on drawings.

2.4 DOOR FABRICATION

- A. Minimum Gauges
1. Interior doors: 0.047 inch or 18 gauge (16 gauge for high frequency doors). Exterior

- doors: 0.059 inch or 16 gauge (14 gauge for windstorm rated doors).Design and Construction:
2. Types: Doors shall be custom fabricated, of types and sizes shown on approved shop drawings, and shall be seamless face construction with no visible seams or joints on vertical edges with fully welded seams free from blemishes and defects. Thickness shall be 1-3/4 inch, unless specifically noted or shown otherwise. Exterior doors: Provide doors with 22-gage steel z-channels placed at six inches (6") apart with foamed in place polyurethane core, with a thermal insulation calculated R factor of 11.01 per ASTM C518 Standards.
 3. Fabrication:
 - a. Doors shall be strong, rigid, and neat in appearance, free from warpage and buckle.
 - b. Corner bends shall be true and straight and of minimum radius for gage of metal used.
 - c. Provide stiffeners with polystyrene core spaced maximum six inches (6") on center and extending full height of door.
 - d. Fill interior with noncombustible fiberglass insulation. Use mineral board filler as required for labeled doors.
 - e. Faces shall be joined at vertical edges of door by a continuous weld extending full height of door. Welds shall be ground, filled, and dressed smooth to provide a smooth flush surface.
 - f. Top and bottom edges of doors shall be closed with a continuous recessed steel channel not less than 16 gauge, extending full width of door and spot weld to both faces. Exterior doors shall have an additional flush closing channel at top and bottom edges. Openings shall be provided in the bottom closure channel at top and bottom edges. Openings shall be provided in the bottom closure of exterior doors to permit the escape of entrapped moisture.
 - g. Continuous hinge reinforcement: Provide welded continuous 12-gage strap for continuous hinges specified in hardware sets in Division 08: Openings.
 - h. Electrical raceways: Provide raceways for standardized plug connectors to accommodate up to 12 wires as required for electrified door hardware specified in hardware sets in Division 08: Openings. Provide sufficient number of concealed wires to accommodate electric function of specified hardware. Wire nut connections are not acceptable.
 - i. Doors in wet or humid areas shall have a top cap and solid foam interior core to prevent internal moisture accumulation and galvannealed.
 - j. Edge profile shall be provided on both vertical edges of door as follows:
 - 1) Single-acting swing doors: Beveled 1/8 inch in two inches (2").
 - k. Hardware reinforcements:
 - 1) Doors shall be mortised, reinforced, drilled, and tapped at factory for fully template hardware, in accordance with the approved hardware schedule and templates provided by Section 08 71 00: Door Hardware. Where surface-mounted hardware is to be applied, doors shall have reinforcing plates only.
 - 2) Minimum gauges for hardware reinforcing plates shall be as follows:
 - a) Hinge and pivot reinforcements: Seven (7) gauge.
 - b) Reinforcements for lock face, flush bolts, concealed holders, concealed or surface-mounted closers: 12 gauge.
 4. Glass moldings and stops: Loose stops shall be not less than 20-gauge steel, with butt corner joints, secured to frame opening by countersunk screws. Snap-on attachments will not be acceptable.
 5. Louvers: Shall be inverted "V" blade, sight-proof type, unless noted otherwise.
 6. Edge clearances:
 - a. Between door and frame at head and jambs: 1/8 inch.
 - b. At doorsills with no threshold: 5/8-inch to 3/4-inch above finished floor.
 - c. At doorsills with threshold: As required to suit threshold.

- d. Between meeting edges of double doors: 1/8 inch.
- B. Finish:
 - 1. Shop paint steel (whether galvanized or ungalvanized) stops and accessories as follows:
 - a. Clean surfaces free of mill scale, rust, oil, grease, dirt, and other foreign matter.
 - b. Chemically treat surfaces and apply one (1) coat of an approved baked-on rust-inhibitive primer paint to provide a minimum 0.5 mil dry film thickness.
 - 2. Field painted under Section 09 90 00: Painting and Coating.
- C. Sound Rated Door: STC of 32, measured in accordance with ASTM E413.
- D. Thermal Insulated Door: Total insulation R-Value of 44 measured in accordance with ASTM C1363, unless otherwise noted on Drawings.

2.5 LABELED DOORS AND FRAMES

- A. Labeled doors and frames shall be provided for openings requiring fire protection ratings as scheduled and to comply with NFPA 80. Such doors and frames shall be constructed as tested and approved by UL, WHI, or other nationally recognized testing agency having a factory inspection service and approved by code authorities having jurisdiction and shall bear the appropriate permanent label.
- B. If any door or frame scheduled to be fire-rated cannot qualify for appropriate labeling because of its size, design, hardware, or other reason, the Architect shall be so advised before fabrication work on that item is started. Indicate and highlight on shop drawing.

PART 3 EXECUTION

3.1 COORDINATION

- A. Coordinate the work of this Section.
- B. Coordinate hardware installation with opening construction. Finish hardware is specified in Section 08 71 00: Door Hardware.
- C. Coordinate doors, frames, and windows with glazing specified in Section 08 80 00: Glazing.
- D. Coordinate doors and frames with painting specified in Section 09 90 00: Painting and Coating.

3.2 INSTALLATION

- A. Separate dissimilar metals. Protect against galvanic action.
- B. Frames:
 - 1. Anchorage and connections: Secure to adjacent construction. Where practical, interior door frames shall be flush with the pull side wall to minimize or eliminate the reveal and allow full 180-degree door swing.
 - 2. Install frames in accordance with manufacturer's instructions and install labeled frames in accordance with NFPA 80.
 - 3. Frame spreader bars: Leave intact until frames are set perfectly square and plumb and anchors are securely attached.
 - 4. Remove hardware, with the exception of prime-coated items, tag box, and reinstall

after finish paint work is completed. Do not remove or paint over labels on labeled frames.

- C. Doors:
 - 1. Install hardware in accordance with hardware manufacturer's templates and instructions.
 - 2. Install doors in accordance with manufacturer's instructions and install labeled doors in accordance with NFPA 80.
 - 3. Adjust operable parts for correct function.
 - 4. Remove hardware, with the exception of prime-coated items, tag, box, and reinstall after finish paint Work is completed. Do not remove or paint over labels on labeled doors.

3.3 ADJUST AND CLEAN

- A. Adjust doors for proper operation, free from binding or other defects.
- B. Clean and restore soiled surfaces.
- C. Remove scraps and debris, and leave site in clean condition.

END OF SECTION 08 11 13

SECTION 08 14 16 FLUSH WOOD DOORS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes requirements including but not limited to:
 - 1. WI Certified, fire-rated and non-rated, flush panel wood doors.
 - 2. Solid core doors with MDF and plastic laminate faces.
 - 3. Integration of a security system.
 - 4. Factory fitting flush wood doors to frames and factory machining for hardware.
 - 5. Accessories necessary for a complete installation.
- B. Related Sections:
 - 1. Section 05 50 00: Metal Fabrications.
 - 2. Section 07 92 00: Joint Sealants.
 - 3. Section 08 11 13: Hollow Metal Doors and Frames.
 - 4. Section 08 80 00: Glazing.
 - 5. Section 09 21 16: Gypsum Board Assemblies.

1.3 SUBMITTALS

- A. Product Data:
 - 1. Technical data for each type of door indicated:
 - a. Include details of core and edge construction, louvers, and trim for openings.
 - b. Include factory finishing specifications.
 - c. Include laboratory test report results of hinge loading, cycle/slam, stile edge screw withdrawals, and stile edge split resistance for fire rated doors.
- B. Shop Drawings:
 - 1. Indicate location, size, and hand of each door; elevation of each kind of door; construction details not covered in Product Data; and the following:
 - a. Dimensions and locations of blocking.
 - b. Dimensions and locations of mortises and holes for hardware.
 - c. Dimensions and locations of cutouts.
 - d. Undercuts.
 - e. Requirements for veneer matching.
 - f. Doors to be factory finished and finish requirements.
 - g. Fire-protection ratings for fire rated doors.
- C. Certificate of Compliance for Fire Rated Doors: Provide copies of Certificate of Compliance for fire rated door assemblies and smoke and draft control door assemblies.
- D. Certificate of Compliance regarding WI construction grade.
- E. Certificate of Compliance regarding WI installation requirements.

1.4 QUALITY ASSURANCE

- A. Regulatory Requirements:
 - 1. Fire rated wood doors - NFPA 80 listed and labeled by UL for fire protection ratings indicated, based on testing at positive pressure according to UL 10C:
 - a. Oversize fire rated door assemblies: For units exceeding sizes of tested assemblies, provide certification by a qualified testing agency that doors comply with standard construction requirements for tested and labeled fire-rated door assemblies except for size.
 - b. Temperature rise limit: At vertical exit enclosures and exit passageways, provide doors that have a maximum transmitted temperature end point of not more than 450 degrees F (250 degrees C) above ambient after 30 minutes of standard fire-test exposure.
 - 2. Smoke and draft control door assemblies: Listed and labeled for smoke and draft control, based on testing according to UL 1784.
 - 3. Accessibility requirements - comply with applicable requirements:
 - a. Americans with Disabilities Act of 1990, as amended:
 - 1) ADA Title II Regulations & the 2016 ADA Standards for Accessible Design.
 - b. CBC 2022 California Building Code (CCR Title 24, Part 2, as adopted and amended by DSA:
 - 2) CBC Chapter 11B, Access to Public Buildings, Public Accommodations, Commercial Buildings and Public Housing.
 - 4. Quality standard: In addition to requirements specified, comply with Woodwork Institute WI Manual of Millwork
 - 5. Maintain at least one copy of WI Manual for reference at jobsite throughout installation period.
- B. Source Limitations: Obtain flush wood doors through one (1) source from a single manufacturer.
- C. Pre-Installation Conference: Conduct conference at site.

1.5 WARRANTY

- A. Warranty:
 - 1. Written warranty signed by manufacturer, installer, and Contractor, in which manufacturer agrees to repair or replace doors that are defective in materials or workmanship. A representative of the door manufacturer shall inspect the installed doors and shall note on the warranty that no provisions of the warranty have been nullified in the manufacture and/or installation:
 - a. Failures include, but are not limited to, the following:
 - 1) Warping (bow, cup, or twist) more than 1/4-inch (6.4 mm) in a 42-inch by 84-inch (1,067 mm by 2,134 mm) section.
 - 2) Telegraphing of core construction in face veneers exceeding 0.01-inch in a three-inch (0.25 mm in a 76.2 mm) span.
 - b. Warranty include installation and finishing that may be required due to repair or replacement of defective doors.
 - c. Warranty period for solid core exterior doors: Five (5) years from date of Substantial Completion.
 - d. Warranty period for solid core interior doors: Life of installation.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Protect wood doors during transit, storage, and handling to prevent damage, soiling, and deterioration. Store wood doors on a flat level surface in a dry, well ventilated, place. Keep wood doors a minimum of 3-1/2 inches (85 mm) off floor surface and protected by a protective covering under the bottom door and over the top door. Covering should protect wood doors from dirt, water, and abuse but allow for air circulation under and around the

stack. Do not store wood doors in direct sunlight. Comply with requirements of referenced standard and manufacturer's written instructions.

- B. Package doors individually in heavy duty cardboard cartons prior to shipment from factory. Mark each door on top and bottom rail with opening number used on shop drawings using temporary, removable, or concealed markings.
- C. Handle wood doors with clean gloves. Lift and carry wood doors when moving them around the site; do not drag wood doors across one another.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Provide Flush Wood Door products by one of the following Manufacturers, subject to compliance with requirements listed here-in:
 - 1. Haley Brothers, Inc.
 - 2. Oshkosh Door Company.
 - 3. Oregon Door.
 - 4. Weyerhaeuser.
 - 5. Approved equal.
- B. Provide High Pressure Laminate products by one of the following Manufacturers, subject to compliance with requirements listed here-in:
 - 1. Formica Corp.
 - 2. Panolam Surface Systems.
 - 3. Wilsonart LLC.
 - 4. Approved equal.

2.2 GENERAL DOOR TYPES

- A. Particleboard Core Doors:
 - 1. Blocking:
 - a. Provide wood blocking in particleboard core doors as necessary to eliminate through-bolting hardware:
 - 1) Five-inch (125 mm) top rail blocking in all doors, whether or not closers are scheduled.
 - 2) Five-inch (125 mm) bottom rail blocking, in exterior doors and doors indicated to have protection plates.
 - 3) Five-inch (125 mm) midrail blocking, in doors indicated to have exit devices.
 - 4) 4-1/2-inch by ten-inch (114 mm by 250 mm) lock blocks, in doors indicated with lock and latch sets.
 - 2. Provide doors with glued wood stave or structural composite lumber cores instead of particleboard cores for doors indicated to receive exit devices.

2.3 VENEERED-FACED DOORS FOR TRANSPARENT FINISH

- a. Interior Solid-Core Doors:
 - Grade: Premium, with Grade A faces
 - Species: Walnut
 - Cut: Plain sliced
 - Match between Veneer Leaves: Bookmatch.
 - Assembly of Veneer Leaves on Door Faces: Center-balance match.
 - Pair and Set Match: Provide for doors hung in same opening

Room Match: Match door faces within each separate room or area of building. Corridor-door faces do not need to match where they are separated by 20 feet or more.

Room Match: Provide door faces of compatible color and grain within each separate room or area of building.

Transom Match: End match.

Blueprint Match: Where indicated, provide doors with faces produced from same flitches as adjacent wood paneling and arranged to provide blueprint match with wood paneling.

Exposed Vertical and Top Edges: <Same species as faces or a compatible species

Core: Particleboard

Construction: Fiveplies. Stiles and rails are bonded to core, then entire unit abrasive planed before veneering.

Construction: Seven plies, either bonded or non-bonded construction.

WDMA I.S.1-A Performance Grade: Heavy Duty.

2.4 LAMINATE-FACED DOORS

A. Particleboard Core Doors with Plastic Laminate Face:

1. Grade and construction: WI custom grade, PC-5; 1-3/4 inch unless otherwise indicated.
2. Core - ANSI A208.1, particleboard or MDF, made with binder containing no urea formaldehyde resin: Provide doors with glued block or structural composite lumber cores instead of particleboard cores at locations where exit devices are indicated.
3. Blocking:
 - a. Provide wood blocking in particleboard core doors necessary to eliminate through bolting hardware:
 - 1) Five-inch (125 mm) top rail blocking. in all doors, whether or not closers are scheduled.
 - 2) Five-inch (125 mm) bottom rail blocking in doors indicated to have protection plates.
 - 3) Five-inch (125 mm) midrail blocking, in doors indicated to have exit devices.
 - 4) 4-1/2-inch by ten-inch (114 mm by 250 mm) lock blocks, in doors indicated with lock and latch sets.
4. Exposed vertical and horizontal edges - impact resistant polymer edging, applied after faces:
 - a. Polymer edging color: Match face color.
5. Construction: Five (5) plies. Stiles and rails are bonded to core, then entire unit is abrasive planed before faces and crossbands are applied. Faces are bonded to core using a hot press.
6. Crossbanding: Minimum 1/16-inch thick, low density hardwood, composite, or high density hardboard.
7. Face: 3-ply AWI PC-HPDL-3 High Pressure Decorative Laminate (HPDL).

2.5 PAINTED DOORS (OPAQUE FINISH)

A. Particleboard Core Doors with Painted Finish:

1. Grade and construction: AWI custom grade, PC-5; 1-3/4 inch unless otherwise indicated.
2. Core - ANSI A208.1, particleboard or MDF, made with binder containing no urea formaldehyde resin: Provide doors with glued block or structural composite lumber cores instead of particleboard cores at locations where exit devices are indicated.
3. Blocking:
 - a. Provide wood blocking in particleboard core doors necessary to eliminate through bolting hardware:
 - 1) Five-inch (125 mm) top rail blocking in all doors, whether or not closers are scheduled.
 - 2) Five-inch (125 mm) bottom rail blocking in doors indicated to have protection

- plates.
- 3) Five-inch (125 mm) midrail blocking, in doors indicated to have exit devices.
- 4) 4-1/2-inch by ten-inch (114 mm by 250 mm) lock blocks, in doors indicated with lock and latch sets.
- 4. Exposed vertical and horizontal edges:
 - a. Seal all exposed edges with primer and provide opaque finish.
 - b. Color: Match face color and finish unless noted otherwise.
 - c. Labels: Mask labels prior to field painting where doors are not delivered with factory finish.
- 5. Construction: Five (5) plies. Stiles and rails are bonded to core, then entire unit is abrasive planed before faces and crossbands are applied. Faces are bonded to core using a hot press.
- 6. Crossbanding: Minimum 1/16-inch thick, low density hardwood, composite, or high density hardboard.
- 7. Face: Paint grade medium density overlay (MDO).

2.6 LIGHT FRAMES AND LOUVERS

- A. Metal Frames for Light Openings: Manufacturer's standard frame formed of 0.048-inch (1.2 mm) thick, cold-rolled steel sheet; factory primed for paint.
- B. Metal Frames for Light Openings in Fire-Rated Doors: Manufacturer's standard frame formed of 0.048-inch (1.2 mm) thick, cold-rolled steel sheet; factory primed for paint with baked-enamel or powder-coated finish, and approved for use in doors of fire-protection rating indicated.
- C. Metal Louvers:
 - 1. Manufacturers are subject to compliance with requirements; provide products by one of the following:
 - a. Air Louvers; a Division of the Activar Construction Products Group.
 - b. L & L Louvers.
 - c. McGill Architectural Products.
 - d. Approved equal.
 - 2. Blade type: Vision-proof, inverted V.
 - 3. Metal and finish: Hot-dip galvanized steel, 0.040-inch (1.0 mm) thick, factory primed for paint with baked-enamel or powder-coated finish.
 - 4. Metal and finish: Extruded aluminum with Class II, clear anodic finish, AA-M12C22A31.
- D. Louvers for Fire-Rated Doors - Metal louvers with fusible link and closing device, listed and labeled for use in doors with fire-protection rating of 1-1/2 hours and less:
 - 1. Manufacturers are subject to compliance with requirements; provide products by one of the following:
 - a. Air Louvers; a Division of the Activar Construction Products Group.
 - b. L & L Louvers, Inc.
 - c. McGill Architectural Products.
 - d. Approved equal.
 - 2. Metal and finish: Hot-dip galvanized steel, 0.040-inch (1.0 mm) thick, factory primed for paint with baked-enamel or powder-coated finish.

2.7 FABRICATION

- A. Factory fit doors to suit frame-opening sizes indicated. Comply with clearance requirements of referenced quality standard for fitting unless otherwise indicated:
 - 1. Comply with NFPA 80 requirements for fire-rated doors.

- B. Factory machine doors for hardware that is not surface applied. Locate hardware to comply with DHI-WDHS-3. Comply with final hardware schedules, door frame shop drawings, BHMA-156.115-W, and hardware templates:
 - 1. Coordinate with hardware mortises in metal frames to verify dimensions and alignment before factory machining.
 - 2. Metal astragals: Factory machine astragals and formed-steel edges for hardware for pairs of fire-rated doors.
- C. Transom and Side Panels:
 - 1. Fabricate matching panels with same construction, exposed surfaces, and finish as specified for associated doors. Finish bottom edges of transoms and top edges of rabbeted doors same as door stiles:
 - a. Fabricate door and transom panels with full-width, solid-lumber, rabbeted, meeting rails. Provide factory-installed spring bolts for concealed attachment into jambs of metal door frames.
- D. Openings:
 - 1. Factory cut and trim openings through doors:
 - a. Light openings: Trim openings with moldings of material and profile indicated.
 - b. Glazing: Factory install glazing in doors indicated to be factory finished. Comply with applicable requirements in Section 08 80 00: Glazing.
 - c. Louvers: Factory install louvers in prepared openings.
- E. Exterior Doors:
 - 1. Factory treat exterior doors with water repellent after fabrication has been completed but before shop priming or factory finishing:
 - a. Flash top of out-swinging doors with manufacturer's standard metal flashing.

2.8 SHOP PRIMING

- A. Doors for Opaque Finish: Shop prime faces, all four edges, edges of cutouts, and mortises with one (1) coat of wood primer specified in Section 09 90 00: Painting and Coating.
- B. Doors for Transparent Finish: Shop prime faces and all four edges with stain (if required), other required pretreatments, and first coat of finish as specified in Section 09 90 00: Painting and Coating. Seal edges of cutouts and mortises with first coat of finish.

2.9 FACTORY FINISHING

- A. General – For factory finish doors, factory finish doors that are indicated to receive transparent finish, and factory finish doors where indicated in schedules or on Drawings as factory finished:
 - a. Comply with referenced quality standard for factory finishing. Complete fabrication, including fitting doors for openings and machining for hardware that is not surface applied, before finishing:
 - 1) Finish faces, all four edges, edges of cutouts, and mortises. Stains and fillers may be omitted on top and bottom edges, edges of cutouts, and mortises.
- B. Transparent Finish:
 - 1. Grade: Premium.
 - 2. Finish: WI's Architectural Woodwork Standards System 9, UV curable, acrylated epoxy, polyester, or urethane; refer to Drawings for finish designation.
 - 3. Staining: As selected by Architect from manufacturer's full range.
 - 4. Effect: Semi-filled finish, produced by applying an additional finish coat to partially fill the wood pores.

- 5. Sheen: Semigloss.
- C. Opaque Finish:
 - 1. Grade: Premium.
 - 2. Finish: AWMAC's and WI's Architectural Woodwork Standards System 10, UV curable, water based; refer to Drawings for finish designation.
 - 3. Color: As selected by Architect from manufacturer's full range.
 - 4. Sheen: Semigloss.

PART 3 EXECUTION

3.1 FIELD CONDITIONS

- A. Environmental Limitations: Do not deliver or install doors until spaces are enclosed and weathertight, wet work in spaces is complete and dry, and HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during remainder of construction period.

3.2 EXAMINATION

- A. Examine doors and installed door frames, with installer present, before hanging doors:
 - 1. Verify that installed frames comply with indicated requirements for type, size, location, and swing characteristics and have been installed with level heads and plumb jambs.
 - 2. Reject doors with defects.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 INSTALLATION

- A. Hardware: For installation, see Section 08 71 00: Door Hardware.
- B. Installation Instructions:
 - 1. Install doors to comply with manufacturer's written instructions, referenced quality standard, and as indicated:
 - a. Install fire-rated doors according to NFPA 80.
 - b. Install smoke and draft-control doors according to NFPA 105.
- C. Job-Fitted Doors:
 - 1. Align and fit doors in frames with uniform clearances and bevels as indicated below; do not trim stiles and rails in excess of limits set by manufacturer or permitted for fire-rated doors. Machine doors for hardware. Seal edges of doors, edges of cutouts, and mortises after fitting and machining:
 - a. Clearances:
 - 1) Provide 1/8 inch (3.2 mm) at heads, jambs, and between pairs of doors.
Provide 3/8 inch (3.2 mm) from bottom of door to top of decorative floor finish or covering unless otherwise indicated. Where threshold is shown or scheduled, provide 1/4 inch (6.4 mm) from bottom of door to top of threshold unless otherwise indicated:
 - a) Comply with NFPA 80 for fire-rated doors.
 - b. Bevel non-fire-rated doors 1/8 inch in two inches (2") - 3-1/2 degrees - at lock and hinge edges.
 - c. Bevel fire-rated doors 1/8 inch in two inches (2") - 3-1/2 degrees- at lock edge; trim stiles and rails only to extent permitted by labeling agency.
- D. Factory Fitted Doors: Align in frames for uniform clearance at each edge.

- E. Factory Finished Doors: Restore finish before installation if fitting or machining is required at Project site.

3.4 ADJUSTING

- A. Operation: Rehang or replace doors that do not swing or operate freely.
- B. Finished Doors: Replace doors that are damaged or that do not comply with requirements. Doors may be repaired or refinished if work complies with requirements and shows no evidence of repair or refinishing.

END OF SECTION 08 14 16

SECTION 08 44 13 GLAZED ALUMINUM CURTAIN WALLS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes requirements including but not limited to:
 - 1. Glazed aluminum curtain walls.
 - 2. Accessories necessary for a complete installation.

1.3 SUBMITTALS

- A. Combined Submittals:
 - 1. Combine submittals for exterior curtainwall and storefronts into a single submission. Submit combined shop drawings that have been reviewed, annotated, and coordinated by each of the principal exterior cladding subcontractors:
 - a. As an indication of review, and as a condition of acceptance by the Architect, provide combined submittal with a cover sheet clearly indicating the signatures of the Contractor and each exterior cladding subcontractor.
 - b. Coordinate curtainwall, storefronts and entrances, windows, ACM, and window wall submittals.
- B. Product Data: Manufacturer's technical data for each type of product, including construction details, material descriptions, dimensions of individual components and profiles, and finishes.
- C. Shop Drawings:
 - 1. Submit plans, elevations, sections, full size details, and attachments to other work:
 - a. Include details of provisions for assembly expansion and contraction and for draining moisture occurring within the assembly to the exterior.
 - b. Include full size isometric details of each vertical to horizontal intersection of glazed aluminum curtain walls showing the following:
 - 1) Joinery, including concealed welds.
 - 2) Anchorage.
 - 3) Expansion provisions.
 - 4) Glazing.
 - 5) Flashing and drainage.
 - 6) Thermal breaks.
 - 7) Interface with building construction.
 - c. Show connection to and continuity with adjacent thermal, weather, air, and vapor barriers.
 - d. Indicate glazing details, methods, locations of various types and thickness of glass, emergency breakout locations, and internal sealant requirements.
 - e. Indicate locations of exposed fasteners and joints for Architect's acceptance.
- D. Fabrication Sample (Mockup Drawings):
 - 1. Submit drawings for field mockup of each vertical to horizontal intersection of assemblies, made from 12-inch (300 mm) lengths of full-size components and showing details of the following:

- a. Joinery, including concealed welds.
 - b. Anchorage.
 - c. Expansion provisions.
 - d. Glazing.
 - e. Flashing and drainage.
- E. Delegated Design Submittal: For glazed aluminum curtain walls indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for the preparation.
- F. Structural Calculations: Submit sealed copies of structural calculations indicating complete compliance with the specified performance requirements. Submit calculations prepared, signed, and sealed by a professional engineer licensed in the State of California.
- G. Maintenance Data: Submit maintenance data to include in maintenance manuals.
- H. Maintenance Data for Structural Sealant: For structural sealant glazed curtain walls to include in maintenance manuals. Include ASTM C1401 recommendations for post-installation-phase quality control program.

1.4 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Engage a qualified professional engineer, licensed in the State of California with experience in the design of curtainwalls and aluminum storefronts to design glazed aluminum curtain walls using performance requirements and design criteria indicated.
- B. Provide curtain wall assembly, storefront system, and windows by a single source and tested as a combined single assembly.
- C. System Description:
- 1. Curtainwall assembly fabricated from aluminum stick framed system with exposed interior and exterior metal framing. Design system to allow for installation tolerances, expansion and contraction of adjacent materials, and joint design:
 - a. Drawings are diagrammatic and do not identify or solve thermal or structural movement, glazing, anchorage, or moisture disposal. Details establish basic dimension of unit, sight lines, and profiles of members.
 - b. Glass, sealants, and interior finishes do not contribute to framing member strength, stiffness, or lateral stability.
 - c. Design and fabricate glazing systems for interior glazing.
 - d. Design perimeter conditions to allow for installation tolerances, expansion and contraction of adjacent materials, and sealant manufacturer's recommended joint design.
 - e. Design attachments to address site conditions, expansion and contraction movements to eliminate possibility of loosening, weakening, or fracturing connection between units and building structure or between units themselves.
 - f. Allow for expansion and contraction due to structural movement without detriment to appearance or performance.
 - g. Design system to drain to exterior face of wall, water entering joints and condensation occurring within system by drain holes and gutters of adequate size to evacuate water without infiltration to interior or the top of lower lites of glass.
 - h. Design metal faces to be visually flat under lighting conditions.
 - i. Design interior dense EPDM wedge gasket with sealed corners, with maximum 30 percent compression when glazed, to create a water and air seal.
 - j. Design rigid isolators to maintain flatness of face caps and provide thermal break between exterior and interior members.

- k. For stresses placed on structural silicone sealants, maintain sealant manufacturer's recommended maximum.
 - l. Not Permitted: Vibration harmonics, wind whistles, noises caused by thermal movement, thermal movement transmitted to other building elements, loosening, weakening, or fracturing of attachments or components of system.
- D. Performance Criteria:
- 1. Provide curtain wall assemblies to meet or exceed performance requirements:
 - a. Design and fabricate curtain wall to withstand the operating loads without measurable permanent deflection. Limit deflections to provide the normal degree of rigidity required to avoid glass breakage, air infiltration, and objectionable results of excessive flexibility.
 - b. Glazed aluminum curtain walls shall withstand movements of supporting structure including, but not limited to, story drift, twist, column shortening, long-term creep, and deflection from uniformly distributed and concentrated live loads.
 - c. Failure also includes the following:
 - 1) Thermal stresses transferring to building structure.
 - 2) Glass breakage.
 - 3) Noise or vibration created by wind and thermal and structural movements.
 - 4) Loosening or weakening of fasteners, attachments, and other components.
 - 5) Failure of operating units.
- E. Structural - Test according to ASTM E330:
- 1. When tested at positive and negative wind-load design pressures, assemblies do not evidence deflection exceeding specified limits.
 - 2. When tested at 150 percent of positive and negative wind-load design pressures, assemblies, including anchorage, do not evidence material failures, structural distress, or permanent deformation of main framing members exceeding 0.2 percent of span.
 - 3. Test durations: As required by design wind velocity, but not less than ten (10) seconds.
- F. Air Infiltration - Test according to ASTM E283 for infiltration:
- 1. Fixed framing and glass area: Maximum air leakage of 0.06 cfm/sq. ft. (0.30 L/s per sq. m) at a static-air-pressure differential of 1.57 lbf/sq. ft. (75 Pa) and 6.24 lbf/sq. ft. (300 Pa).
- G. Water Penetration under Static Pressure - Test according to ASTM E331: No evidence of water penetration through fixed glazing and framing areas when tested according to a minimum static-air-pressure differential of 20 percent of positive wind-load design pressure.
- H. Water Penetration under Dynamic Pressure - Test according to AAMA 501.1:
- 1. No evidence of water penetration through fixed glazing and framing areas when tested at dynamic pressure equal to 20 percent of positive wind-load design pressure.
 - 2. Maximum water leakage: According to AAMA 501.1. Water leakage does not include water controlled by flashing and gutters, or water that is drained to exterior.
- I. Interstory Drift - Accommodate design displacement of adjacent stories indicated:
- 1. Design displacement: Indicated on Drawings.
 - 2. Test performance: Complying with criteria for passing based on building occupancy type when tested according to AAMA 501.4 at design displacement.
- J. Seismic Performance:
- 1. Glazed aluminum curtain walls shall withstand the effects of earthquake motions determined according to ASCE 7. Design and size components to withstand seismic loads and sway displacement as calculated in accordance with CBC Section 1613A:
 - a. Seismic drift causing glass fallout: Complying with criteria for passing based on building occupancy type when tested according to AAMA 501.6 at design

- displacement.
 - b. Vertical interstory movement: Complying with criteria for passing based on building occupancy type when tested according to AAMA 501.7 at design displacement.
 - c. Design and size components to withstand seismic loads and sway displacement as calculated in accordance with CBC Section 1613A.
- K. Energy Performance:
- 1. Certify and label energy performance according to NFRC:
 - a. Thermal transmittance (U-factor): Fixed glazing and framing areas shall have U-factor of not more than 0.69 Btu/sq. ft. x h x deg F (3.92 W/sq. m x K) as determined according to NFRC 100.
 - b. Solar heat gain coefficient: Fixed glazing and framing areas shall have a solar heat gain coefficient of no greater than 0.45 as determined according to NFRC 200.
 - c. Condensation resistance: Fixed glazing and framing areas shall have an NFRC certified condensation resistance rating of no less than 25 as determined according to NFRC 500. Excessive condensation is defined as the accumulation of uncontrolled condensate flowing from the curtain wall at any location, or visible ice, frost, or water on more than five percent (5%) of the area of any module of the exterior wall.
- L. Noise Reduction - Test according to ASTM E90, with ratings determined by ASTM E1332:
- 1. Outdoor-indoor transmission class (OITC): Minimum 30.
- M. Sound Transmission:
- 1. Provide window wall and storefront systems with fixed glazing and framing areas having sound transmission characteristics of:
 - a. Sound transmission class (STC): Minimum 35 standard and 41 laminated STC when tested for laboratory sound transmission loss according to ASTM E90 and determined by ASTM E413.
- N. Thermal Movements:
- 1. Allow for thermal movements resulting from ambient and surface temperature changes:
 - a. Temperature change: 120 degrees F (67 degrees C), ambient; 180 degrees F (100 degrees C), material surfaces.
 - b. Thermal cycling:
 - 1) No buckling; stress on glass; sealant failure; excess stress on framing, anchors, and fasteners; or reduction of performance when tested according to AAMA 501.5:
 - a) High exterior ambient air temperature: That which produces an exterior metal surface temperature of 180 degrees F (82 degrees C).
 - b) Low exterior ambient air temperature: 0 degrees F (minus 18 degrees C).
- O. Structural Sealant Joints:
- 1. Designed to carry gravity loads of glazing.
 - 2. Designed to produce tensile or shear stress of less than 20 psi (138 kPa).
- P. Structural Sealant:
- 1. Capable of withstanding tensile and shear stresses imposed by structural sealant glazed curtain walls without failing adhesively or cohesively. When tested for preconstruction adhesion and compatibility, cohesive failure of sealant shall occur before adhesive failure:
 - a. Adhesive failure occurs when sealant pulls away from substrate cleanly, leaving no sealant material behind.
 - b. Cohesive failure occurs when sealant breaks or tears within itself but does not

separate from each substrate because sealant-to-substrate bond strength exceeds sealant's internal strength.

- Q. Design Modifications:
1. Submit design modifications necessary to meet performance requirements and field coordination:
 - a. Variations in details or materials shall not adversely affect the appearance, durability, or strength of components, nor shall variations cause excessive stress, or deflections, to building structural frame.
 - b. Maintain general design concept without altering size of members, profiles, and alignment.

1.5 QUALITY ASSURANCE

- A. Regulatory Requirements:
1. Building code:
 - a. 2022 California Building Code (CBC) (CCR Title 24, Part 2, as adopted and amended by DSA):
 - 1) CBC Section 1609A Wind Loads.
 - 2) CBC Section 1613A Earthquake Loads.
 2. Surface burning characteristics:
 - a. Comply with ASTM E84, testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency:
 - 1) Flame spread index: 25 or less.
 - 2) Smoke developed index: 450 or less.
 3. Accessibility requirements:
 - a. Americans with Disabilities Act of 1990, as amended: ADA Title II Regulations and the 2010 ADA Standards for Accessible Design.
 - b. CBC Chapter 11B, Accessibility to Public Buildings, Public Accommodations, Commercial Buildings and Public Housing.
 4. Welding standards: Welding shall be performed by skilled and qualified mechanics. Welding shall be performed in accordance with the applicable provisions of AWS for Steel and AWS D1.2 Structural Welding Code - Aluminum.
 5. Structural sealant glazing: Comply with ASTM C1401 for design and installation of structural sealant glazed curtain walls.
 6. Energy performance standards: NFRC for minimum standards of energy performance, materials, components, accessories, and fabrication. Comply with more stringent requirements if indicated.
- B. Manufacturer/Fabricator Qualifications: Fabricator specializing in the fabrication of aluminum framed window wall and window systems and components, having minimum ten (10) years' documented experience, and with sufficient production capacity, organized quality control and testing procedures, and published written and illustrated installation manuals to produce and install the entrance assemblies required.
- C. Installer Qualifications:
1. Firm that specializes in the erection of aluminum framed window wall, storefront, and window systems, having minimum ten (10) years' documented experience, and approved or certified by manufacturer/fabricator:
 - a. Engineering responsibility:
 - 1) Prepare data for curtainwall, storefront, and window systems, including shop drawings, based on testing and engineering analysis of manufactured units in systems similar to those indicated:
 - a) Professional engineer qualifications: A professional engineer who is legally licensed to practice in the State of California, experienced in providing engineering services of the kind indicated. Engineering

services are defined as those performed for installations of heavy glass storefront and entrance system similar to those indicated in material, design, and extent.

- D. Laboratory Mockup Testing Agency Qualifications: Qualified according to ASTM E699 for testing indicated.
- E. Testing Agency Qualifications: Qualified according to ASTM E699 for testing indicated.
- F. Product Options:
 - 1. Information on Drawings and in Specifications establishes requirements for aesthetic effects and performance characteristics of assemblies. Aesthetic effects are indicated by dimensions, arrangements, alignment, and profiles of components and assemblies as they relate to sightlines, to one another, and to adjoining construction:
 - a. Do not change intended aesthetic effects, as judged solely by Architect, except with Architect approval. If changes are proposed, submit comprehensive explanatory data to Architect for review.
- G. Source Limitations: Obtain components of curtain wall system, including framing spandrel panels, venting windows, entrances, sun control, and accessories from single manufacturer.
- H. Pre-Installation Conference: Conduct conference at site.
- I. Mockups:
 - 1. Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for fabrication and installation:
 - a. Build mockup of typical wall area as shown on Drawings.
 - b. Perform testing on mockups according to specified requirements.
 - c. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
 - d. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.
- J. Laboratory Mockup Testing:
 - 1. Curtain wall mockup testing shall include components of fixed window units, glazed framing including captured mullions and SSG mullions, and storefront units in mockup:
 - a. Provide mockups as specified for testing. Verify required mockup submittals are reviewed and have received final approval from the Architect prior to construction of the mockups:
 - 1) Laboratory testing mockups are used as a standard for judging visual and performance acceptability of the work for the Project. Replace unsatisfactory work as directed. Provide personnel to construct exterior wall mockups who will be the same personnel who will be performing and supervising the actual work. Simulate actual construction conditions as accurately as possible in every way. Provide extra materials necessary to replace any that fail during tests. Cut glass used in mockups to the minimum tolerances expected in the final exterior wall installation.
 - 2) Size: As shown but not less than the requirements of AAMA Standard 501 and ASTM E331 Section 9. Provide larger mockup(s) if the proposed exterior wall details create a condition requiring a larger mockup(s) for proper evaluation and testing. Provide mockups at wall testing facility complete with glass, aluminum framing, metal panels, anchors, connections, flashings, sealants, and joint fillers as accepted on the mockup shop drawings. Do not take special precautions or use techniques that do not represent those to be used on the work.

- 3) Laboratory testing: Notify the Architect of the readiness of the mockups for preliminary and final testing. Do not begin the testing program without the presence of the Owner's representative and the Architect.
- 4) Preliminary test: Conduct single static pressure test at 50 percent of the maximum wind pressure followed by a single test for water penetration at 50 percent of the pressure specified. The preliminary test is purposely limited to a single event. No interim or repeat preliminary testing for Contractor benefit or correction of systems shall be permitted.
- 5) Perform tests of the mockup(s) in accordance with the standards except as modified, in the order listed, and in accordance with the specified performance criteria. Tests 1 and 5 shall be conducted at 1.57 lbf/sq. ft. (75 Pa) and 6.24 lbf/sq. ft. (300 Pa), respectively. Tests 2, 3, and 6 shall be conducted at 12 lbf/sq. ft. (600 Pa) for 1 cycle, maintaining the test pressure for 15 minutes:
 - a) Test 1 (for air infiltration): ASTM E283. Extraneous air leakage (tare) shall be limited to ten percent (10%) or less of the net air leakage through the exterior wall assembly as provided under ASTM E283. Provide pressure taps as required within the test chamber to ensure uniform stratification of design test pressure across the exterior wall assembly.
 - b) Test 2 (for water penetration - uniform static pressure): ASTM E331.
 - c) Test 3 (for water penetration - dynamic pressure): AAMA 501.1.
 - d) Test 4 (for structural performance): ASTM E330, Method B, test to .5 and 1.0 times the wind pressure, during test. Deflection readings shall be taken at end connections and midspans of main framing members, at intersections of framing members and at midspans of glass holding members, glass, and panels. Take readings for both positive and negative loading. If failure occurs through glass breakage prior to achieving 1.5 times the maximum wind pressure, replace glass and repeat test. Two (2) successive failures of the same light or panel not otherwise attributable to inherent glass defects will be considered unacceptable. Further tests shall be suspended until deficiencies are corrected, which may include increasing the stiffness of glass holding members and/or adjustment of the glazing details.
 - e) Test 5 (retest for air infiltration): ASTM E283. Extraneous air leakage (tare) shall be limited to ten percent (10%) or less of the net air leakage through the exterior wall assembly as provided under ASTM E283. Provide pressure taps as required within the test chamber to ensure uniform stratification of design test pressure across the exterior wall assembly.
 - f) Test 6 (retest for water penetration, uniform static pressure): ASTM E331.
 - g) Test 7 (for structural performance): ASTM E330, Method B, except conduct test to 1.5 times the maximum wind pressure. Record pressures and deflections at 1.5 times the wind pressure, during test.
 - h) Test 8 (for live load deflection performance): AAMA 501.4 Modified. Test for live load deflection by applying vertical load to the frame supporting the mockup specimen so as to induce a deflection in the mockup equivalent to the live load deflection identified on the Drawings at the location the mockup is simulating. The load shall be applied and released through ten (10) cycles. Visually inspect mockup specimen after each displacement.
 - i) Test 9 (exterior window maintenance equipment test): Perform concentrated load testing on the exterior wall maintenance tie back equipment attached to the exterior wall framing. Apply outward, inward, and side-loading of a magnitude and for a duration as required to

comply with the authorities having jurisdiction for window washing equipment. There shall be no failure or gross permanent distortion of the tie back equipment or any part of the exterior wall framing.

- j) Test 10 (for thermal transmittance and condensation resistance): At the completion of Test 9, carefully disassemble the glass, glazing, and metal framing components and reassemble them as a mockup, and test the mockup, in accordance with AAMA 1503.
- b. Corrective measures:
 - 1) Correct deficiencies in mockups observed during testing and repeat tests as required to show compliance with performance standards. Deficiencies requiring repair or modification to mockup(s) require complete retesting of mockup(s) beginning with the specified preliminary test unless otherwise directed by the Architect:
 - a) The Owner will pay the cost of the first mockup test. The cost of subsequent tests and retesting is the responsibility of the Contractor. The Contractor shall bear costs for additional retesting until compliance with performance standards is accomplished.
 - b) Incorporate corrective measures indicated by the test report into the final exterior wall assemblies after review by the Architect.

1.6 WARRANTY

- A. Assembly Warranty:
 - 1. Written warranty signed by manufacturer, Contractor, and installer in which the manufacturer agrees to repair or replace components of glazed aluminum curtain wall that do not comply with requirements or that fail in materials or workmanship within specified warranty period:
 - a. Failures include, but are not limited to, the following:
 - 1) Failure to meet performance requirements.
 - 2) Structural failures including, but not limited to, excessive deflection.
 - 3) Glass breakage due to defective design.
 - 4) Noise or vibration created by wind and thermal and structural movements.
 - 5) Deterioration of metals, finishes, and materials beyond normal weathering.
 - 6) Water penetration through fixed glazing and framing areas.
 - 7) Deterioration of materials and finishes beyond normal weathering.
 - 8) Failure of insulating glass.
 - 9) Noise or vibration created by wind and thermal and structural movements.
 - 10) Failure of operating components.
 - 2. Warranty period: Two (2) years from date of Substantial Completion.
- B. Finish Warranty:
 - 1. Written warranty signed by manufacturer in which manufacturer agrees to repair finishes or replace aluminum that shows evidence of deterioration of factory applied finishes within specified warranty period:
 - a. Deterioration includes, but is not limited to, the following:
 - 1) Color fading more than five (5) Hunter units when tested according to ASTM D2244.
 - 2) Chalking in excess of a No. 8 rating when tested according to ASTM D4214.
 - 3) Cracking, checking, peeling, or failure of paint to adhere to bare metal.
 - 2. Warranty period: Two (2) years from date of Substantial Completion.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Identify components of curtainwall work after fabrication by marks clearly indicating location in the building. Package components to protect components from damage during shipping and handling.

- B. Storage on Site: Store units, components, and materials in clean, dry location, away from uncured concrete, masonry work, sprayed on fireproofing work, and construction activities. Cover with nonstaining waterproof paper, tarpaulin, or polyethylene sheeting to permit circulation of air inside the covering.
- C. Keep handling on site to a minimum. Exercise care to avoid damage to finishes of metals or breakage of glass.

PART 2 PRODUCTS

2.1 FRAMING

- A. Manufacturers are subject to compliance with requirements. Provide products by one of the following:
 - 1. Arcadia, Inc.
 - 2. EFCO Corporation.
 - 3. Trulite Glass & Aluminum Solutions, LLC.
- B. Framing Members:
 - 1. Extruded or formed aluminum framing members of thickness required and reinforced necessary to support imposed loads:
 - a. Construction: Thermally broken.
 - b. Glazing system: Retained mechanically with gaskets on four sides.
 - c. Glazing plane: Front.
 - d. Finish: Clear anodized.
 - e. Fabrication method: Either factory or field fabricated system.
- C. Pressure Caps: Aluminum components that mechanically retain glazing with snap on aluminum trim that conceals fasteners.
- D. Brackets and Reinforcements: High strength aluminum with nonstaining, nonferrous shims for aligning system components.
- E. Materials:
 - 1. Aluminum:
 - a. Alloy and temper recommended by manufacturer for type of use and finish indicated:
 - 1) Sheet and plate: ASTM B209.
 - 2) Extruded bars, rods, profiles, and tubes: ASTM B221.
 - 3) Extruded structural pipe and tubes: ASTM B429.
 - 2. Steel reinforcement:
 - a. Zinc rich, corrosion resistant primer complying with SSPC-PS Guide No. 12.00; applied immediately after surface preparation and pretreatment. Select surface preparation methods according to recommendations in SSPC-SP COM, and prepare surfaces according to applicable SSPC standard:
 - 1) Structural shapes, plates, and bars: ASTM A36.
 - 2) Cold rolled sheet and strip: ASTM A1008.
 - 3) Hot rolled sheet and strip: ASTM A1011.
 - 3. Carbon steel: ASTM A36.

2.2 INSULATED SPANDREL PANELS

- A. Insulated Spandrel Panels:
 - 1. Laminated, metal faced flat panels with no deviations in plane exceeding 0.8 percent of panel dimension in width or length:

- a. Overall panel thickness: One inch (25.4 mm).
- b. Exterior skin – aluminum:
 - 1) Thickness: Standard for finish and texture indicated.
 - 2) Finish: Match framing system.
 - 3) Texture: Smooth.
 - 4) Backing sheet: 0.125-inch (3.2 mm) thick, corrugated, high density polyethylene.
- c. Interior skin – aluminum:
 - 1) Thickness: Standard for finish and texture indicated.
 - 2) Finish: Matching curtain wall framing.
 - 3) Texture: Smooth.
 - 4) Backing sheet 0.125-inch (3.2 mm) thick, corrugated, high density polyethylene.
- d. Thermal insulation core: Rigid, closed cell, polyisocyanurate board.

2.3 GLAZING

- A. Glazing: Comply with Section 08 80 00: Glazing.
- B. Glazing Gaskets: Sealed corner pressure glazing system of black, resilient elastomeric glazing gaskets, setting blocks, and shims or spacers.
- C. Glazing Sealants: Recommended by manufacturer.
- D. Structural Glazing Sealants - ASTM C1184:
 - 1. Chemically curing silicone formulation that is compatible with system components with which it comes in contact, specifically formulated and tested for use as structural sealant and approved by structural-sealant manufacturer for use in curtainwall assembly indicated:
 - a. Color: Black
- E. Weatherseal Sealants – ASTM C920 for Type S; Grade NS; Class 25; Uses NT, G, A, and O:
 - 1. Chemically curing silicone formulation that is compatible with structural sealant and other system components with which it comes in contact; recommended by structural sealant, weatherseal sealant, and structural sealant glazed curtainwall manufacturers for this use:
 - a. Color: Match structural sealant.

2.4 ACCESSORIES

- A. Fasteners and Accessories:
 - 1. Corrosion resistant, nonstaining, nonbleeding fasteners and accessories compatible with adjacent materials:
 - a. Use self-locking devices where fasteners are subject to loosening or turning out from thermal and structural movements, wind loads, or vibration.
 - b. Reinforce members as required to receive fastener threads.
 - c. Use exposed fasteners with countersunk Phillips screw heads, finished to match framing system.
- B. Anchors:
 - 1. Three-way adjustable anchors with minimum adjustment of one inch (25.4 mm) that accommodate fabrication and installation tolerances in material and finish compatible with adjoining materials and recommended by manufacturer:
 - a. Concrete and masonry inserts: Hot dip galvanized cast iron, malleable iron, or steel

inserts complying with ASTM A123 or ASTM A153 requirements.

- C. Concealed Flashing: Corrosion resistant, nonstaining, nonbleeding flashing compatible with adjacent materials
- D. Bituminous Paint: Cold applied asphalt mastic paint complying with SSPC-Paint 12 requirements except containing no asbestos, formulated for 30-mil (0.762-mm) thickness per coat.

2.5 FABRICATION

- A. Form or extrude aluminum shapes before finishing.
- B. Weld in concealed locations to greatest extent possible to minimize distortion or discoloration of finish. Remove weld spatter and welding oxides from exposed surfaces by descaling or grinding.
- C. Fabricate components that, when assembled, have the following characteristics:
 - 1. Profiles that are sharp, straight, and free of defects or deformations.
 - 2. Accurately fitted joints with ends coped or mitered.
 - 3. Physical and thermal isolation of glazing from framing members.
 - 4. Accommodations for thermal and mechanical movements of glazing and framing to maintain required glazing edge clearances.
 - 5. Provisions for field replacement of glazing from exterior.
 - 6. Fasteners, anchors, and connection devices that are concealed from view to greatest extent possible.
 - 7. Components curved to indicate radii.
- D. Fabricate components to resist water penetration:
 - 1. Internal guttering system or other means to drain water passing joints, condensation occurring within framing members, and moisture migrating within glazed aluminum curtain wall to exterior.
 - 2. Pressure equalized system or double barrier design with primary air and vapor barrier at interior side of glazed aluminum curtain wall and secondary seal weeped and vented to exterior.
- E. Factory Assembled Frame Units:
 - 1. Rigidly secure nonmovement joints.
 - 2. Prepare surfaces that are in contact structural sealant according to sealant manufacturer's written instructions to ensure compatibility and adhesion.
 - 3. Preparation includes, but is not limited to, cleaning and priming surfaces.
 - 4. Seal joints watertight unless otherwise indicated.
 - 5. Install glazing to comply with requirements in Section 08 80 00: Glazing.
- F. After fabrication, clearly mark components to identify locations according to shop drawings.

2.6 ALUMINUM FINISHES

- A. Color Anodic Finish - AAMA 611, AA-M12C22A42/A44, Class I, 0.018 mm or thicker:
 - 1. Color: Selected by Architect.

2.7 SOURCE QUALITY CONTROL

- A. Structural Sealant: Perform quality control procedures complying with ASTM C1401 recommendations including, but not limited to, assembly material qualification procedures,

sealant testing, and assembly fabrication reviews and checks.

PART 3 EXECUTION

3.1 PROJECT CONDITIONS

- A. Field Measurements:
 - 1. Verify dimensions of supporting structure by field measurements before fabrication so curtainwall work is accurately designed, fabricated, and fitted to the structure. Indicate measurements on shop drawings. Coordinate fabrication schedule with construction progress to avoid delaying the work. Use Contractor's lines and benchmarks as a basis for measurements:
 - a. Established dimensions: Where field measurements cannot be made without delaying the work, establish dimensions and proceed with fabricating curtainwalls without field measurements. Coordinate supporting structure construction to ensure actual dimensions correspond to established dimensions.

3.2 EXAMINATION

- A. Examine openings, substrates, adjoining construction, structural support, anchorage, and conditions for compliance with requirements for installation tolerances and conditions affecting performance of the work:
 - 1. Verify rough opening dimensions, levelness of sill plate, and operational clearances. Examine wall flashings, vapor retarders, water and weather barriers, and built in components to ensure weathertight window wall installation.
 - 2. Notify Architect in writing of dimensions or conditions found that prevent proper execution of the window wall work, including specified tolerances.
- B. Proceed with installation after correcting unsatisfactory conditions.

3.3 PREPARATION

- A. Prepare surfaces that will contact structural sealant according to sealant manufacturer's written instructions to ensure compatibility and adhesion. Preparation includes, but is not limited to, cleaning and priming surfaces.

3.4 INSTALLATION

- A. Coordinate installation with building enclosure work.
- B. Comply with manufacturer's written instructions for installing curtain wall, accessories, and other components. For installation procedures and requirements not addressed in manufacturer's written instructions, comply with installation requirements in ASTM E2112:
 - 1. Do not install damaged components.
 - 2. Fit frame joints to produce hairline joints free of burrs and distortion.
 - 3. Rigidly secure nonmovement joints.
 - 4. Remove loose particles present or resulting from fabrication or field cutting and drilling by blowing out joints with oil free compressed air, or by vacuuming joints.
 - 5. Remove protective coatings, oils from cutting and drilling operations, and residue on metallic surfaces with solvents that leave no residue.
 - 6. Do not allow solvent to air dry without wiping. Use lint free towels for wiping of surfaces. Wipe metal surfaces with IPA (isopropyl alcohol) or xylene unless otherwise required by compatibility and adhesion testing results. Seal joints watertight. Clean excess joint sealants from finished surfaces.
 - 7. Install anchors with separators and isolators to prevent metal corrosion and electrolytic

- deterioration and to prevent impeding movement of moving joints.
 - 8. Where welding is required, weld components in concealed locations to minimize distortion or discoloration of finish. Protect glazing surfaces from welding.
 - 9. Seal joints watertight unless otherwise indicated.
 - 10. Set components within erection tolerances with uniform joints. Place components on shims and fasten to supporting substrates using bolts and similar fasteners.
 - 11. Do not erect components that are warped, deformed, bowed, dented, defaced, or damaged and impair strength or appearance. Remove and replace members damaged in process of erection.
 - 12. Coat concealed surfaces of dissimilar materials, and ferrous metal components, with heavy coating of bituminous paint, zinc rich primer or separation in accordance with manufacturer's recommendations. Where aluminum components will contact concrete or masonry, protect against corrosion by painting contact surfaces with bituminous paint.
 - 13. Do not burn, cut into, or field drill holes or slots in building framing member without written acceptance of the structural engineer.
- C. Metal Protection:
- 1. Where aluminum is in contact with dissimilar metals, protect against galvanic action by painting contact surfaces with primer, applying sealant or tape, or installing nonconductive spacers as recommended by manufacturer for this purpose.
 - 2. Where aluminum is in contact concrete or masonry, protect against corrosion by painting contact surfaces with bituminous paint.
- D. Install components to drain water passing joints, condensation occurring within framing members, and moisture migrating within glazed aluminum curtain wall to exterior.
- E. Install components plumb and true in alignment with established lines and grades.
- F. Permanently fasten to building structure with manufacturer recommended attachments and shims to permanently fasten system to building structure. Securely anchor components and units in place, allowing for required movement, including expansion and contraction. Set sill members in bed of sealant. Set other members with internal sealants and baffles to provide weathertight construction.
- G. Water Drainage: Compartmentalize each light of glass using joint plugs and silicone sealant to divert water to the horizontal weep locations. Locate weep holes in the horizontal pressure plates and covers to divert water to the exterior of the building.
- H. Install operable units level and plumb, securely anchored, and without distortion. Adjust weather stripping contact and hardware movement to produce proper operation.
- I. Glazing:
- 1. Install glazing gaskets and sealants in accordance with manufacturer's instructions without exception; including surface preparations. Refer to Section 08 80 00: Glazing:
 - a. Prepare surfaces that will contact structural sealant according to sealant manufacturer's written instructions to ensure compatibility and adhesion:
 - 1) Preparation includes, but is not limited to, cleaning and priming surfaces.
- J. Insulation and Fire Stopping
- K. Weatherseal: Install weatherseal sealant according to Section 07 92 00: Joint Sealants and according to sealant manufacturer's written instructions to produce weatherproof joints. Install joint filler behind sealant as recommended by sealant manufacturer.

3.5 ERECTION TOLERANCES

- A. Erection Tolerances:
 - 1. Install glazed aluminum curtain walls to comply with the following maximum tolerances:
 - a. Plumb: 1/8 inch in ten feet (3.2 mm in 3 m); 1/4 inch in 40 feet (6.35 mm in 12.2 m).
 - b. Level: 1/8 inch in 20 feet (3.2 mm in 6 m); 1/4 inch in 40 feet (6.35 mm in 12.2 m).
 - c. Alignment:
 - 1) Where surfaces abut in line or are separated by reveal or protruding element up to 1/2 inch (12.7 mm) wide, limit offset from true alignment to 1/16 inch (1.6 mm).
 - 2) Where surfaces are separated by reveal or protruding element from 1/2 to one inch (12.7 to 25.4 mm) wide, limit offset from true alignment to 1/8 inch (3.2 mm).
 - 3) Where surfaces are separated by reveal or protruding element of one inch (25.4 mm) wide or more, limit offset from true alignment to 1/4 inch (6 mm).
 - d. Location: Limit variation from plane to 1/8 inch in 12 feet (3.2 mm in 3.6 m); 1/2 inch (12.7 mm) over total length.
 - e. Tolerances are not accumulative.

3.6 FIELD QUALITY CONTROL

- A. The Owner reserves the rights to engage an independent testing and inspection agency to verify the adequacy of the Contractor's quality control. Obtain inspections from representative of the Owner's independent testing and inspection agency. Testing and inspecting agency will interpret tests and state in each report whether tested work complies with or deviates from requirements.
- B. Test Area: Perform tests on representative areas of glazed aluminum curtain walls.
- C. Field Quality Control Testing:
 - 1. Perform the following tests on representative areas of glazed aluminum curtain walls.
 - a. Water spray test:
 - 1) Before installation of interior finishes has begun, areas designated by Architect shall be tested according to AAMA 501.2 and shall not evidence water penetration:
 - a) Perform a minimum of two (2) tests in areas as directed by Architect.
 - b) Perform tests in each test area as directed by Architect. Perform at least three (3) tests, prior to 70 percent completion.
 - b. Air infiltration:
 - 1) ASTM E783 at 1.5 times the rate specified for laboratory testing but not more than 0.09 cfm/sq. ft. (0.45 L/s per sq. m) at a static-air-pressure differential of 1.57 lbf/sq. ft. (75 Pa):
 - a) Perform a minimum of two tests in areas as directed by Architect.
 - b) Perform tests in each test area as directed by Architect. Perform at least three (3) tests, prior to 70 percent completion.
 - c. Water penetration: ASTM E1105 at a minimum cyclic static-air-pressure differential of 0.67 times the static-air-pressure differential specified for laboratory testing, but not less than 6.24 lbf/sq. ft. (300 Pa) and shall not evidence water penetration.
- D. Structural Sealant Adhesion:
 - 1. Test structural sealant according to recommendations in ASTM C1401, Destructive Test Method A, Hand Pull Tab (Destructive), Appendix X2:
 - a. Test a minimum of two (2) areas on each building facade.
 - b. Repair installation areas damaged by testing.
- E. Glazed aluminum curtain walls will be considered defective if they do not pass tests and

inspections.

- F. Prepare test and inspection reports.
- G. Remove and replace noncomplying windows and retest as specified.
- H. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

3.7 CLEANING

- A. Clean metal surfaces promptly after installation, exercising care to avoid damage to factory finished exposed surfaces.
- B. Wash glass on both faces not more than four (4) days prior to date scheduled for inspections that establish date of Substantial Completion. Wash glass as recommended by glass manufacturer. Remove excess glazing and sealant compounds, dirt, and other substances.
- C. Immediately remove deleterious material from surfaces of aluminum.

3.8 PROTECTION

- A. Institute protective measures required throughout the remainder of the construction period to ensure that window wall work will be without damage or deterioration, other than normal weathering, at time of acceptance.

END OF SECTION 08 44 13

SECTION 08 51 13 ALUMINUM WINDOWS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section specifies architectural aluminum type windows as indicated on Drawings with integral glazing units and accessories.
- B. Related Sections:
 - 1. Section 07 92 00: Joint Sealants.
 - 2. Section 08 80 00: Glazing.
- C. Reference Standards:
 - 1. American Architectural Manufacturer's Association (AAMA):
 - a. AAMA/WDMA/CSA101/I.S.2/A440 North American Fenestration Standard/Specification for Windows, Doors, and Skylights, Includes Update No. 1.
 - b. AAMA 502 Voluntary Specification for Field Testing of Newly Installed Fenestration Products.
 - c. AAMA 609 Cleaning and Maintenance Guide for Architecturally Finished Aluminum.
 - d. AAMA 611 Voluntary Standards for Anodized Architectural Aluminum.
 - e. AAMA 2605 Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels (with Coil Coating Appendix).
 - 2. Glass Association of North America (GANA):
 - a. GANA 01-0300 Proper Procedures for Cleaning Architectural Glass Products.
 - 3. ASTM International (ASTM):
 - a. ASTM E283 Standard Test Method for Determining Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen.
 - b. ASTM E330 Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference.
 - c. ASTM E547 Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Cyclic Static Air Pressure Difference.
 - d. ASTM F588 Standard Test Methods for Measuring the Forced Entry Resistance of Window Assemblies, Excluding Glazing Impact.
 - 4. National Fenestration Rating Council (NFRC):
 - a. NFRC 100A Procedure for Determining Fenestration Attachment Product U-Factors.
 - b. NFRC 200A Procedure for Determining Attachment Product Solar Heat Gain Coefficient and Visible Transmittance at Normal Incidence.
 - c. NFRC 500 Procedure for Determining Fenestration Product Condensation Resistance Values.

1.3 SUBMITTALS

- A. Product Data - Manufacturer's standard specifications and descriptive literature, including:
 - 1. Certified test laboratory reports to show compliance with requirements:

- a. Windows with sizes exceeding the gateway sizes do not qualify under these tests.
 - b. Windows manufactured with configurations different than the tested configurations do not qualify under these tests; windows can be tested for performance outside the already tested gateway sizes.
 - c. Windows with hardware different from what is referenced on the test reports do not qualify under these tests.
2. Manufacturer's standard head, jamb, and sill details.
- B. Manufacturer's Certificates: Submit certified independent testing agency reports indicating window unit meets or exceeds specified performance requirements.
- C. Shop Drawings - For each installation and for special components not dimensioned or detailed in manufacturer's product data:
 1. Provide shop drawings indicating details of construction and installation including, but not limited to, window location chart, window schedule, size, muntin type and design, sections and details of multiple window assemblies, hardware, glazing details, frame type, STC, glass types, screens, and handing operation.
- D. Samples:
 1. Window section:
 - a. Submit eight-inch by eight-inch (8" x 8") minimum corner section sample of frame for each glazing type specified.
 - b. Sample will be used to verify construction, corner joint, frame finish and color.
 - c. Quantity 5.
 2. Glazing:
 - a. Insulated glazing 12 x 12 inch.
 3. Finish - AAMA 611 Anodized Architectural Coatings; AAMA 2605 for Organic Coatings on Aluminum Extrusions:
 - a. Class 1 Anodized.
- E. Manufacturer's written instructions, including:
 1. Delivery, storage, and handling recommendations.
 2. Preparation and installation recommendations.
- F. Installer's Experience: Submit verification of evidence of work similar to work of this Section.
- G. Warranty:
 1. Fully executed, issued in Owner's name and registered with manufacturer, including:
 - a. Manufacturer's 1 year warranty, from date of accepted delivery, covering defects in materials.

1.4 PERFORMANCE REQUIREMENTS

- A. Design pressure, air infiltration, and water penetration:
 1. Comply with AAMA /WDMA/CSA 101/I.S.2/A440 CW-PG35.
- B. Uniform Load Deflection and Uniform Load Structural to ASTM E330.
- C. ASTM E283, Air Leakage: 1.57 psf: 0.3cfm/ft2 maximum.
- D. ASTM E547, Water Penetration: at 4.59 psf: no leakage.
- E. ASTM F588, Forced Entry Resistance: Type B Grade 10: Pass for no entry.
- F. U-Value [].

G. Solar Heat Gain Coefficient (SHGC) [_____].

H. Acoustical Performance: STC [_____].

1.5 QUALITY ASSURANCE

- A. Manufacturer Qualifications:
 - 1. Minimum ten (10) years' experience in producing aluminum windows of the type specified:
 - a. Manufacturer must be certified through the PPG Certified Window Fabricator Program.
- B. Installer Qualifications: Licensed contractor with a minimum three (3) years' experience installing similar windows.
- C. Mockups:
 - 1. Provide and install at jobsite a mockup using acceptable products and manufacturer approved installation methods. Obtain Owner's and Architect's acceptance of finish color and workmanship standard:
 - a. Maintenance: Maintain mockup during construction for workmanship comparison; remove and legally dispose of mockup when no longer required.
 - b. Incorporation:
 - 1) Mockup may be incorporated into final construction upon Owner's and Architect's approval.
 - c. Modify mockup as required to produce acceptable work.
- D. Source Quality Control:
 - 1. Use only fabricators who have training and experience with similar work of this Section.
 - 2. Ensure all window framing materials come from single manufacturer.
- E. Field Quality Control:
 - 1. Comply with AAMA 502.
 - 2. Field testing performance: To AAMA 502.
 - 3. Proper execution of the field test:
 - a. Ensure window is plumb, level, and square:
 - 1) If conditions fall outside the +/-1/8-inch tolerance, do not test product.
 - 2) Test at a pressure greater than 2/3 the fenestration product laboratory test pressure.
 - 4. Qualification of the agency performing the test: Ensure agency is an AAMA accredited independent testing agency.
 - 5. Site visits:
 - a. Schedule site visits to review work at stages listed:
 - 1) After delivery and storage of aluminum windows and when preparatory work on which work of this Section depends is complete, but before application begins.
 - 2) Twice during progress of work at 25 percent and 60 percent complete.
 - 3) Upon completion of work, after cleaning is carried out.
 - 4) Obtain reports within three (3) days of review and submit immediately to Architect.

1.6 WARRANTY

- A. Manufacturer's Warranty:
 - 1. Submit, for Owner's acceptance, manufacturer's standard warranty document executed by authorized company official.

2. Manufacturer's warranty is in addition to and not intended to limit other rights Owner may have under Contract Conditions.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Delivery:
 1. Deliver materials in accordance with manufacturer's written instructions and labeling.
 2. Deliver materials in manufacturer's original, unopened, undamaged containers or packaged with identification labels intact, and product name and manufacturer clearly visible and in sizes to suit Project.
- B. Storage: Store materials upright and protected from exposure to harmful environmental conditions, clean, dry, frost-free, and at manufacturer's recommended temperature and humidity levels.
- C. Handling:
 1. Exercise care during off-loading and installation to avoid damage and marring of finishes.
 2. Handle in a manner to evenly distribute material load and prevent twisting, ending, and cracking of windows, doors, and associated parts.
 3. Replace materials damaged during handling.

PART 2 PRODUCTS

2.1 MANUFACTURER

- A. Acceptable Manufacturer: All Weather Architectural Aluminum, 777 Aldridge Road, Vacaville, California 95688; Phone: (707) 452-1600; Fax: (707) 452-1616; Email: randy.agno@allweatheraa.com; Website: www.allweatheraa.com.
- B. Basis for Design: Series 5000 Windows by All Weather Architectural Aluminum.
- C. Information, including sample (size and configuration per Architect's requirements) must be submitted for consideration a minimum of ten (10) days before Project bid date.

2.2 DESCRIPTION

- A. Acceptable Material - Series 5000 Outside Glazed Windows by All Weather Architectural Aluminum:
 1. Aluminum framed windows as indicated and accessories.
 - a. Window dimensions: See Drawings for window types and configurations.

2.3 MATERIALS

- A. Frames – 2-1/4 inches Pour and Debridge, thermally broken extruded aluminum Type 6063 age hardened to T-6 rating for strength and durability:
 1. Integral extrusion wall thickness: 0.094 inches.
 2. Nominal web thickness: 1/8 inch.
 3. Include full perimeter exterior snap in glazing stops.
 4. Corners of frame and ventilators: Mitered and welded; muntin and intermediate bars attached to cross joints and abutting sash sections.
 5. Operating sash: Mitered, corner keyed and crimped frames.
 6. Finish types:
 - a. Aluminum to AA DAF-45, Class 1, bronze anodized

- B. Glazing:
 - 1. Insulated glass 1 inch.

2.4 FABRICATION

- A. Miter and weld corner joints of frames.
- B. Vents: Mitered, corner keyed, and crimped.
- C. Attach muntin and intermediate bars to cross joints and abutting sections.
- D. Ensure sill, vents, and intermediate bars have weep holes and are sloped for positive drainage to exterior.
- E. Pre-drill and tap frames to receive screen attachment hardware as required.
- F. Ensure surfaces to be glazed include bead retaining notch.
- G. Ensure operable windows include two rows of weather-stripping in extruded slot at perimeter of vent or opening.
- H. Install hardware specified.

2.5 ACCESSORIES

- A. Hardware:
 - 1. For casement windows: 4 bar heavy duty stainless steel concealed hinges
- B. Screens - Painted roll formed aluminum frames finished to match window frames, factory-drilled/tapped to receive screen attachment hardware:
 - 1. Screen hardware:
 - b. Wire.
- C. Weatherstripping: 64A durometer black santoprene bulb insert.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verification of Conditions:
 - 1. Verify that conditions of substrate previously installed under other Sections or contracts are acceptable for aluminum window installation in accordance with manufacturer's written recommendations:
 - a. Visually inspect substrate.
 - b. Verify openings are dimensionally correct and within allowable tolerances, and substrates are plumb, level, and clean.
 - c. Verify in the presence of the Architect that anchoring surface is in accordance with approved shop drawings.
 - d. Inform Architect of unacceptable conditions immediately upon discovery.
 - e. Proceed with installation only after unacceptable conditions have been remedied and after receipt of written approval to proceed from Architect.
 - f. Starting window installation implies substrate conditions are acceptable for work of this Section.

3.2 INSTALLATION

- A. Install aluminum windows in accordance with manufacturer's written recommendations:
 - 1. Ensure operable windows are closed and locked during installation.

3.3 SEALANTS

- A. Apply sealant in accordance with manufacturer's written installation guidelines.

3.4 CLEANING

- A. Clean sealants, caulking, and other materials from surfaces, including adjacent work.
- B. Clean window frames, casings, and glass using materials and methods recommended by the window and glass manufacturer that do not cause defacement of work:
 - 1. Clean using methods that comply with AAMA 609.
 - 2. Clean glass using methods that comply with GANA 01-0300.
- C. Protect installed products until completion of Project.
- D. Touch-up, repair, or replace damaged products before Substantial Completion.

3.5 PROTECTION

- A. Protect installed aluminum windows from damage during construction.
- B. Repair or replace adjacent materials damaged by installation of aluminum windows.

END OF SECTION 08 51 13

SECTION 08 71 00
DOOR HARDWARE

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Door hardware.
 - 2. Gate Hardware.
 - 3. Allowance for Best brand cores and keys..
 - 4. Padlocks.
 - 5. Cylinders for doors fabricated with locking hardware.
- B. Related Divisions:
 - 1. Division 06 – door hardware installation
 - 2. Division 07 – Section “Joint Sealants” for sealant requirements applicable to threshold installation specified in this section.
 - 3. Division 08 – metal doors and frames.
 - 1. Procure scheduled Best brand temporary and permanent cylinder cores and keys from (Owner’s lock shop / Owner’s Physical Plant Maintenance Dept). Allow \$45 per core and \$7.50 per key. Owner’s agent will purchase the cores and keys directly from Best Access Systems or provide the units from Owner’s attic stock.
- C. Specific Omissions: Hardware for the following is specified or indicated elsewhere.
 - 1. Windows.
 - 2. Cabinets, including open wall shelving and locks.
 - 3. Signs.
 - 4. Toilet accessories, including grab bars.
 - 5. Installation.
 - 6. Rough hardware.
 - 7. Access doors and panels.
 - 8. Welded steel gates and supports.

1.2 REFERENCES:

- A. Use date of standard in effect as of Bid date.
 - 1. American National Standards Institute
 - a) ANSI/BHMA A156.1 - A156.29, and ANSI/BHMA A156.31 - Standards for Hardware and Specialties.
 - 2. BHMA – Builders Hardware Manufacturers Association
 - 3. 2022 California Building Code.
 - a) Chapter 11B – Accessibility To Public Buildings, Public Accommodations, Commercial Buildings and Public Housing.
 - 4. DHI – Door and Hardware Institute.

5. UL – Underwriters Laboratories
 - a) UL 305 – Panic Hardware
 6. WHI – Warnock Hersey Incorporated State of California Building Code
 7. Local applicable codes
 8. SDI – Steel Door Institute
 9. NAAMM – National Association of Architectural Metal Manufacturers
- B. Abbreviations
1. Manufacturers: see table at 2.1.A of this section.
 2. Finishes: see 2.7 of this section.

1.3 SUBMITTALS & SUBSTITUTIONS

- A. SUBMITTALS: Submit electronic copy of schedule. Organize vertically formatted schedule into “Hardware Sets” with index of doors and headings, indicating complete designations of every item required for each door or opening. Minimum 10pt font size. Include following information:
1. Type, style, function, size, quantity, and finish of hardware items.
 2. Use BHMA Finish codes per ANSI A156.18.
 3. Name, part number and manufacturer of each item.
 4. Fastenings and other pertinent information.
 5. Location of hardware set coordinated with floor plans and door schedule.
 6. Explanation of abbreviations, symbols, and codes contained in schedule.
 7. Mounting locations for hardware.
 8. Door and frame sizes, materials, and degrees of swing.
 9. List of manufacturers used and their nearest representative with address and phone number.
 10. Catalog cuts.
- B. Bid and submit manufacturer’s updated/improved item if scheduled item is discontinued.
- C. Deviations: Highlight, encircle or otherwise identify deviations from “Schedule of Finish Hardware” on submittal with notations clearly designating those portions as deviating from this section.
- D. If discrepancy between drawings and scheduled material in this section, bid the more expensive of the two choices, note the discrepancy in the submittal and request direction from Architect for resolution.
- E. Substitutions per Division 1. Include product data and indicate benefit to the Project. Furnish operating samples on request.
- F. Furnish as-built/as-installed schedule with closeout documents, including keying schedule, riser and point-to-point wiring diagrams, manufacturers’ installation, adjustment and maintenance information, and supplier’s final inspection report.

1.4 QUALITY ASSURANCE:

- A. Qualifications:

1. Hardware supplier: direct factory contract supplier who employs a hardware consultant, available at reasonable times during course of work for project hardware consultation to Owner, Architect and Contractor.
 - a) Responsible for detailing, scheduling, and ordering of finish hardware. Detailing implies that the submitted schedule of hardware is correct and complete for the intended function and performance of the openings.
- B. Hardware: Free of defects, blemishes, and excessive play. Obtain each kind of hardware (latch and locksets, exit devices, hinges, and closers) from one manufacturer.
- C. Exit Doors: Operable from inside with single motion without the use of a key or special knowledge or effort.
- D. Furnish hardware items required to complete the work in accordance with specified performance level and design intent, complying with manufacturers' instructions and code requirements.

1.5 DELIVERY, STORAGE AND HANDLING:

- A. Delivery: coordinate delivery to appropriate locations (shop or field).
 1. Permanent keys and cores: secured delivery direct to Owner's representative.
- B. Acceptance at Site: Items individually packaged in manufacturers' original containers, complete with proper fasteners and related pieces. Clearly mark packages to indicate contents, locations in hardware schedule and door numbers.
- C. Storage: Provide securely locked storage area for hardware, protect from moisture, sunlight, paint, chemicals, dust, excessive heat and cold, etc.

1.6 PROJECT CONDITIONS AND COORDINATION:

- A. Where exact types of hardware specified are not adaptable to finished shape or size of members requiring hardware, provide suitable types having as nearly as practical the same operation and quality as type specified, subject to Architect's approval.
- B. Coordination: Coordinate hardware with other work. Furnish hardware items of proper design for use on doors and frames of the thickness, profile, swing, security and similar requirements indicated, as necessary for proper installation and function, regardless of omissions or conflicts in the information on the Contract Documents. Furnish related trades with the following information:
 1. Location of embedded and attached items to concrete.
 2. Location of wall-mounted hardware, including wall stops. Note: Careful coordination required for reinforcement/blocking for wall stop support. If random inspection yields an unsupported wall stop, all locations will be rebuilt at no expense to the Owner or Architect.
 3. Location of finish floor materials and floor-mounted hardware.

4. At masonry construction, coordinate with the anchoring and hollow metal supplier prior to frame installation by placing a strip of insulation, wood, or foam, on the back of the hollow metal frame behind the rabbet section for continuous hinges, as well as at rim panic hardware strike locations, silencers, coordinators, and door closer arm locations. When the frame is grouted in place, the backing will allow drilling and tapping without dulling or breaking the installer's bits.
 5. Coordinate: flush top rails of doors at out swinging exteriors, and throughout where adhesive-mounted seals occur.
 6. Manufacturers' templates to door and frame fabricators.
- C. Check Shop Drawings for doors and entrances to confirm that adequate provisions will be made for proper hardware installation.
- D. Environmental considerations: segregate unused recyclable paper and paper product packaging, uninstalled metals, and plastics, and have these sent to a recycling center.

1.7 WARRANTY:

- A. Part of respective manufacturers' regular terms of sale. Provide manufacturers' written warranties.
- B. Include factory order numbers with close-out documents to validate warranty information, required for Owner in making future warranty claims:
- C. Minimum warranties:
- | | |
|----------------------|-------------------------|
| 1. Mortise Locksets: | Ten years mechanical |
| 2. Exit Devices: | Ten years mechanical |
| 3. Closers: | Thirty years mechanical |
| 4. Hinges: | One year |
| 5. Other Hardware | Two years |

1.8 COMMISSIONING:

- A. Conduct these tests prior to request for certificate of substantial completion:
1. With installer present, test door hardware operation with climate control system and stairwell pressurization system both at rest and while in full operation.
 2. With installer, access control contractor and electrical contractor present, test electrical, electronic, and electro-pneumatic hardware systems for satisfactory operation.
 3. With installer and electrical contractor present, test hardware interfaced with fire/life-safety system for proper operation and release.

1.9 REGULATORY REQUIREMENTS:

- A. Locate latching hardware between 34 inches to 44 inches above the finished floor, per-2022 California Building Code, Section 11B-404.2.7.

1. Panic hardware: locate between 36 inches to 44 inches above the finished floor.
- B. Handles, pull, latches, locks, other operable parts:
 1. Readily openable from egress side with one hand and without tight grasping, tight pinching, or twisting of the wrist to operate. 2022 California Building Code Section 11B-309.4.
 2. Force required to activate the operable parts: 5.0 pounds maximum, per 2022 California Building Code Section 11B-309.4.
- C. Adjust doors to open with not more than 5.0-pounds pressure to open at exterior doors and 5.0-pounds at interior doors. As allowed per 2022 California Building Code Section 11B-404.2.9, local authority may increase the allowable pressure for fire doors to achieve positive latching, but not to exceed 15-pounds.
 1. Exception: exterior doors' pressure-to-open may be increased to 8.5-pounds if: at a single location, and one of a bank of eight leaves or fraction of eight, and one leaf of this bank is fitted with a low- or high-energy operator.
- D. Adjust door closer sweep periods so that from an open position of 90 degrees, the door will take at least 5 seconds to move to a point 12 degrees from the latch, measured to the landing side of the door, per 2022 California Building Code Section 11B-404.2.8.
- E. Smooth surfaces at bottom 10 inches of push sides of doors, facilitating push-open with wheelchair footrests, per 2022 California Building Code Section 11B-404.2.10.
 1. Applied kickplates and armor plates: bevel the left and right edges; free of sharp or abrasive edges. Cavities created by kickplates to be capped per 2022 California Building Code Section 11B-404.2.10.
 2. Tempered glass doors without stiles: bottom rail may be less than 10 inches if top leading edge is tapered 60 degrees minimum.
- F. Door opening clear width no less than 32 inches, measured from face of frame stop, or edge of inactive leaf of pair of doors, to door face with door opened to 90 degrees. Hardware projection not a factor in clear width if located above 30 inches and below 80 inches, and the hardware projects no more than 4 inches. 2022 California Building Code Section 11B-404.2.3.
 1. Exception: In alterations, a projection of 5/8 inch (15.9 mm) maximum into the required clear width shall be permitted for the latch side stop.
 2. Door closers and overhead stops: not less than 78 inches above the finished floor or ground, per 2022 California Building Code 11B-307.4.
- G. Thresholds: floor or landing no more than 0.50 inches below the top of the threshold of the doorway, per 2022 California Building Code Section 11B-404.2.5. Vertical rise no more than 0.25 inches, change in level between 0.25 inches and 0.50 inches: beveled to slope no greater than 1:2 (50 percent slope). 2022 California Building Code Section 11B-303.2 & ~.3.
- H. Floor stops: Do not locate in path of travel. Locate no more than 4 inches from walls, per DSA Policy #99-08 (Access).

- I. Pairs of doors with independently activated hardware both leafs: limit swing of right-hand or right-hand-reverse leaf to 90 degrees to protect persons reading wall-mounted tactile signage, per 2022 California Building Code Section 11B-703.4.2.

PART 2 PRODUCTS

2.1 MANUFACTURERS:

- A. Manufacturers and their abbreviations used in this schedule:

BES	Best
IVE	H. B. Ives
KEE	Keedex
LCN	LCN Closers
SCH	Schlage Lock Company
VON	Von Duprin
ZER	Zero International

2.2 HINGING METHODS:

- A. Drawings typically depict doors at 90 degrees, doors will actually swing to maximum allowable. Use wide-throw conventional or continuous hinges as needed up to 8 inches in width to allow door to stand parallel to wall for true 180-degree opening. Advise architect if 8-inch width is insufficient.
- B. Conform to manufacturer's published hinge selection standard for door dimensions, weight and frequency, and to hinge selection as scheduled. Where manufacturer's standard exceeds the scheduled product, furnish the heavier of the two choices, notify Architect of deviation from scheduled hardware.
- C. Conventional Hinges: Steel or stainless-steel pins and approved bearings. Hinge open widths minimum, but of sufficient throw to permit maximum door swing.
 1. Out-swinging exterior doors: non-ferrous with non-removable (NRP) pins and security studs.
 2. Non-ferrous material exteriors and at doors subject to corrosive atmospheric conditions.

2.3 LOCKSETS, LATCHSETS, DEADBOLTS:

- A. Mortise Locksets and Latchsets: as scheduled.
 1. Chassis: cold-rolled steel, handing field-changeable without disassembly.
 2. Universal lock case – 10 functions in one case.
 3. Floating mounting tabs automatically adjusts to fit a beveled door edge.
 4. Latchbolts: 0.75 inch throw stainless steel anti-friction type.
 5. Lever Trim: through-bolted, accessible design, cast lever or solid extruded bar type levers as scheduled. Filled hollow tube design unacceptable.

- a) Spindles: security design independent breakaway. Breakage of outside lever does not allow access to inside lever's hubworks to gain wrongful entry.
 - b) Inside lever applied by screwless shank mounting – no exposed trim mount screws.
 - c) Levers rotate up or down for ease of use.
- 6. Furnish solid cylinder collars with wave springs. Wall of collar to cover rim of mortise cylinder.
 - 7. Turnpieces: accessible offset turn-lever design not requiring pinching or twisting motions to operate.
 - 8. Strikes: 16 gage curved steel, bronze or brass with 1-inch-deep box construction, lips of sufficient length to clear trim and protect clothing.
 - 9. Scheduled Lock Series and Design: Schlage L series, 06A design.
 - 10. Certifications:
 - a) ANSI A156.13, 1994, Grade 1 Operational.
 - b) ANSI/ASTM F476-84 Grade 31 UL Listed.
 - 11. Accessibility: Require not more than 5 lb to retract the latchbolt or deadbolt, or both, per CBC 2022 11B-404.2.7 and 11B-309.4.

2.4 EXIT DEVICES / PANIC HARDWARE

A. General features:

- 1. Independent lab-tested 1,000,000 cycles.
- 2. Push-through push-pad design. No exposed push-pad fasteners, no exposed cavities when operated. Return stroke fluid dampeners and rubber bottoming dampeners, plus anti-rattle devices.
- 3. Deadlocking latchbolts, 0.75-inch projection.
- 4. End caps: impact-resistant, flush-mounted. No raised edges or lips to catch carts or other equipment.
- 5. No exposed screws to show through glass doors.
- 6. Non-handed basic device design with center case interchangeable with all functions, no extra parts required to effect change of function.
- 7. Accessibility: Require not more than 5 lb. to retract the latchbolt, per CBC 2022 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. Specific features:

- 1. Non-Fire Rated Devices: cylinder dogging with security indicator where specified.
- 2. Lever Trim: breakaway type, forged brass or bronze escutcheon min. 0.130-inch thickness, compression spring drive, match lockset lever design.
- 3. Removable Mullions: Removable with single turn of building key. Securely reinstalled without need for key. Furnish storage brackets for securely stowing the mullion away from the door when removed.

2.5 CLOSERS

A. Surface Closers: 4040XP

1. Full rack-and-pinion type cylinder with removable non-ferrous cover and cast-iron body. Double heat-treated pinion shaft, single piece forged piston, chrome-silicon steel spring.
2. ISO 2000 certified. Units stamped with date-of-manufacture code.
3. Independent lab-tested 10,000,000 cycles.
4. Non-sized, non-handed, and adjustable. Place closer inside building, stairs, and rooms.
5. Plates, brackets and special templating when needed for interface with particular header, door and wall conditions and neighboring hardware.
6. Adjust doors to open with not more than 5.0-pounds pressure to open at exterior doors and 5.0-pounds at interior doors. As allowed per 2022 California Building Code Section 11B-404.2.9, local authority may increase the allowable pressure for fire doors to achieve positive latching, but not to exceed 15-pounds.
 - a) Exception: exterior doors' pressure-to-open may be increased to 8.5-pounds if: at a single location, and one of a bank of eight leafs or fraction of eight, and one leaf of this bank is fitted with a low- or high-energy operator.
7. Separate adjusting valves for closing speed, latching speed and backcheck, fourth valve for delayed action where scheduled.
8. Extra-duty arms (EDA) at exterior doors scheduled with parallel arm units.
9. Exterior door closers: tested to 100 hours of ASTM B117 salt spray test, furnish data on request.
10. Exterior doors: seasonal adjustments not required for temperatures from 120 degrees F to -30 degrees F, furnish checking fluid data on request.
11. Non-flaming fluid will not fuel door or floor covering fires.
12. Pressure Relief Valves (PRV) not permitted.

2.6 OTHER HARDWARE

- A. Automatic Flush Bolts: Low operating force design.
- B. Kick Plates: Four beveled edges, .050 inches minimum thickness, height and width as scheduled. Sheet-metal screws of bronze or stainless steel to match other hardware.
- C. Door Stops: Provide stops to protect walls, casework, or other hardware.
 1. Unless otherwise noted in Hardware Sets, provide floor type with appropriate fasteners. Where floor type cannot be used, provide wall type. If neither can be used, provide overhead type.
- D. Seals: Four-fingered type at head & jambs. Inelastic, rigid back, not subject to stretching. Self-compensating for warp, thermal bow, door settling, and out-of-plumb. Adhesive warranted for life of installation.
 1. Proposed substitutions: submit for approval.
 2. Three-fingered type at hinge jambs of doors fitted with continuous hinges where jamb leaf of hinge is fastened to the frame reveal.

DOOR HARDWARE

- E. Thresholds: As scheduled and per details. Comply with CBC 2022 11B-404.2.5. Substitute products: certify that the products equal or exceed specified material's thickness. Proposed substitutions: submit for approval.
 - 1. Saddle thresholds: 0.125 inches minimum thickness.
 - 2. Exteriors: Seal perimeter to exclude water and vermin. Use sealant complying with requirements in Division 7 "Thermal and Moisture Protection". Minimum 0.25-inch diameter fasteners and lead expansion shield anchors, or Red-Head #SFS-1420 (or approved equivalent) Flat Head Sleeve Anchors. National Guard Products' "COMBO" or Pemko Manufacturing's "FHSL".
 - 3. Plastic plugs with wood or sheet metal screws are not an acceptable substitute for specified fastening methods.
 - 4. Fasteners: Generally, exposed screws to be Phillips or Robertson drive. Pinned TORX drive at high security areas. Flat head sleeve anchors (FHSL) may be slotted drive. Sheet metal and wood screws: full thread. Sleeve nuts: full length to prevent door compression.
- F. Through-bolts: Do not use. Coordinate with wood doors; ensure provision of proper blocking to support wood screws for mounting panic hardware and door closers. Coordinate with metal doors and frames; ensure provision of proper reinforcement to support machine screws for mounting panic hardware and door closers.
 - 1. Exception: surface-mounted overhead stops, holders, and friction stays.

2.8 FINISH:

- A. Generally: BHMA 626 Satin Chromium.
 - 1. Areas using BHMA 626: furnish push-plates, pulls and protection plates of BHMA 630, Satin Stainless Steel, unless otherwise scheduled.
- B. Door closers: factory powder coated to match other hardware, unless otherwise noted.

2.8 KEYING REQUIREMENTS:

- A. Key System: (Verify with Owner) existing Best Access Systems small format interchangeable core system, procured per Allowances in 1.1.C. Owner's agent will install the cores prior to Substantial Completion. Initiate and conduct meeting(s) with Owner to determine system structure and keybow styles, furnish Owner's written approval of the system; do not order keys or cylinders without written confirmation of actual requirements from the Owner. Owner will order and supply permanent cylinders/cores.
- B. Interchangeable Cores: 7-pin solid brass construction.
- C. Permanent cores: furnish factory keyed.

PART 3 - EXECUTION

3.1 ACCEPTABLE INSTALLERS:

- A. Can read and understand manufacturers' templates, suppliers' hardware schedule and printed installation instructions. Can readily distinguish drywall screws from manufacturers' furnished fasteners. Available to meet with manufacturers' representatives and related trades to discuss installation of hardware.

3.2 PREPARATION:

- A. Ensure that walls and frames are square and plumb before hardware installation. Make corrections before commencing hardware installation. Installation denotes acceptance of wall/frame condition.
- A. Locate hardware per SDI-100 and applicable building, fire, life-safety, accessibility, and security codes.
 - 1. Notify Architect of code conflicts before ordering material.
 - 1. Locate latching hardware between 34 inches to 44 inches above the finished floor, per California Building Code, Section 1008.1.9.2 and 11B-404.2.7.
 - 2. Locate panic hardware between 36 inches to 44 inches above the finished floor.

3.3 INSTALLATION

- A. Install hardware per manufacturer's instructions and recommendations. Do not install surface-mounted items until finishes have been completed on substrate. Set units level, plumb and true to line and location. Adjust and reinforce attachment substrate for proper installation and operation. Remove and reinstall or replace work deemed defective by Architect.
 - 1. Gaskets: install jamb-applied gaskets before closers, overhead stops, rim strikes, etc; fasten hardware over and through these seals. Install sweeps across bottoms of doors before astragals, cope sweeps around bottom pivots, trim astragals to tops of sweeps.
 - 2. Use manufacturers' fasteners furnished with hardware items or submit Request for Substitution with Architect.
 - 3. Replace fasteners damaged by power-driven tools.
- B. Locate floor stops no more than 4 inches from walls and not within paths of travel. See paragraph 2.2 regarding hinge widths, door should be well clear of point of wall reveal. Point of door contact no closer to the hinge edge than half the door width. Where situation is questionable or difficult, contact Architect for direction.
- C. Door Closers: Mount closers on room side of corridor doors, inside of exterior doors, and stair side of stairway doors from corridors. Closers shall not be visible in corridors, lobbies and other public spaces unless approved by Architect.
- D. Closer/Holders: Mount closer/holders on room side of corridor doors, inside of exterior doors, and stair side of stairway doors.

- E. Locate overhead stops for minimum 90 degrees at rest and for maximum allowable degree of swing.
- F. Thresholds: Set thresholds in full bed of sealant complying with requirements specified in Division 07 Section "Joint Sealants".
- G. Perimeter Gasketing: Apply to head and jamb, forming seal between door and frame.
- H. Meeting Stile Gasketing: Fasten to meeting stiles, forming seal when doors are closed.
- I. Drill pilot holes for fasteners in wood doors and/or frames.

3.4. ADJUSTING

- A. Adjust and check for proper operation and function. Replace units, which cannot be adjusted to operate freely and smoothly.
 - 1. Hardware damaged by improper installation or adjustment methods: repair or replace to Owner's satisfaction.
 - 2. Adjust doors to fully latch with no more than 1 pound of pressure.
 - a) Door closer valves: turn valves clockwise until at bottom – do not force. Turn valves back out one and one-half turns and begin adjustment process from that point. Do not force valves beyond three full turns counterclockwise.
 - 3. Adjust door closers per 1.9 this section.
- B. Final inspection: Installer to provide letter to Owner that upon completion installer has visited the Project and has accomplished the following:
 - 1. Has re-adjusted hardware.
 - 2. Has evaluated maintenance procedures and recommend changes or additions and instructed Owner's personnel.
 - 3. Has identified items that have deteriorated or failed.
 - 4. Has submitted written report identifying problems.

3.5 DEMONSTRATION:

- A. Demonstrate mechanical hardware, including adjustment and maintenance procedures.

3.6 PROTECTION/CLEANING:

- A. Cover installed hardware, protect from paint, cleaning agents, weathering, carts/barrows, etc. Remove covering materials and clean hardware just prior to substantial completion.
- B. Clean adjacent wall, frame and door surfaces soiled from installation / reinstallation process.

3.7 SCHEDULE OF FINISH HARDWARE







- A. See door schedule in drawings for hardware set assignments.

- B. Do not order material until submittal has been reviewed, stamped, and signed by Architect's door hardware consultant.
- C. The hardware sets represent the design intent and direction of the owner and architect. They are a guideline only and should not be considered a detailed hardware schedule. Discrepancies, conflicting hardware and missing items should 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 and functionality.

Opt. #: OPT0407852-V1














HARDWARE GROUP NO. 01

Provide each SGL door(s) with the following:

3	EA	HINGE	5BB1 4.5 X 4.5 NRP		652	IVE
1	EA	OFFICE/ENTRY LOCK W/ INSIDE INDICATOR	L9050HD 06A L583-363 IS-LOC		626	SCH
1	EA	PERMANENT CORE	AS REQUIRED PER OWNER STANDARDS		626	BES
1	EA	SURFACE CLOSER	4040XP EDA		689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS		630	IVE
1	EA	FLOOR STOP	FS436/438 AS REQ'D		626	IVE
1	EA	GASKETING	488SBK PSA		BK	ZER











HARDWARE GROUP NO. 02

Provide each SGL door(s) with the following:

3	EA	HINGE	5BB1HW SH 4.5 X 4.5 NRP		630	IVE
1	EA	PANIC HARDWARE	CDSI-PA-AX-98-NL-OP-110MD		626	VON
1	EA	SFIC MORTISE CYLINDER X TEMP CONST. CORE	80-132 X XQ11-948 36-083 36-082-025		626	SCH
1	EA	SFIC RIM CYLINDER X TEMP CONST. CORE	80-159 BRN		626	SCH
2	EA	PERMANENT CORE	AS REQUIRED PER OWNER STANDARDS		626	BES
1	EA	CYLINDER GUARD RING	K-24		626	KEE
1	EA	DOOR PULL	VR910 NL SNB		630	IVE
1	EA	SURFACE CLOSER	4040XP EDA		689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS		630	IVE
1	EA	FLOOR STOP	FS18L/FS18S AS REQ'D		BLK	IVE
1	EA	RAIN DRIP	142AA (OMIT @ OVERHANG)		AA	ZER
1	SET	SET SEAL	429AA-S (@ HEAD & JAMBS)		AA	ZER
1	EA	DOOR SWEEP	8192AA		AA	ZER
1	EA	THRESHOLD	547A-223 (OR AS REQ'D. PER DETAIL/CONDITIONS)		A	ZER






HARDWARE GROUP NO. 03

Provide each SGL door(s) with the following:

3	EA	HINGE	5BB1HW SH 4.5 X 4.5 NRP		630	IVE
1	EA	OFFICE/ENTRY LOCK W/ INSIDE INDICATOR	L9050HD 06A L583-363 IS-LOC		626	SCH
1	EA	PERMANENT CORE	AS REQUIRED PER OWNER STANDARDS		626	BES
1	EA	LOCK GUARD	LG12		630	IVE
1	EA	SURFACE CLOSER	4040XP EDA		689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS		630	IVE
1	EA	FLOOR STOP	FS18L/FS18S AS REQ'D		BLK	IVE
1	EA	RAIN DRIP	142AA (OMIT @ OVERHANG)		AA	ZER
1	SET	SET SEAL	429AA-S (@ HEAD & JAMBS)		AA	ZER
1	EA	DOOR SWEEP	8192AA		AA	ZER
1	EA	THRESHOLD	547A-223 (OR AS REQ'D. PER DETAIL/CONDITIONS)		A	ZER







HARDWARE GROUP NO. 04

Provide each SGL door(s) with the following:

3	EA	HINGE	5BB1 4.5 X 4.5		652	IVE
1	EA	CLASSROOM LOCK	L9070HD 06A		626	SCH
1	EA	PERMANENT CORE	AS REQUIRED PER OWNER STANDARDS		626	BES
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS		630	IVE
1	EA	FLOOR STOP	FS436/438 AS REQ'D		626	IVE
1	EA	GASKETING	488SBK PSA		BK	ZER












HARDWARE GROUP NO. 05

Provide each SGL door(s) with the following:

3	EA	HW HINGE	5BB1HW 4.5 X 4.5		652	IVE
1	EA	OFFICE/ENTRY LOCK W/ INSIDE INDICATOR	L9050HD 06A L583-363 IS-LOC		626	SCH
1	EA	PERMANENT CORE	AS REQUIRED PER OWNER STANDARDS		626	BES
1	EA	SURFACE CLOSER	4040XP REG		689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS		630	IVE
1	EA	FLOOR STOP	FS436/438 AS REQ'D		626	IVE
1	EA	GASKETING	488SBK PSA		BK	ZER













HARDWARE GROUP NO. 06

Provide each SGL door(s) with the following:

3	EA	HINGE	5BB1HW SH 4.5 X 4.5 NRP		630	IVE
1	EA	CLASSROOM DEAD LOCK	L9463HD XB11-720		626	SCH
1	EA	PERMANENT CORE	AS REQUIRED PER OWNER STANDARDS		626	BES
1	EA	PUSH PLATE	8200 6" X 16" CFT		630	IVE
1	EA	DOOR PULL	VR900 SNB		630	IVE
1	EA	SURFACE CLOSER	4040XP EDA		689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS		630	IVE
1	EA	FLOOR STOP	FS18L/FS18S AS REQ'D		BLK	IVE
1	EA	RAIN DRIP	142AA (OMIT @ OVERHANG)		AA	ZER
1	SET	SET SEAL	429AA-S (@ HEAD & JAMBS)		AA	ZER
1	EA	DOOR SWEEP	8192AA		AA	ZER
1	EA	THRESHOLD	547A-223 (OR AS REQ'D. PER DETAIL/CONDITIONS)		A	ZER










HARDWARE GROUP NO. 07

Provide each SGL door(s) with the following:

3	EA	HINGE	5BB1HW SH 4.5 X 4.5 NRP		630	IVE
1	EA	PANIC HARDWARE	CDSI-PA-AX-98-NL-OP-110MD		626	VON
1	EA	SFIC MORTISE CYLINDER X TEMP CONST. CORE	80-132 X XQ11-948 36-083 36- 082-025		626	SCH
1	EA	SFIC RIM CYLINDER X TEMP CONST. CORE	80-159 BRN		626	SCH
2	EA	PERMANENT CORE	AS REQUIRED PER OWNER STANDARDS		626	BES
1	EA	CYLINDER GUARD RING	K-24		626	KEE
1	EA	DOOR PULL	VR910 NL SNB		630	IVE
1	EA	SURFACE CLOSER	4040XP SCUSH		689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS		630	IVE
1	EA	RAIN DRIP	142AA (OMIT @ OVERHANG)		AA	ZER
1	SET	SET SEAL	429AA-S (@ HEAD & JAMBS)		AA	ZER
1	EA	DOOR SWEEP	8192AA		AA	ZER
1	EA	THRESHOLD	547A-223 (OR AS REQ'D. PER DETAIL/CONDITIONS)		A	ZER











HARDWARE GROUP NO. 08

Provide each SGL door(s) with the following:

3	EA	HINGE	5BB1 4.5 X 4.5		630	IVE
1	EA	STOREROOM LOCK	L9080HD 06A		626	SCH
1	EA	PERMANENT CORE	AS REQUIRED PER OWNER STANDARDS		626	BES
1	EA	SURFACE CLOSER	4040XP REG		689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS		630	IVE
1	EA	FLOOR STOP	FS436/438 AS REQ'D		626	IVE
1	EA	RAIN DRIP	142AA (OMIT @ OVERHANG)		AA	ZER
1	SET	SET SEAL	429AA-S (@ HEAD & JAMBS)		AA	ZER
1	EA	DOOR SWEEP	8192AA		AA	ZER
1	EA	THRESHOLD	547A-223 (OR AS REQ'D. PER DETAIL/CONDITIONS)		A	ZER

HARDWARE GROUP NO. 09

Provide each SGL door(s) with the following:

3	EA	HINGE	5BB1HW 4.5 X 4.5		630	IVE
1	EA	PRIVACY INDICATOR LOCK	L9456HD 06N L583-363 OS-OCC		626	SCH
1	EA	FSIC CORE	30-120		626	SCH
1	EA	SURFACE CLOSER	4040XP REG		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	WALL STOP	WS406/407CCV AS REQ.D		626	IVE
1	EA	RAIN DRIP	142AA (OMIT @ OVERHANG)		AA	ZER
1	SET	SET SEAL	429AA-S (@ HEAD & JAMBS)		AA	ZER
1	EA	DOOR SWEEP	8192AA		AA	ZER
1	EA	THRESHOLD	547A-223 (OR AS REQ'D. PER DETAIL/CONDITIONS)		A	ZER












HARDWARE GROUP NO. 10

Provide each PR door(s) with the following:

8	EA	HW HINGE	5BB1HW 4.5 X 4.5 NRP		630	IVE
1	EA	REMOVABLE MULLION	KR4954 STAB		689	VON
1	EA	PANIC HARDWARE	LD-PA-AX-98-EO		626	VON
1	EA	PANIC HARDWARE	LD-PA-AX-98-NL-OP-110MD		626	VON
1	EA	MULLION STORAGE KIT	MT54		689	VON
1	EA	SFIC MORTISE CYLINDER X TEMP CONST. CORE	80-132 X K510-730 36-083 36-082-025		626	SCH
1	EA	SFIC RIM CYLINDER X TEMP CONST. CORE	80-159 BRN		626	SCH
2	EA	PERMANENT CORE	AS REQUIRED PER OWNER STANDARDS		626	BES
1	EA	CYLINDER GUARD RING	K-24		626	KEE
1	EA	DOOR PULL	VR910 NL SNB		630	IVE
2	EA	SURFACE CLOSER	4040XP SCUSH		689	LCN
2	EA	KICK PLATE	8400 10" X 2" LDW B-CS		630	IVE
1	EA	RAIN DRIP	142AA (OMIT @ OVERHANG)		AA	ZER
1	SET	SET SEAL	429AA-S (@ HEAD & JAMBS)		AA	ZER
1	EA	MULLION SEAL	8780NBK PSA		BK	ZER
1	EA	MEETING STILE SEAL	555AA X 55AA		AA	ZER
2	EA	DOOR SWEEP	8192AA		AA	ZER
1	EA	THRESHOLD	547A-223 (OR AS REQ'D. PER DETAIL/CONDITIONS)		A	ZER














HARDWARE GROUP NO. 11

Provide each SGL door(s) with the following:

3	EA	HINGE	5BB1HW SH 4.5 X 4.5 NRP		630	IVE
1	EA	PANIC HARDWARE	LD-PA-AX-98-NL-OP-110MD		626	VON
1	EA	SFIC RIM CYLINDER X TEMP CONST. CORE	80-159 BRN		626	SCH
1	EA	PERMANENT CORE	AS REQUIRED PER OWNER STANDARDS		626	BES
1	EA	CYLINDER GUARD RING	K-24		626	KEE
1	EA	DOOR PULL	VR910 NL SNB		630	IVE
1	EA	SURFACE CLOSER	4040XP SCUSH		689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS		630	IVE
1	EA	RAIN DRIP	142AA (OMIT @ OVERHANG)		AA	ZER
1	SET	SET SEAL	429AA-S (@ HEAD & JAMBS)		AA	ZER
1	EA	DOOR SWEEP	8192AA		AA	ZER
1	EA	THRESHOLD	547A-223 (OR AS REQ'D. PER DETAIL/CONDITIONS)		A	ZER









HARDWARE GROUP NO. 12

Provide each PR door(s) with the following:

8	EA	HINGE	5BB1HW SH 4.5 X 4.5 NRP		630	IVE
1	EA	CONST LATCHING BOLT	FB51P		630	IVE
1	EA	DUST PROOF STRIKE	DP1/2 AS REQ'D		626	IVE
1	EA	STOREROOM LOCK	L9080HD 06A		630	SCH
2	EA	PERMANENT CORE	AS REQUIRED PER OWNER STANDARDS		626	BES
1	EA	COORDINATOR	COR X FL		628	IVE
2	EA	MOUNTING BRACKET	MB AS REQ'D		689	IVE
2	EA	SURFACE CLOSER	4040XP SHCUSH SRI		689	LCN
2	EA	KICK PLATE	8400 10" X 1" LDW B-CS		630	IVE
1	EA	RAIN DRIP	142AA (OMIT @ OVERHANG)		AA	ZER
1	SET	SET SEAL	429AA-S (@ JAMBS)		BK	ZER
1	EA	ASTRAGAL	44STST		STST	ZER
2	EA	DOOR SWEEP	8192AA		AA	ZER
1	EA	THRESHOLD	547A-223 (OR AS REQ'D. PER DETAIL/CONDITIONS)		A	ZER



HARDWARE GROUP NO. 13

Provide each SGL door(s) with the following:

3	EA	HINGE	5BB1 SH 4.5 X 4.5 NRP		630	IVE
1	EA	STOREROOM LOCK	L9080HD 06A		626	SCH
1	EA	PERMANENT CORE	AS REQUIRED PER OWNER STANDARDS		626	BES
1	EA	SURFACE CLOSER	4040XP SHCUSH		689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B-CS		630	IVE
1	EA	RAIN DRIP	142AA (OMIT @ OVERHANG)		AA	ZER
1	SET	SET SEAL	429AA-S (@ HEAD & JAMBS)		AA	ZER
1	EA	DOOR SWEEP	8192AA		AA	ZER
1	EA	THRESHOLD	547A-223 (OR AS REQ'D. PER DETAIL/CONDITIONS)		A	ZER











HARDWARE GROUP NO. 14

Provide each PR door(s) with the following:

1	EA	STOREROOM LOCK	L9080HD 06A		630	SCH
1	EA	PADLOCK L/CYL-SFIC	KS41F1200		625	SCH
2	EA	PERMANENT CORE	AS REQUIRED PER OWNER STANDARDS		626	BES
2	EA	FLOOR STOP	FS18L/FS18S AS REQ'D		BLK	IVE
1	EA	CANE BOLT	LOCKING CANE BOLT @ INACTIVE LEAF BY GATE MANUFACTURER/SUPPLIER			B/O
	EA	NOTE	REMAINDER OF HARDWARE BY GATE MANUFACTURER/SUPPLIER			

HARDWARE GROUP NO. 15

Provide each PR door(s) with the following:

2	EA	GATE CLOSER	MAMMOTH180		689	LOX
1	EA	REMOVABLE MULLION	KR4954 STAB		689	VON
1	EA	PANIC HARDWARE	CD-OUT-PA-AX-98-EO-WH		626	VON
1	EA	PANIC HARDWARE	CD-OUT-PA-AX-98-NL-OP-110MD-WH		626	VON
1	EA	SFIC MORTISE CYLINDER X TEMP CONST. CORE	80-132 X K510-730 36-083 36-082-025		626	SCH
2	EA	SFIC MORTISE CYLINDER X TEMP CONST. CORE	80-132 X XQ11-948 36-083 36-082-025		626	SCH
1	EA	SFIC RIM CYLINDER X TEMP CONST. CORE	80-159 BRN		626	SCH
4	EA	PERMANENT CORE	AS REQUIRED PER OWNER STANDARDS		626	BES
2	EA	WELD-IN LOCK BX	K-BXED-V990NL-2		600	KEE
1	EA	DOOR PULL	VR910 DT SNB		630	IVE
1	EA	DOOR PULL	VR910 NL SNB		630	IVE
2	EA	FLOOR STOP	FS18L/FS18S AS REQ'D		BLK	IVE
2	EA	NOTE	REMAINDER OF HARDWARE BY GATE MANUFACTURER/SUPPLIER			

END OF SECTION

SECTION 08 80 00 GLAZING

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes requirements including but not limited to:
 - 1. Float glass.
 - 2. Tempered glass.
 - 3. Reflective glass.
 - 4. Spandrel coated glass.
 - 5. Insulated glass.
 - 6. Laminate glass.
 - 7. Fire resistive glazing.
 - 8. Spandrel glazing.
 - 9. Glazing sealants.
 - 10. Glass film overlay.
 - 11. Insulated metal panel.
 - 12. Accessories necessary for a complete installation.

1.3 DEFINITIONS

- A. Glass Thickness: Indicated by thickness designations in millimeters according to ASTM C1036.
- B. Interspace: Space between lites of an insulating glass unit.

1.4 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Design glass panels including comprehensive engineering analysis by a qualified professional engineer lawfully licensed in the State of California, using performance requirements and design criteria indicated.
- B. Installed Glazing: Design glazing systems to withstand normal thermal movement and wind and impact loads (where applicable) without failure, including loss or glass breakage attributable to the following: defective manufacture, fabrication, or installation; failure of sealants or gaskets to remain watertight and airtight; deterioration of glazing materials; or other defects in construction.
- C. Structural Performance:
 - 1. Glazing shall withstand the following design loads within limits and under conditions indicated determined according to the CBC and ASTM E1300:
 - a. Design Wind Pressures: Indicated on Structural Drawings.
 - b. Design Wind Pressures: Determine design wind pressures applicable to Project according to ASCE 7, based on heights above grade indicated on Drawings:
 - 1) Wind Design Data: As indicated on Drawings.
 - 2) Basic Wind Speed: 115 mph.
 - 3) Importance Factor: 1.0.
 - 2. Exposure Category: D.

3. Design Snow Loads: Indicated on Drawings.
 4. Thickness of Patterned Glass: Base design of patterned glass on thickness at thinnest part of the glass.
 5. Probability of Breakage for Sloped Glazing: For glass surfaces sloped more than 15 degrees from vertical, design glass for a probability of breakage not greater than 0.001.
 6. Maximum Lateral Deflection: For glass supported on all four edges, limit center of glass deflection at design wind pressure to not more than 1/50 times the short side length or 1 inch (25 mm), whichever is less.
- D. Safety Glazing: Where safety glazing is indicated, provide glazing that complies with 16 CFR 1201, Category II.
- E. Thermal and Optical Performance Properties:
1. Provide glass with performance properties specified, as indicated in manufacturer's published test data, based on procedures indicated below:
 - a. For monolithic glass lites, properties are based on units with lites 6 mm thick.
 - b. For laminated glass lites, properties are based on products of construction indicated.
 - c. For insulating glass units, properties are based on units of thickness indicated for overall unit and for each lite.
 - d. U-Factors: Center of glazing values, according to NFRC 100 and based on LBL's WINDOW 5.2 computer program, expressed as Btu/sq. ft. x h x deg F (W/sq. m x K).
 - e. Solar Heat Gain Coefficient and Visible Transmittance: Center of glazing values, according to NFRC 200 and based on LBL's WINDOW 5.2 computer program.
 - f. Visible Reflectance: Center-of-glazing values, according to NFRC 300.

1.5 SUBMITTALS

- A. Product Data: Technical data for each type of product including recommended installation and cleaning procedures.
- B. Glass Samples: For each type of glass required. Prepare samples from same material to be used for Work.
- C. Glazing Schedule: List glass types and thickness for each size opening and location. Use same designations indicated on Drawings.
- D. Delegated Design Submittal: For glass indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
- E. Product Certificates:
1. Submit glass product certificates required by Code:
 - a. Glass Manufacturer Certificate: The glass manufacturer shall submit a letter certifying it has reviewed the glazing details proposed for the project, including the use of gaskets and sealants, and that each product furnished is recommended for the application shown and compliance with the Code.
- F. Thermal Stress and Wind Load Analyses:
1. Submit the following from the glass manufacturer:
 - a. Thermal stress analysis for each exterior glass unit type, each building elevation. The analysis shall clearly indicate the expected service temperature ranges and the effects of partial and full shading on the glass:
 - 1) Attach to the thermal stress analysis a statement from the glass

manufacturer that based upon this analysis that the resulting thermal stresses will not reduce the specified statistical probability of breakage.

2. Wind load analysis for each glass unit type, each building elevation. The analysis shall indicate the statistical probability of breakage at the design wind pressure does not exceed the specified statistical probability of breakage.

G. Product Test Reports:

1. Submit test reports for insulating glass and glazing sealants, for tests performed by a qualified testing agency:
 - a. Glazing Sealants: Provide test reports based on testing current sealant formulations within previous 36 month period.
 - b. Glazing Sealants: Preconstruction adhesion and compatibility test report.

1.6 QUALITY ASSURANCE

A. Regulatory Requirements:

1. Comply with applicable requirements of the CBC for glazing.
2. Where safety glazing is indicated, permanently mark glazing with certification label of the SGCC or manufacturer. Label shall indicate manufacturer's name, type of glass, thickness, and safety glazing standard with which glass complies:
 - a. As a minimum provide Category II materials complying with testing requirements in 16 CFR 1201 (Consumer Product Safety Commission *Safety Standard for Architectural Glazing Materials*, published in the Code of Federal Regulations) and ANSI Z97.1.
 - b. Permanently mark safety glass with certification label of Safety Glazing Certification Council.
3. Insulating Glass Certification Program: Permanently marked either on spacers or on at least one component lite of units with appropriate certification label of IGCC.
4. Comply with published recommendations of glass product organizations:
 - a. GANA: Glazing Manual.
 - b. IGMA: SIGMA TM-3000 Vertical Glazing Guidelines.
 - c. GANA: Laminated Glazing Reference Manual.
 - d. AAMA: AAMA GDSG-1 Glass Design for Sloped Glazing.
 - e. AAMA: TIR A7 Sloped Glazing Guidelines.
 - f. IGMA for Sloped Glazing: IGMA TB-3001 Guidelines for Sloped Glazing.
 - g. IGMA for Insulating Glass: SIGMA TM-3000 North American Glazing Guidelines for Sealed Insulating Glass Units for Commercial and Residential Use.
5. Fire Rated Door Assemblies: Assemblies complying with NFPA 80 listed and labeled by UL for fire ratings indicated, based on testing according to NFPA 252.
6. Where glass thickness is indicated, it is a minimum. Provide glass that complies with performance requirements and is not less than the thickness indicated:
 - a. Minimum Glass Thickness for Exterior Lites: 1/4 inch (6 mm).
 - b. Thickness of Tinted Glass: Provide same thickness for each tint color indicated.
7. Where annealed float glass is indicated, provide annealed float glass, heat strengthened float glass, or fully tempered float glass necessary to comply with performance requirements:
 - a. Where heat strengthened float glass is indicated, provide heat strengthened float glass or fully tempered float glass necessary to comply with performance requirements.
 - b. Where fully tempered float glass is indicated, provide fully tempered float glass.

B. Manufacturer Qualifications for Insulating Glass Units with Sputter Coated, Low E Coatings: Insulating glass manufacturer who is approved and certified by coated glass manufacturer.

C. Installer Qualifications, Glazer: Experience entity having minimum 5 years documented

experience and who employs glass installers certified under the National Glass Association's Certified Glass Installer Program.

- D. Installer Qualifications, Decorative Film: Experience entity having minimum 5 years documented experience in the installation of glass films.
- E. Source Limitations for Glass and Glass Accessories: Obtain each type of glass and glass accessories from a single source.
- F. Glass Testing Agency Qualifications: A qualified independent testing agency accredited according to the NFRC CAP 1 Certification Agency Program.
- G. Sealant Testing Agency Qualifications: An independent testing agency qualified according to ASTM C1021 to conduct the testing indicated.
- H. Mockups: Build mockups to demonstrate aesthetic effects and to set quality standards for materials and execution.
- I. Install glazing in mockups specified to match glazing systems required for Project, including glazing methods:
 - 1. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.
- J. Preconstruction Adhesion and Compatibility Testing:
 - 1. Test each glass product, tape sealant, gasket, glazing accessory, and glass framing member for adhesion to and compatibility with elastomeric glazing sealants:
 - a. Testing is not required if data are submitted based on previous testing of current sealant products and glazing materials matching those submitted.
 - b. Use ASTM C1087 to determine whether priming and other specific joint-preparation techniques are required to obtain rapid, optimum adhesion of glazing sealants to glass, tape sealants, gaskets, and glazing channel substrates.
 - c. Test no fewer than eight Samples of each type of material, including joint substrates, shims, sealant backings, secondary seals, and miscellaneous materials.
 - d. Schedule enough time for testing and analyzing results to prevent delaying the Work.
 - e. For materials failing tests, submit sealant manufacturer's written instructions for corrective measures including the use of specially formulated primers.
- K. Pre-installation Conference: Conduct conference at site.

1.7 WARRANTY

- A. Written warrant, executed by glass manufacturer agreeing to repair or replace **glass** units that fail in materials and workmanship or deteriorate within warranty period. Warranty covers only deterioration due to normal conditions of use and not to handling, installing, and cleaning practices contrary to decorative glass manufacturer's published instructions:
 - 1. Warranty Period: Five (5) years from date of Substantial Completion.
- B. Written warranty signed by manufacturer in which glass manufacturer agrees to replace **coated glass** units that deteriorate within specified warranty period. Deterioration of coated glass is defined as defects developed from normal use that are not attributed to glass breakage or to maintaining and cleaning coated glass contrary to manufacturer's written instructions. Defects include peeling, cracking, and other indications of deterioration in coating:

1. Warranty Period: Ten (10) years from date of Substantial Completion.
- C. Written warranty signed by manufacturer in which manufacturer agrees to replace **laminated glass** units that deteriorate within specified warranty period. Deterioration of laminated glass is defined as defects developed from normal use that are not attributed to glass breakage or to maintaining and cleaning laminated glass contrary to manufacturer's written instructions. Defects include edge separation, delamination materially obstructing vision through glass, and blemishes exceeding those allowed by referenced laminated-glass standard:
1. Warranty Period: Ten (10) years from date of Substantial Completion.
- D. Written warranty signed by manufacturer in which manufacturer agrees to replace **insulating glass** units that deteriorate within specified warranty period. Deterioration of insulating glass is defined as failure of hermetic seal under normal use that is not attributed to glass breakage or to maintaining and cleaning insulating glass contrary to manufacturer's written instructions. Evidence of failure is the obstruction of vision by dust, moisture, or film on interior surfaces of glass:
1. Warranty Period: Ten (10) years from date of Substantial Completion.
- E. Written warranty signed by **glass film** manufacturer and installer in which manufacturer and installer agree to replace glass film that crack, peel, delaminate, discolor, change appearance, or failure to meet solar criteria within specified warranty period:
1. Warranty Period: Five (5) years from date of Substantial Completion.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Protect glazing materials according to manufacturer's written instructions. Prevent damage to glass and glazing materials from condensation, temperature changes, direct exposure to sun, or other causes.
- B. Delivery: Deliver materials in manufacturer's original, unopened, undamaged containers with identification labels intact.
- C. Storage and Protection: Store materials protected from exposure to harmful environmental conditions and at temperature and humidity conditions recommended by manufacturer.
- D. Exercise exceptional care to prevent edge damage to glass, and damage/deterioration to coating on glass.
- E. Comply with insulating glass manufacturer's written instructions for venting and sealing units to avoid hermetic seal ruptures due to altitude change.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Manufacturers are subject to compliance with requirements; provide products by one of the following:
 1. Glass:
 - a. Vitro Architectural Glass (Basis of Design).
 - b. AGC Glass Company North America, Inc.
 - c. Cardinal Glass Industries.
 - d. Guardian Industries Corp.;
 - e. Pilkington North America.
 - f. Viracon.

2. Fire Protection Rated Glazing:
 - a. AGC Glass Company North America, Inc.
 - b. Pilkington North America.
 - c. SAFTI FIRST Fire Rated Glazing Solutions.
 - d. Schott North America, Inc.
 - e. Technical Glass Products.
 3. Glass Film:
 - a. 3M Construction Markets Division. <http://www.3m.com>
 - b. Bekaert Specialty Films. <http://www.solargard.com>
 - c. Madico. <http://www.madico.com>
- B. Clear Annealed Float Glass: ASTM C1036, Type I, Class 1 (clear), Quality-Q3.
- C. Ultraclear Float Glass: ASTM C1036, Type I, Class I (clear), Quality-Q3.
- D. Tinted Annealed Float Glass: ASTM C1036, Type I, Class 2 (tinted), Quality-Q3.
- E. Fully Tempered Float Glass:
 1. ASTM C1048, Kind FT (fully tempered), Condition A (uncoated) unless otherwise indicated, Type I, Class 1 (clear) or Class 2 (tinted) as indicated, Quality-Q3:
 - a. Fabrication Process: By horizontal (roller hearth) process with roll wave distortion parallel to bottom edge of glass as installed unless otherwise indicated.
- F. Heat Strengthened Float Glass:
 1. ASTM C1048, Kind HS (heat strengthened), Type I, Condition A (uncoated) unless otherwise indicated, Type I, Class 1 (clear) or Class 2 (tinted) as indicated, Quality-Q3:
 - a. Fabrication Process: By horizontal (roller hearth) process with roll wave distortion parallel to bottom edge of glass as installed unless otherwise indicated.
- G. Pyrolytic Coated, Low Maintenance Glass: Clear float glass with a coating on first surface having both photocatalytic and hydrophilic properties that act to loosen dirt and to cause water to sheet evenly over the glass instead of beading.
- H. Ceramic Coated Vision Glass: ASTM C1048, Condition C, Type I, Class 1 (clear) or Class 2 (tinted) as indicated, Quality-Q3; and complying with Specification No. 95-1-31 in *GANA Engineering Standards Manual*.
- I. Silicone Coated Spandrel Glass: ASTM C1048, Type I, Condition C, Quality-Q3.
- J. Reflective Coated Spandrel Glass: ASTM C1376, Kind CS.
- K. Glass Film Overlay: Translucent, dimensionally stable, cast PVC film, 2 mil (0.05 mm) minimum thickness, with pressure sensitive, clear adhesive back for adhering to glass and releasable protective backing.

2.2 LAMINATED GLASS

- A. ASTM C1172. Use materials that have a proven record of no tendency to bubble, discolor, or lose physical and mechanical properties after fabrication and installation:
1. Construction: Laminate glass with cast in place and cured transparent resin interlayer to comply with interlayer manufacturer's written instructions.
 2. Interlayer Thickness: Provide thickness not less than that indicated and as needed to comply with requirements.
 3. Interlayer Thickness: 0.090 inch (2.29 mm).
 4. Interlayer Color: Clear unless otherwise indicated.

- B. Windborne Debris Impact Resistant Laminated Glass: Comply with requirements for laminated glass except laminate glass with ionomeric polymer interlayer to comply with interlayer manufacturer's written instructions:

2.3 INSULATING GLASS

- A. Factory assembled units consisting of sealed lites of glass separated by a dehydrated interspace, qualified according to ASTM E2190.
- B. Performance Properties:
 - 1. Basis of Design Product: Vitro Architectural Glass: Tint Color **Solargray**
 - 2. Overall Unit Thickness: 1 inch (25 mm).
 - 3. Minimum Thickness of Each Glass Lite: 1/4 inch (6 mm).
 - 4. Outdoor Lite: Fully tempered float glass.
 - 5. Interspace Content: Air.
 - 6. Indoor Lite: Fully tempered float glass.
 - 7. Safety glazing required.
- C. Sealing System:
 - 1. Dual seal, with polyisobutylene and silicone primary and secondary sealants:
 - a. Spacer: Aluminum with black, color anodic finish. Thermally broken aluminum.
 - b. Manufacturers: Subject to compliance with requirements, provide products by Technoform Glass Insulation NA, Inc.
 - c. Desiccant: Molecular sieve or silica gel, or a blend of both.
- D. Fire Protection Rated Glazing: Listed and labeled by a testing agency acceptable to authorities having jurisdiction, for fire protection ratings indicated, based on positive pressure testing according to NFPA 257 or UL 9, including the hose stream test, and complying with NFPA 80. For ratings 60 minutes or greater, glazing shall meet the test requirements of ASTM E119 or UL 263.
- E. Fire Protection Rated Glazing Labeling: Permanently mark fire protection rated glazing with certification label of a testing agency acceptable to authorities having jurisdiction indicating manufacturer's name; test standard; whether glazing is permitted to be used in doors or openings; if permitted in openings, whether or not glazing has passed the hose-stream test; whether or not glazing meets 450 degrees F (250 degrees C) temperature rise limitation; and the fire resistance rating in minutes.
- F. Film Faced Ceramic Glazing: Clear, ceramic flat glass; 5 mm thickness; faced on one surface with a clear glazing film; and complying with 16 CFR 1201, Category II.

2.4 GLASS FILM

- A. Performance Requirements:
 - 1. Scratch resistant coating that, after fully cured, facilitates cleaning without damaging or scratching film.
 - 2. Optical Distortion: When viewed from a distance of 10 feet at angles up to 45 degrees from either side of the glass, there is no discernable distortion.
 - 3. Edges: Seal edges except when the film is applied with a lacquer that prevents moisture or free water from penetrating between the film and the glass.
- B. Provide coating with uniform finish, without noticeable pin holes, streaks, thin spots, scratches, or banding:
 - 1. Light Transmission:
 - a. Maximum Variation across Width and Length: Not to exceed 1 percent.

- b. Variation in Transmission across Width and Length: Not to exceed 2 percent.
- C. Rate of Change of Total Transmission across Width and Length: Not to exceed 1 percent in 4 inches.

2.5 GLAZING ACCESSORIES

- A. Compatibility: Provide glazing sealants compatible with one another and with other materials in contact, including glass products, seals of insulating glass units, and glazing channel substrates, under conditions of service and application, demonstrated by sealant manufacturer based on testing and field experience.
- B. Suitability: Comply with sealant and glass manufacturers' written instructions for selecting glazing sealants suitable for applications indicated and for conditions existing at time of installation.
- C. Colors of Exposed Glazing Sealants: Selected by Architect.
- D. Glazing Sealant - Neutral curing silicone glazing sealant complying with ASTM C920, Type S, Grade NS, Class 100/50, Use NT:
 - 1. Manufacturers are subject to compliance with requirements; provide products by one of the following:
 - a. Dow Corning Corporation.
 - b. GE Construction Sealants; Momentive Performance Materials Inc.
 - c. May National Associates, Inc.; a subsidiary of Sika Corporation.
 - d. Pecora Corporation.
 - e. Sika Corporation.
- E. Glazing Sealant - Neutral curing silicone glazing sealant complying with ASTM C920, Type S, Grade NS, Class 50, Use NT:
 - 1. Manufacturers are subject to compliance with requirements; provide products by one of the following:
 - a. BASF Corporation; Construction Systems.
 - b. Dow Corning Corporation.
 - c. GE Construction Sealants; Momentive Performance Materials Inc.
 - d. May National Associates, Inc.; a subsidiary of Sika Corporation.
 - e. Pecora Corporation.
 - f. Polymeric Systems, Inc.
 - g. Sika Corporation.
- F. Glazing Sealant - Neutral curing silicone glazing sealant complying with ASTM C920, Type S, Grade NS, Class 25, Use NT:
 - 1. Manufacturers are subject to compliance with requirements; provide products by one of the following:
 - a. Bostik, Inc.
 - b. Dow Corning Corporation.
 - c. GE Construction Sealants; Momentive Performance Materials Inc.
 - d. May National Associates, Inc.; a subsidiary of Sika Corporation.
 - e. Polymeric Systems, Inc.
 - f. Schnee-Morehead, Inc., an ITW company.
 - g. Sika Corporation.
- G. Glazing Sealant - Acid curing silicone glazing sealant complying with ASTM C920, Type S, Grade NS, Class 25, Use NT:
 - 1. Manufacturers are subject to compliance with requirements; provide products by one of

the following:

- a. BASF Corporation; Construction Systems.
- b. Bostik, Inc.
- c. Dow Corning Corporation.
- d. GE Construction Sealants; Momentive Performance Materials Inc.
- e. May National Associates, Inc.; a subsidiary of Sika Corporation.
- f. Pecora Corporation.
- g. Polymeric Systems, Inc.
- h. Schnee-Morehead, Inc., an ITW company.
- i. Sika Corporation.

- H. Glazing Sealants for Fire rated Glazing Products - Neutral curing silicone glazing sealant complying with ASTM C920, Type S, Grade NS, Class 50, Use NT. Comply with sealant and glass manufacturers' written instructions for selecting glazing sealants suitable for applications indicated:
1. Manufacturers are subject to compliance with requirements; provide products by one of the following:
 - a. Dow Corning Corporation.
 - b. GE Construction Sealants; Momentive Performance Materials Inc.
 2. Colors of Exposed Glazing Sealants: Selected by Architect.
- I. Back Bedding Mastic Glazing Tapes:
1. Preformed, butyl based, 100 percent solids elastomeric tape; nonstaining and nonmigrating in contact with nonporous surfaces; with or without spacer rod recommended in writing by tape and glass manufacturers for application indicated; and complying with ASTM C1281 and AAMA 800 for products indicated below:
 - a. Tape, where indicated.
 - b. Tape, for glazing applications in which tape is subject to continuous pressure.
 - c. Tape, for glazing applications in which tape is not subject to continuous pressure.
- J. Expanded Cellular Glazing Tapes:
1. Closed-cell, PVC foam tapes; factory coated with adhesive on both surfaces; and complying with AAMA 800 for the following types:
 - a. Type 1, for glazing applications in which tape acts as the primary sealant.
 - b. Type 2, for glazing applications in which tape is used in combination with a full bead of liquid sealant.
- K. Miscellaneous Glazing Accessories:
1. Provide products of material, size, and shape complying with referenced glazing standard, with requirements of manufacturers of glass and other glazing materials for application indicated, and with proven record of compatibility with surfaces contacted in installation:
 - a. Cleaners, Primers, and Sealers: Types recommended by sealant or gasket manufacturer.
 - b. Setting Blocks: Elastomeric material with a Shore, Type A durometer hardness of 85, plus or minus 5.
 - c. Spacers: Elastomeric blocks or continuous extrusions of hardness required by glass manufacturer to maintain glass lites in place for installation indicated.
 - d. Edge Blocks: Elastomeric material of hardness needed to limit glass lateral movement (side walking).
 - e. Cylindrical Glazing Sealant Backing: ASTM C1330, Type O (open-cell material), of size and density to control glazing sealant depth and otherwise produce optimum glazing sealant performance.
 - f. Perimeter Insulation for Fire Resistive Glazing: Product approved by testing agency listed and labeled fire resistant glazing product with which it is used for application and fire protection rating indicated.

2.6 FABRICATION OF GLAZING UNITS

- A. Fabricate glazing units in sizes required to fit openings indicated for Project, with edge and face clearances, edge and surface conditions, and bite complying with written instructions of product manufacturer and referenced glazing publications, to comply with system performance requirements:
 - 1. Allow for thermal movements from ambient and surface temperature changes acting on glass framing members and glazing components:
 - a. Temperature Change: 120 degrees F (67 degrees C), ambient; 180 degrees F (100 degrees C), material surfaces.
 - 2. Edge and Surface Conditions: Comply with the recommendations of AAMA *Structural Properties of Glass* for clean cut edges, except comply with manufacturer's recommendations.
 - 3. Exposed Glass Edges and Surface Condition: Finish edges flat with an arrissed edge profile (small bevel of uniform width not exceeding 1.5 mm at an angle of approximately 45 degrees to the surface of the glass) with polished (surface is reflective in appearance similar to the major surface of the glass) surface.
- B. Cutting: Wheel cut or sawed edges and seamed at manufacturer's option. For site cut glass, provide glass 2 inches (50.8 mm) larger than required in both dimensions to facilitate cutting of clean cut edges without the necessity of seaming or nipping. Do not cut, seam, nip or abrade heat treated glass.
- C. Butt Glazing: Clean cut or flat grind vertical edges of butt glazed monolithic lites to produce square edges with slight chamfers at junctions of edges and faces.
- D. Edges: Grind smooth and polish exposed glass edges and corners.

2.7 INSULATED METAL INFILL PANELS – SP1

- A. Metal Composite Material Wall Panel System:
 - 1. Basis of Design:
 - a. Product/Manufacturer: **8200 System as manufactured by NOW Specialties Inc.,** Carrollton, Texas 75006:
 - 1) Other manufacturers listed below are to provide factory-formed and assembled, metal composite material panels fabricated from two metal facings that are bonded to a solid, extruded thermoplastic core; formed into profile for installation with existing aluminum storefront system and new aluminum storefront system. Include attachment assembly components, panel stiffeners, and accessories required for weathertight system.
 - 2) Manufacturers are subject to compliance with requirements; provide products by one of the following:
 - a) Alucobond, manufactured by 3A Composites USA, Inc., Benton, KY 42025.
 - b) Alpolic, Mitsubishi Plastics Composites America, Inc., Chesapeake, VA 23320
 - c) Reynobond, Alcoa Architectural Products, Eastman GA 31023.
- B. Composite Panels:
 - 1. Aluminum-faced panel with thermoplastic core:
 - a. Overall Panel thickness: 1 inch.
 - b. Aluminum-Face: 0.0197 inches, with strippable protective film. Protective film: heavy and opaque if required to indicate finish grain direction.
 - c. Aluminum Backer Sheet thickness: 0.0197 inches.
 - d. Aluminum Alloy: ASTM B209 3003 at coated finish.

- C. Composition:
 - 1. Two sheets of aluminum sandwiching core of extruded thermoplastic material formed in continuous process with no glues or adhesives between dissimilar materials. Products laminated sheet by sheet or in batch process using glues or adhesives between materials shall not be acceptable:
 - a. Fire-Retardant Core (where required by CBC): Complies with NFPA 285, with the following surface-burning characteristics as determined by testing identical products per ASTM E84 by UL or another testing and inspecting agency acceptable to authorities having jurisdiction:
 - 1) Flame-Spread Index: 15 or less.
 - 2) Smoke-Developed Index: 105 or less.

PART 3 EXECUTION

3.1 FIELD CONDITIONS

- A. Environmental Limitations:
 - 1. Do not proceed with glazing when ambient and substrate temperature conditions are outside limits permitted by glazing material manufacturers and when glazing channel substrates are wet from rain, frost, condensation, or other causes:
 - a. Do not install glazing sealants when ambient and substrate temperature conditions are outside limits permitted by sealant manufacturer or are below 40 degrees F (4.4 degrees C).
- B. Field Measurements: Verify actual dimensions of openings and construction contiguous with decorative glass by field measurements before fabrication.

3.2 COORDINATION

- A. Coordinate glazing channel dimensions to provide necessary bite on glass, minimum edge and face clearances, and adequate sealant thicknesses, with reasonable tolerances.

3.3 EXAMINATION

- A. Examine framing, glazing channels, and stops, with Installer present, for compliance with the following:
 - 1. Manufacturing and installation tolerances, including size, squareness, and offsets at corners.
 - 2. Presence and functioning of weep systems.
 - 3. Minimum required face and edge clearances.
 - 4. Effective sealing between joints of glass-framing members.
- B. Proceed with installation after correcting unsatisfactory conditions.

3.4 PREPARATION

- A. Clean glazing channels and framing members receiving glass immediately before glazing. Remove coatings not firmly bonded to substrates:
 - 1. Comply with manufacturer instructions for wiping of surfaces immediately before application of primers.
 - 2. Wipe metal surfaces with IPA (isopropyl alcohol) unless otherwise required by compatibility and adhesion testing results.
- B. Inspect each piece of glass immediately before installation. Do not install pieces improperly sized or with damaged edges, scratches, abrasion, or evidence damage. Remove labels

from glass immediately after installation.

- C. Examine glazing units to locate exterior and interior surfaces. Label or mark units so exterior and interior surfaces are readily identifiable. Do not use materials that leave visible marks in the completed Work.
- D. Seal vent (breather or capillary) tubes in insulating glass units in accordance with insulating glass manufacturer written recommendations.
- E. Glass Film Preparation:
 - 1. Remove particulate matter on the glass surface using a scraping blade.
 - 2. Place an absorbent towel on window sill or sash to absorb moisture generated by the film application.

3.5 GLAZING

- A. Comply with combined written instructions of manufacturers of glass, sealants, gaskets, and glazing materials, unless more stringent requirements are indicated, including those in referenced glazing publications.
- B. Protect glass edges from damage during handling and installation. Remove damaged glass from Project site and legally dispose of off Project site. Damaged glass includes glass with edge damage or other imperfections that, when installed, could weaken glass, impair performance, or impair appearance.
- C. Apply primers to joint surfaces where required for adhesion of sealants, as determined by preconstruction testing.
- D. Install setting blocks in sill rabbets, sized and located to comply with referenced glazing publications, unless otherwise required by glass manufacturer. Set blocks in thin course of compatible sealant suitable for heel bead.
- E. Do not exceed edge pressures stipulated by glass manufacturers for installing glass lites.
- F. Provide spacers for glass lites where length plus width is larger than 50 inches (1270 mm):
 - 1. Locate spacers directly opposite each other on both inside and outside faces of glass. Install correct size and spacing to preserve required face clearances, unless gaskets and glazing tapes are used that have demonstrated ability to maintain required face clearances and to comply with system performance requirements.
 - 2. Provide 1/8 inch (3 mm) minimum bite of spacers on glass and use thickness equal to sealant width. With glazing tape, use thickness slightly less than final compressed thickness of tape.
- G. Provide edge blocking where indicated or needed to prevent glass lites from moving sideways in glazing channel, as recommended in writing by glass manufacturer and according to requirements in referenced glazing publications.
- H. Set glass lites in each series with uniform pattern, draw, bow, and similar characteristics.
- I. Set glass lites with proper orientation so that coatings face exterior or interior as specified.
- J. Where wedge shaped gaskets are driven into one side of channel to pressurize sealant or gasket on opposite side, provide adequate anchorage so gasket cannot walk out when installation is subjected to movement:
 - 1. Square cut wedge shaped gaskets at corners and install gaskets as recommended by

gasket manufacturer to prevent corners from pulling away; seal corner joints and butt joints with sealant recommended by gasket manufacturer.

K. Tape Glazing:

1. Position tapes on fixed stops so that, when compressed by glass, the exposed edges are flush with or protrude slightly above sightline of stops:
 - a. Install tapes continuously, but not necessarily in one continuous length. Do not stretch tapes to make tapes fit opening.
 - b. Cover vertical framing joints by applying tapes to heads and sills first, then to jambs. Cover horizontal framing joints by applying tapes to jambs, then to heads and sills.
 - c. Place joints in tapes at corners of opening with adjoining lengths butted together, not lapped. Seal joints in tapes with compatible sealant approved by tape manufacturer.
 - d. Do not remove release paper from tape until right before each glazing unit is installed.
 - e. Apply heel bead of elastomeric sealant.
 - f. Center glass lites in openings on setting blocks, and press firmly against tape by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings.
 - g. Apply cap bead of elastomeric sealant over exposed edge of tape.

L. Gasket Glazing (Dry):

1. Cut compression gaskets to lengths recommended by gasket manufacturer to fit openings exactly, with allowance for stretch during installation:
 - a. Insert soft compression gasket between glass and frame or fixed stop so it is securely in place with joints miter cut and bonded together at corners.
 - b. Installation with Drive in Wedge Gaskets: Center glass lites in openings on setting blocks, and press firmly against soft compression gasket by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended by gasket manufacturer.
 - c. Installation with Pressure Glazing Stops: Center glass lites in openings on setting blocks, and press firmly against soft compression gasket. Install dense compression gaskets and pressure glazing stops, applying pressure uniformly to compression gaskets. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended by gasket manufacturer.
 - d. Install gaskets to protrude past face of glazing stops.

M. Sealant Glazing (Wet):

1. Install continuous spacers, or spacers combined with cylindrical sealant backing, between glass lites and glazing stops to maintain glass face clearances and to prevent sealant from extruding into glass channel and blocking weep systems until sealants cure. Secure spacers or spacers and backings in place and in position to control depth of installed sealant relative to edge clearance for optimum sealant performance:
 - a. Force sealants into glazing channels to eliminate voids and to ensure complete wetting or bond of sealant to glass and channel surfaces.
 - b. Tool exposed surfaces of sealants to provide a substantial wash away from glass.

N. Erection Tolerances:

1. Maximum Deviation from Vertical: 1/8 inch in any story and 1/4 inch in any 45 foot run.
2. Maximum Deviation from Horizontal: 1/8 inch in any 30 foot run.

3. Maximum Deviation from True Alignment: 1/32 inch for any two (2) abutting units.
Allow no edge projections.
 4. Maximum Joint Gap: 1/32 inch.
- O. Insulating-Glass Unit(s)
1. Double Glazed Tinted Solar Control Insulating Glass Unit [Solarban® 60 on Solargray® 6mm (2) | Air 1/2" (12.7mm) | Clear 6mm:
 - a. Conformance: ASTM E2190.
 - b. Outdoor Lite: Solargray® Tinted Float Glass as manufactured by Vitro Architectural Glass:
 - 1) Conformance: ASTM C1036, Type 1, Class 2, Quality q3.
 - 2) Glass Thickness: 6mm (1/4")
 - 3) Magnetic Sputter Vacuum Deposition Coating (MSVD): ASTM C1376.
 - 4) Coating: Solarban® 60 on Surface # 2
 - 5) Heat-Treatment: [None] [Heat-strengthened, ASTM C1048, Kind HS] [Tempered; ASTM C1048, Kind FT; Safety Glazing meets ANSI Z97.1 and CPSC 16CFR-1201] Specifier Notes: Specify the method of heat treatment. Vitro recommends that heat strengthened glass be specified and used, except where tempered glass is mandated for safety or other purposes by code.
 - c. Interspace Content: Air 1/2" (12.7mm)
 - d. Indoor Lite:
 - 1) Clear float glass as manufactured by Vitro Architectural Glass:
 - a) Conformance: ASTM C1036, Type 1, Class 1, Quality q3.
 - b) Heat-Treatment: [None] [Heat-strengthened, ASTM C1048, Kind HS] [Tempered; ASTM C1048, Kind FT; Safety Glazing meets ANSI Z97.1 and CPSC 16CFR-1201] Specifier Notes: Specify the method of heat treatment. Vitro recommends that heat strengthened glass be specified and used, except where tempered glass is mandated for safety or other purposes by code.
 - c) Glass Thickness: 6mm (1/4")
 - e. Performance Requirements:
 - 1) Visible Light Transmittance: 35 percent minimum.
 - 2) Winter Nighttime U-Factor: 0.29 (Btu/hr*ft2*°F) maximum.
 - 3) Summer daytime U-Factor: 0.27 (Btu/hr*ft2*°F) maximum.
 - 4) Shading Coefficient: 0.29 maximum.
 - 5) Solar Heat Gain Coefficient: 0.25 maximum.
 - 6) Outdoor Visible Light Reflectance: 9 percent maximum.

3.6 CLEANING AND PROTECTION

- A. Immediately after installation remove nonpermanent labels and clean surfaces.
- B. Protect glass from contact with contaminating substances resulting from construction operations. Examine glass surfaces adjacent to or below exterior concrete and other masonry surfaces at frequent intervals during construction, but not less than once a month, for buildup of dirt, scum, alkaline deposits, or stains:
 1. If contaminating substances come into contact with glass, remove substances immediately as recommended in writing by glass manufacturer. Remove and replace glass that cannot be cleaned without damage to coatings.
- C. Remove and replace glass that is damaged during construction period.
- D. Wash glass on both exposed surfaces not more than four days before date scheduled for inspections that establish date of Substantial Completion. Wash glass as recommended in

writing by glass manufacturer.

PART 4 SCHEDULE

4.1 GLAZING SCHEDULE

- A. G-1 Insulated Glass: 1 inch (25 mm) sealed insulated unit consisting of an exterior lite of 1/4 inch (6 mm) low-e tinted tempered float glass, 1/2 inch gas filled air space, and 1/4 inch (6 mm) clear tempered float glass interior lite.
- B. G-3 Clear Tempered Glass: 1/4 inch (6 mm) clear tempered float glass.
- C. G-4 Annealed Float Glass.

END OF SECTION 08 80 00

SECTION 08 91 19 FIXED LOUVERS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes requirements including but not limited to:
 - 1. Fixed, extruded aluminum and formed metal louvers.
 - 2. Accessories necessary for a complete installation.

1.3 DEFINITIONS

- A. Louver Terminology: Definitions of terms for metal louvers contained in AMCA 501 apply to this Section unless otherwise defined in this Section or in referenced standards.
- B. Horizontal Louver: Louver with horizontal blades (i.e., the axes of the blades are horizontal).
- C. Vertical Louver: Louver with vertical blades (i.e., the axes of the blades are vertical).
- D. Drainable Blade Louver: Louver with blades having gutters that collect water and drain it to channels in jambs and mullions, which carry it to bottom of unit and away from opening.
- E. Wind Driven Rain Resistant Louver: Louver that provides specified wind driven rain performance determined by testing according to AMCA 500-L.

1.4 SUBMITTALS

- A. Product Data: Technical data for each type of product indicated. For louvers specified to bear AMCA seal, include printed catalog pages showing specified models with appropriate AMCA Certified Ratings Seals.
- B. Shop Drawings:
 - 1. For louvers and accessories. Include plans, elevations, sections, details, and attachments to other work. Show frame profiles and blade profiles, angles, and spacing:
 - a. Show weep paths, gaskets, flashing, sealant, and other means of preventing water intrusion.
 - b. Show mullion profiles and locations.
 - c. Windstorm: Design loads as indicated on drawings.
- C. Samples: Submit for units with factory applied color finishes.

1.5 QUALITY ASSURANCE

- A. Delegated Design Submittal: For louvers indicated to comply with structural [**and seismic**] performance requirements, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
- B. Product Test Reports: Based on evaluation of comprehensive tests performed according to

AMCA 500-L by a qualified testing agency or by manufacturer and witnessed by a qualified testing agency, for each type of louver and showing compliance with performance requirements specified.

- C. Windborne debris impact resistance test reports.
- D. Regulatory Requirements:
 - 1. SMACNA Standard: Comply with recommendations in SMACNA *Architectural Sheet Metal Manual* for fabrication, construction details, and installation procedures.
 - 2. Welding - Qualify procedures and personnel according to the following:
 - a. AWS D1.2 Structural Welding Code - Aluminum.
- E. Source Limitations: Obtain louvers and vents from single source from a single manufacturer where indicated to be of same type, design, or factory applied color finish.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Aluminum Extrusions: ASTM B221, Alloy 6063-T5, T-52, or T6.
- B. Aluminum Sheet: ASTM B209, Alloy 3003 or 5005 with temper as required for forming, or as otherwise recommended by metal producer for required finish.
- C. Galvanized Steel Sheet: ASTM A653/A653M, G90 (Z275) zinc coating, mill phosphatized.
- D. Stainless Steel Sheet: ASTM A240/A240M, Type 304, No. 4 finish, with grain running parallel to length of blades and frame members..
- E. Fasteners - Use types and sizes to suit unit installation conditions:
 - 1. Use tamper resistant screws for exposed fasteners unless otherwise indicated.
 - 2. For fastening aluminum, use aluminum or 300 series stainless-steel fasteners.
 - 3. For fastening galvanized steel, use hot dip galvanized steel or 300 series stainless steel fasteners.
 - 4. For fastening stainless steel, use 300 series stainless-steel fasteners.
 - 5. For color finished louvers, use fasteners with heads that match color of louvers.
- F. Post installed Fasteners for Concrete and Masonry: Torque controlled expansion anchors, made from stainless-steel components, with capability to sustain, without failure, a load equal to 4 times the loads imposed, for concrete, or 6 times the load imposed for masonry, as determined by testing according to ASTM E488, conducted by a qualified independent testing agency.
- G. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D1187.

2.2 FIXED, EXTRUDED ALUMINUM LOUVERS

- A. Horizontal Continuous Line, Drainable Blade Louver: Drainable blade louver with blade gutters (drains) in rear two-thirds of blades only and with semirecessed mullions capable of collecting and draining water from blades:
 - 1. Manufacturers are subject to compliance with requirements. Provide products of one of the following:
 - a. Airolite Company, LLC (The).
 - b. Arrow United Industries.
 - c. Construction Specialties, Inc.

- d. Greenheck Fan Corporation.
- e. Ruskin Company; Tomkins PLC.
- 2. Louver Depth: 6 inches (150 mm).
- 3. Frame and Blade Nominal Thickness: Not less than 0.080 inch (2.03 mm).
- 4. Louver Performance Ratings:
 - a. Free Area: Not less than 7.8 sq. ft. (0.72 sq. m) for 48 inch (1220 mm) wide by 48 inch (1220 mm) high louver.
 - b. Point of Beginning Water Penetration: Not less than 850 fpm (4.3 m/s).
 - c. Air Performance: Not more than 0.10 inch wg (25-Pa) static pressure drop at 800 fpm (4.1-m/s) free area exhaust velocity.

2.3 LOUVER SCREENS

- A. Provide screen at each exterior louver:
 - 1. Screen Location for Fixed Louvers: Interior face.
 - 2. Screening Type: Insect screening.
- B. Secure screen frames to louver frames with stainless steel machine screws, spaced a maximum of 6 inches (150 mm) from each corner and at 12 inches (300 mm) o.c.
- C. Louver Screen Frames - Fabricate with mitered corners to louver sizes indicated:
 - 1. Metal: Same type and form of metal as indicated for louver to which screens are attached. Reinforce extruded aluminum screen frames at corners with clips.
 - 2. Finish: Same finish as louver frames to which louver screens are attached.
 - 3. Type: Rewirable frames with a driven spline or insert.
- D. Louver Screening for Galvanized Steel Louvers:
 - 1. Insect Screening: Aluminum, 18 by 16 (1.4 mm by 1.6 mm) mesh, 0.012 inch (0.30 mm) wire.
 - 2. Insect Screening: Stainless steel, 18 by 18 (1.4 mm by 1.4 mm) mesh, 0.009 inch (0.23 mm) wire.

2.4 FABRICATION

- A. Factory assemble louvers to minimize field splicing and assembly. Disassemble units as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation.
- B. Vertical Assemblies:
 - 1. Where height of louver units exceeds fabrication and handling limitations, fabricate units to permit field bolted assembly with close fitting joints in jambs and mullions, reinforced with splice plates:
 - a. Continuous Vertical Assemblies: Fabricate units without interrupting blade spacing pattern unless horizontal mullions are indicated.
 - b. Horizontal Mullions: Provide horizontal mullions at joints unless continuous vertical assemblies are indicated.
- C. Maintain equal louver blade spacing, including separation between blades and frames at head and sill to produce uniform appearance.
- D. Fabricate frames, including integral sills, to fit in openings of sizes indicated, with allowances made for fabrication and installation tolerances, adjoining material tolerances, and perimeter sealant joints.
- E. Include supports, anchorages, and accessories required for complete assembly.

- F. Provide vertical mullions of type and at spacings indicated, but not more than is recommended by manufacturer, or 72 inches (1830 mm) o.c., whichever is less:
 - 1. Fully Recessed Mullions: Where indicated, provide mullions fully recessed behind louver blades. Where length of louver exceeds fabrication and handling limitations, fabricate with close fitting blade splices designed to permit expansion and contraction.
 - 2. Semirecessed Mullions: Where indicated, provide mullions partly recessed behind louver blades so louver blades appear continuous. Where length of louver exceeds fabrication and handling limitations, fabricate with interlocking split mullions and close-fitting blade splices designed to permit expansion and contraction.
 - 3. Exposed Mullions: Where indicated, provide units with exposed mullions of same width and depth as louver frame. Where length of louver exceeds fabrication and handling limitations, provide interlocking split mullions designed to permit expansion and contraction.
 - 4. Exterior Corners: Prefabricated corner units with mitered blades with concealed close fitting splices and with fully recessed mullions at corners.
- G. Provide subsills made of same material as louvers or extended sills for recessed louvers.
- H. Join frame members to each other and to fixed louver blades with fillet welds concealed from view, unless otherwise indicated or size of louver assembly makes bolted connections between frame members necessary.

2.5 FINISHES

- A. Comply with NAAMM *Metal Finishes Manual for Architectural and Metal Products* for recommendations for applying and designating finishes.
- B. Aluminum Finishes:
 - 1. Finish louvers after assembly.
 - 2. Baked Enamel or Powder Coat Finish:
 - a. AAMA 2603 except with a minimum dry film thickness of 1.5 mils (0.04 mm). Comply with coating manufacturer's written instructions for cleaning, conversion coating, and applying and baking finish:
 - 1) Color and Gloss: Selected by Architect.
 - 3. High Performance Organic Finish:
 - a. Two coat fluoropolymer finish complying with AAMA 2605 and containing not less than **50** 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:
 - 1) Color and Gloss: Selected by Architect.
- C. Galvanized Steel Sheet Finishes:
 - 1. Finish louvers after assembly.
 - 2. Surface Preparation: Clean surfaces with nonpetroleum solvent so surfaces are free of oil and other contaminants. After cleaning, apply a conversion coating compatible with the organic coating to be applied over it. Clean welds, mechanical connections, and abraded areas and repair according to ASTM A780.
 - 3. Baked Enamel or Powder Coat Finish:
 - a. Immediately after cleaning and pretreating, apply two coat, baked on finish consisting of prime coat and thermosetting topcoat, with a minimum dry film thickness of 2 mils (0.05 mm):
 - 1) Color and Gloss: Selected by Architect.
- D. Stainless Steel Sheet Finishes: Repair sheet finish by grinding and polishing irregularities, weld spatter, scratches, and forming marks to match surrounding finish.

PART 3 EXECUTION

3.1 FIELD CONDITIONS

- A. Field Measurements: Verify actual dimensions of openings by field measurements before fabrication.

3.2 EXAMINATION

- A. Examine substrates and openings, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Proceed with installation after correcting unsatisfactory conditions.

3.3 PREPARATION

- A. Coordinate setting drawings, diagrams, templates, instructions, and directions for installation of anchorages that are to be embedded in concrete or masonry construction. Coordinate delivery of such items to Project site.

3.4 INSTALLATION

- A. Locate and place louvers level, plumb, and at indicated alignment with adjacent work.
- B. Use concealed anchorages where possible. Provide brass or lead washers fitted to screws where required to protect metal surfaces and to make a weathertight connection.
- C. Form closely fitted joints with exposed connections accurately located and secured.
- D. Provide perimeter reveals and openings of uniform width for sealants and joint fillers, as indicated.
- E. Repair finishes damaged by cutting, welding, soldering, and grinding. Restore finishes so no evidence remains of corrective work. Return items that cannot be refinished in the field to the factory, make required alterations, and refinish entire unit or provide new units.
- F. Protect unpainted galvanized and nonferrous-metal surfaces that are in contact with concrete, masonry, or dissimilar metals from corrosion and galvanic action by applying a heavy coating of bituminous paint or by separating surfaces with waterproof gaskets or nonmetallic flashing.
- G. Install concealed gaskets, flashings, joint fillers, and insulation as louver installation progresses, where weathertight louver joints are required. Comply with Section 07 92 00 for sealants applied during louver installation.

3.5 ADJUSTING AND CLEANING

- A. Clean exposed louver surfaces that are not protected by temporary covering, to remove fingerprints and soil during construction period. Do not let soil accumulate during construction period.
- B. Before final inspection, clean exposed surfaces with water and a mild soap or detergent not harmful to finishes. Thoroughly rinse surfaces and dry.
- C. Restore louvers damaged during installation and construction so no evidence remains of

corrective work. If results of restoration are unsuccessful, as determined by Architect, remove damaged units and replace with new units:

1. Touch up minor abrasions in finishes with air dried coating that matches color and gloss of, and is compatible with, factory applied finish coating.

END OF SECTION 08 91 19

SECTION 09 21 16 GYPSUM BOARD ASSEMBLIES

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes requirements including but not limited to:
 - 1. Gypsum Board.
 - 2. Reinforced Gypsum Board Sheathing (Tile Backer Board).
 - 3. Cementitious Backer Units.
 - 4. Impact Resistant Gypsum Board.
 - 5. Accessories necessary for a complete installation.
- B. Related Sections:
 - 1. Section 05 50 00: Metal Fabrications.
 - 2. Section 06 10 00: Rough Carpentry.
 - 3. Section 08 11 13: Hollow Metal Doors and Frames.
 - 4. Section 08 51 00: Aluminum Windows.
 - 5. Section 09 30 00: Tiling.
 - 6. Section 09 90 00: Painting and Coating.

1.3 PERFORMANCE REQUIREMENTS

- A. Comply with manufacturer's load tables and the following design pressures and deflections:
 - 1. Stairs, Elevator Hoistways, and Vertical Shafts: 1/120 at 10 psf.
 - 2. Ground Floor Lobbies: 1/120 at 15 psf.
 - 3. Partitions Receiving Stone Cladding, Lath and Plaster, or Plaster Veneer: 1/360 at 15 psf.
 - 4. Partitions Receiving Monitors, Televisions, Heavy Audio/Visual Equipment: 1/360 at 15 psf.
 - 5. Typical Partitions: 1/240 at 5 psf.
 - 6. Other Partitions: 1/240 at 5 psf.
 - 7. Maximum Deflection:
 - a. L/240 at 5 lbf per sq. ft.
 - b. L/120 at 5 lbf per sq. ft.
 - c. L/120 at 7.5 lbf per sq. ft.
 - d. L/120 at 10 lbf per sq. ft.
- B. Fire Resistance Rated Assemblies: For fire resistance rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E119 by an independent testing agency.
- C. STC Rated Assemblies: For STC-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E90 and classified according to ASTM E413 by an independent testing agency.

1.4 SUBMITTALS

- A. Product Data: Submit For each type of drywall including calculations for loadings and

stresses of exterior walls and specially fabricated framing based on manufacturer's load tables.

- B. Shop Drawings: Indicate locations, fabrication, and installation of control and expansion joints including plans, elevations, sections, details of components, and attachments to other units of Work.
- C. Samples:
 - 1. Trim Accessories: Full size Sample in 12 inch (300 mm) long length for each trim accessory indicated.
 - 2. Textured Finishes: 12 inches by 12 inches (300 mm by 300 mm) for each textured finish indicated and on same backing indicated for Work.
- D. Calculations: Submit calculations verifying steel partition stud minimum base metal thickness and depth compliance with Code and ASTM C645 for height, load, and deflection.
- E. Evaluation Reports: ICC-ES reports for dimpled steel studs and runners and firestop tracks.

1.5 QUALITY ASSURANCE

- A. Regulatory Requirements:
 - 1. 2022 California Building Code (CBC) (CCR Title 24, Part 2, as adopted and amended by DSA):
 - a. CBC-7 – Chapter 7, Fire Resistant Materials and Construction
 - b. CBC-19A – Chapter 19A, Concrete
 - c. CBC – Chapter 25, Gypsum Board and Plaster.
 - 2. Division of the State Architect, Interpretation of Regulations (DSA-IR):
 - a. DSA-IR 25-3, Drywall Ceiling Suspension Conventional Construction-One Layer.
 - b. DSA-IR 25-2.13, Metal Suspension Systems for Lay in Panel Ceilings.
 - 3. Fire Resistance Rated Assemblies: For fire resistance rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E119 by an independent testing agency.
- B. Single Source Responsibility:
 - 1. Framing Members: Obtain steel framing members from single manufacturer.
 - 2. Panel Products: Obtain each type of gypsum board and other panel products from single manufacturer.
 - 3. Finishing Materials: To the extent possible, obtain finishing materials from same manufacturer supplying gypsum board products. When not possible, obtain materials from manufacturer acceptable to gypsum board manufacturer.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials in original packages, containers, or bundles bearing brand name and identification of manufacturer or supplier.
- B. Store materials inside under cover and keep them dry and protected against weather, condensation, direct sunlight, construction traffic, and potential causes of damage. Stack panels flat and supported on risers on a flat platform to prevent sagging.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Manufacturers are subject to compliance with requirements; provide products by one of the

following:

1. Steel Studs and Tracks:
 - a. USG Corp. Basis of Design.
 - b. ClarkDietrich
 - c. CEMCO; California Expanded Metal Products Co.
 - d. Custom Stud.
 - e. MBA Building Supplies.
 - f. MRI Steel Framing, LLC.
 - g. Phillips Manufacturing Co.
 - h. SCAFCO Steel Stud Co.
 - i. Steel Network, Inc. (The).
 - j. Telling Industries.
 2. Ceiling Grid:
 - a. USG Corporation; Drywall Suspension System.
- B. Framing Members:
1. ASTM C754 for component sizes and conditions under specified maximum deflection and lateral loading conditions indicated:
 - a. Steel Sheet Components: Comply with ASTM C645 requirements for metal.
 - b. Protective Coating: ASTM A653/A653M, G60 (Z180), hot dip galvanized.
- C. Steel Framing Components:
1. ASTM C754 for conditions indicated; hot dip galvanize complying with ASTM A653 Z180:
 - a. Steel Studs and Runners: ASTM C645, 0.0179 inch (0.45 mm) minimum base metal thickness; Depth indicated on Drawings.
 - b. Dimpled Steel Studs and Runners: ASTM C645, equivalent to minimum base metal thickness indicated on Drawings for depth indicated on Drawings.
 - c. Flat Strap and Backing Plate: Steel sheet for blocking and bracing in length and width indicated. Minimum Base Metal Thickness: 0.0179 inch (0.45 mm).
 - d. Cold Rolled Channel Bridging: 0.0538 inch (1.37 mm) bare steel thickness, with minimum 1/2 inch (12.7 mm) wide flanges. Depth indicated on Drawings.
 - e. Clip Angle: Not less than 1-1/2 inches by 1-1/2 inches (38.1 mm by 38.1 mm), 0.068 inch (1.73 mm) thick, galvanized steel.
 - f. Hat Shaped, Rigid Furring Channels: ASTM C645; 0.0179 inch (0.45 mm) minimum base metal thickness; Depth indicated on Drawings.
 - g. Resilient Furring Channels: 1/2 inch (12.7mm) deep, steel sheet members designed to reduce sound transmission. Configuration: Asymmetrical or hat shaped.
 - h. Cold Rolled Furring Channels - 0.0538 inch (1.37mm) bare steel thickness, with minimum 1/2 inch (12.7mm) wide flanges:
 - 1) Depth: Indicated on Drawings.
 - 2) Furring Brackets: Adjustable, corrugated edge type of steel sheet with minimum bare steel thickness of 0.0312 inch (0.79 mm).
 - 3) Tie Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, 0.0625-inch (1.59mm) diameter wire, or double strand of 0.0475 inch (1.21mm) diameter wire.
 - i. Z Shaped Furring: With slotted or nonslotted web, face flange of 1-1/4 inches (31.8 mm), wall attachment flange of 7/8 inch (22.2 mm), minimum bare metal thickness of 0.0179 inch (0.45 mm), and depth required to fit insulation thickness indicated.
 - j. Auxiliary Framing Materials: Fasteners of type, material, size, corrosion resistance, holding power, and other properties required to fasten steel members to substrates.
 - k. Slip Type Head Joints - Where indicated, provide one of the following:
 - 1) Single Long Leg Runner System: ASTM C645 top runner with 2 inch (50.8 mm) deep flanges in thickness not less than indicated for studs, installed with

- studs friction fit into top runner and with continuous bridging, located within 12 inches (305 mm) of the top of studs to provide lateral bracing.
- 2) Double Runner System: ASTM C645 top runners, inside runner with 2 inch (50.8 mm) deep flanges in thickness not less than indicated for studs and fastened to studs, and outer runner sized to friction fit inside runner.
 - 3) Deflection Track - Steel sheet top runner manufactured to prevent cracking of finishes applied to interior partition framing resulting from deflection of structure above; in thickness not less than indicated for studs and in width to accommodate depth of studs. Provide one of the following:
 - a) Dietrich Metal Framing; SLP-TRK Slotted Deflection Track.
 - b) Steel Network Inc. (The); VertiClip SLD or VertiTrack VTD Series.
 - c) Superior Metal Trim; Superior Flex Track System (SFT).
- I. Firestop Tracks:
- 1) Top runner manufactured to allow partition heads to expand and contract with movement of the structure while maintaining continuity of fire resistance rated assembly indicated; in thickness not less than indicated for studs and in width to accommodate depth of studs. Provide one of the following:
 - a) Fire Trak Corp.; Fire Trak attached to studs with Fire Trak Slip Clip.
 - b) Grace Construction Products; FlameSafe FlowTrak System.
 - c) Metal-Lite, Inc.; The System.
 - d) Steel Network Inc. (The); VertiClip SLD or VertiTrack VTD Series as applicable.
- D. Ceiling Suspension Components:
1. Tie Wire: ASTM A641/A641M, Class 1 zinc coating, soft temper, 0.0625-inch (1.59 mm) diameter wire, or double strand of 0.0475-inch (1.21 mm) diameter wire.
 2. Hanger Attachments to Concrete:
 - a. Anchors: Postinstalled, chemical anchor or postinstalled, expansion anchor fabricated from corrosion resistant materials with holes or loops for attaching wire hangers and capable of sustaining, without failure, a load equal to 5 times that imposed by construction as determined by testing according to ASTM E488 by an independent testing agency.
 - b. Powder Actuated Fasteners: Suitable for application indicated, fabricated from corrosion resistant materials with clips or other devices for attaching hangers of type indicated, and capable of sustaining, without failure, a load equal to 10 times that imposed by construction as determined by testing according to ASTM E1190 by an independent testing agency.
 3. Wire Hangers: ASTM A641/A641M, Class 1 zinc coating, soft temper, 0.162-inch (4.12 mm) diameter.
 4. Carrying Channels: Cold rolled, commercial steel sheet with base metal thickness of 0.0538 inch (1.37 mm) and minimum 1/2 inch (12.7 mm) wide flanges. Depth indicated on Drawings.
 5. Furring Channels (Furring Members):
 - a. Cold Rolled Channels: 0.0538 inch (1.37 mm) bare steel thickness, with minimum 1/2 inch (12.7 mm) wide flanges, 3/4 inch (19.1 mm) deep.
 - b. Steel Studs: ASTM C645; minimum base metal thickness of 0.0312 inch (0.79 mm); Depth indicated on Drawings.
 - c. Hat Shaped, Rigid Furring Channels: ASTM C645, 7/8 inch (22.2 mm) deep; Minimum base metal thickness of 0.0312 inch (0.79 mm).
 6. Resilient Furring Channels: 1/2 inch (12.7 mm) deep members designed to reduce sound transmission. Configuration: Hat shaped.
 7. Grid Suspension System for Ceilings: ASTM C645, direct hung system composed of main beams and cross furring members that interlock.
- E. Gypsum Board:
1. ASTM C1396/C1396M, applicable to type of gypsum board indicated and whichever is

more stringent:

- a. Core - Use Type X throughout:
 - 1) Thickness: 5/8 inch (15.9 mm).
 - 2) Long Edges: Tapered and featured (rounded or beveled) for prefilling.
 - b. Ceiling Type - Manufactured for sag resistance:
 - 1) Thickness: 1/2 inch (13mm).
 - 2) Long Edges: Tapered.
 - c. Moisture and Mold Resistant Type - Type X with moisture and mold resistant core and surfaces. Core:
 - 1) Thickness: 5/8 inch (15.9 mm).
 - 2) Long Edges: Tapered.
- F. Impact Resistant Gypsum Board:
1. ASTM C1396/C1396M gypsum board, tested according to ASTM C1629/C1629M:
 - a. Core and Thickness: 5/8 inch (15.9 mm), Type X.
 - b. Surface Abrasion: ASTM C1629/C1629M, meets or exceeds Level 1 requirements.
 - c. Indentation: ASTM C1629/C1629M, meets or exceeds Level 1 requirements.
 - d. Soft Body Impact: ASTM C1629/C1629M, meets or exceeds Level 1 requirements.
 - e. Hard Body Impact: ASTM C1629/C1629M, meets or exceeds Level 1 requirements according to test in Annex A1.
 - f. Long Edges: Tapered.
 - g. Mold Resistance: ASTM D3273, score of 10 as rated according to ASTM D3274.
- G. Acoustically Enhanced Gypsum Board:
1. ASTM C1396/C1396M. Multilayer products constructed of two layers of gypsum boards sandwiching a viscoelastic sound-absorbing polymer core:
 - a. Manufacturers are subject to compliance with requirements; provide products by one of the following:
 - 1) National Gypsum Company.
 - 2) Quiet Solution.
 - b. Core: 1-3/8 inch (35 mm), regular type.
 - c. Long Edges: Tapered.
- H. Reinforced Gypsum Sheathing (Tile Backer Board):
1. ASTM C1278/C1278M, standard edges. Cellulose fiber reinforced panels may be used in lieu of cementitious board:
 - a. Core and Thickness: 1/2 inch (12.7 mm) or 5/8 inch (15.9 mm) to match conditions, Type X.
 - b. Long Edge: Tapered.
 - c. Mold Resistance: ASTM D3273, score of 10 as rated according to ASTM D3274.
- I. Glass Mat Gypsum Sheathing Board:
1. ASTM C1177/C1177M, with fiberglass mat laminated to both sides and with standard edges:
 - a. Core: Type X
 - b. Thickness: 5/8 inch (15.9 mm).
 - c. Size: 48 inches by 96 inches (1219 mm by 2438 mm).
 - d. Long Edges: Tapered.
- J. Cementitious Backer Units:
1. ASTM C1288 or ASTM C1325:
 - a. Thickness: 1/2 inch (12.7 mm) and 5/8 inch (15.9 mm) to match conditions.
 - b. Long Edges: Standard.
 - c. Mold Resistance: ASTM D3273, score of 10 as rated according to ASTM D3274.
- K. Exterior Gypsum Board For Ceilings and Soffits:

1. Glass Mat Gypsum Sheathing Board: ASTM C1177/C1177M, with fiberglass mat laminated to both sides and with standard edges.
 2. Core: 5/8 inch (15.9 mm), Type X.
- L. Exterior Trim:
1. ASTM C1047, hot dip galvanized steel sheet, plastic, or rolled zinc:
 - a. Shapes:
 - 1) Cornerbead.
 - 2) LC Bead: J shaped; exposed long flange receives joint compound.
 - 3) Expansion (Control) Joint: One piece, rolled zinc with V shaped slot and removable strip covering slot opening.
- M. Interior Trim:
1. ASTM C1047; galvanized or aluminum coated steel sheet, rolled zinc, plastic, or paper faced galvanized steel sheet:
 - a. Shapes:
 - 1) Cornerbead.
 - 2) Bullnose bead.
 - 3) LC Bead: J shaped; exposed long flange receives joint compound.
 - 4) L Bead: L shaped; exposed long flange receives joint compound.
 - 5) U Bead: J shaped; exposed short flange does not receive joint compound.
 - 6) Expansion (control) joint.
 2. Manufacturers are subject to compliance with requirements; provide products by one of the following:
 - a. Pittcon Industries.
 - b. Fry Reglet Corp.
 - c. Gordon, Inc.
- N. Continuous Corner:
1. Extruded Aluminum; continuous integral fin for surface contact with gypsum board; 7/8 inch (22 mm) wide, tapered to edge; punched with holes staggered to accept screw fastening. Prime with corrosion resistant primer. Provide Pittcon Softforms (Basis of Design) or Schluter:
 - a. Subject to compliance with requirements, provide basis of design or comparable by one of the following:
 - 1) Pittcon Industries.
 - 2) Fry Reglet Corporation.
 - 3) Schluter.
- O. Joint Treatment - ASTM C475/C475M:
1. Joint Tape:
 - a. Exterior Gypsum Soffit Board: USG Sheetrock Brand Paper Tape.
 - b. Glass Mat Gypsum Sheathing Board Exterior Applications: USG Sheetrock Brand Paper Tape.
 - c. Interior Gypsum Board: USG Sheetrock Brand Paper Tape.
 - d. Cementitious Board: USG Durock Tape.
 2. Joint Compound:
 - a. Gypsum Board – Prefilling - At open joints, rounded or beveled panel edges, and damaged surface areas, use setting type taping compound: USG Sheetrock Brand Easy Sand Setting-Type Joint Compound:
 - 1) Embedding and First Coat - For embedding tape and first coat on joints, fasteners, and trim flanges, use setting type taping compound: USG Sheetrock Brand All Purpose Joint Compound:
 - a) Use setting type compound for installing paper faced metal trim accessories: USG Sheetrock Brand All Purpose Joint Compound.

- 2) Fill Coat: For second coat, use setting type, sandable topping compound: USG Sheetrock Brand Topping Joint Compound.
 - 3) Finish Coat: For third coat, use setting type, sandable topping compound: USG Sheetrock Brand Topping Joint Compound.
 - 4) Skim Coat: For final coat of Level 4 finish, use setting type, sandable topping compound: USG Sheetrock Brand Topping Joint Compound.
 - b. Cementitious Units: USG Sheetrock Brand Easy Sand Setting-Type Joint Compound.
 - c. Tile Backing Panels: USG Sheetrock Brand Easy Sand Setting-Type Joint Compound.
 - d. Water Resistant Gypsum Backing Board: Use setting type taping compound and setting-type, sandable topping compound: USG Sheetrock Brand Easy Sand Setting-Type Joint Compound.
 - e. Glass Mat Sheathing Board: USG Sheetrock Brand Easy Sand Setting-Type Joint Compound.
- P. Auxiliary Gypsum Materials:
1. Comply with referenced installation standards and manufacturer's written recommendations:
 - a. Steel Drill Screws: ASTM C1002, use screws complying with ASTM C954 for fastening panels to steel members from 0.033 to 0.112 inch (0.84 to 2.84 mm) thick.
 - b. Sound Attenuation Blankets:
 - 1) ASTM C665, Type I (blankets without membrane facing) produced by combining thermosetting resins with mineral fibers manufactured from glass, slag wool, or rock wool:
 - a) Fire Resistance Rated Assemblies: Comply with mineral-fiber requirements of assembly.
 - c. Acoustical Sealant:
 - 1) Nonsag, paintable, nonstaining latex sealant complying with ASTM C834. Product effectively reduces airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies according to ASTM E90:
 - a) USG Corporation; Sheetrock Brand Acoustical Sealant.
- Q. Anchors, Clips, and Fasteners:
1. Steel shapes and clips: ASTM A36/A36M, zinc coated by hot dip process according to ASTM A123/A123M.
 2. Expansion anchors: Fabricated from corrosion resistant materials, with allowable load or strength design capacities calculated according to ICC-ES AC193 and ACI 318 greater than or equal to the design load, as determined by testing per ASTM E488 conducted by a qualified testing agency.
 3. Power actuated anchors: Fastener system of type suitable for application indicated, fabricated from corrosion resistant materials, with allowable load capacities calculated, greater than or equal to the design load, as determined by testing per ASTM E1190 conducted by a qualified testing agency.
 4. Mechanical fasteners:
 - a. ASTM C1513, corrosion resistant coated, self-drilling, self-tapping, steel drill screws:
 - 1) Head type: Low profile head beneath sheathing.
 5. Welding electrodes: Comply with AWS standards.

PART 3 EXECUTION

3.1 PROJECT CONDITIONS

- A. Environmental Limitations:
 - 1. Comply with ASTM C840 for gypsum board manufacturer's written instructions, whichever are more stringent:
 - a. Do not install paper faced gypsum panels until installation areas are enclosed and conditioned.
- B. Room Temperatures: Maintain minimum 40 degrees F (4 degrees C). For adhesive attachment and finishing of gypsum board, maintain minimum 50 degrees F (10 degrees C) for 48 hours before application and continuously after until dry. Do not exceed 95 degrees F (35 degrees C) when using temporary heat sources.
- C. Ventilation: Ventilate building spaces as required to dry joint treatment materials. Avoid drafts during hot, dry weather to prevent finishing materials from drying too rapidly.
- D. Do not install panels that are wet, moisture damaged, and mold damaged:
 - 1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
 - 2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

3.2 EXAMINATION

- A. Examine areas and substrates including welded hollow metal frames, cast in anchors, and structural framing, for compliance with requirements and other conditions affecting performance. Proceed with installation after unsatisfactory conditions have been corrected.

3.3 PREPARATION

- A. Suspended Assemblies: Coordinate installation of suspension systems with installation of overhead structure to ensure that inserts and other provisions for anchorages to building structure have been installed to receive hangers at spacing required to support the Work and that hangers will develop their full strength. Furnish concrete inserts and other devices indicated to other trades for installation in advance of time needed for coordination and construction.

3.4 INSTALLATION

- A. Installation Standard: ASTM C754, except comply with framing sizes and spacing indicated.
- B. Gypsum Board Assemblies: Comply with requirements in ASTM C840 applicable to framing installation.
- C. Suspension System:
 - 1. Isolate suspension systems from building structure where they abut or are penetrated by building structure to prevent transfer of loading imposed by structural movement:
 - a. Suspend hangers from building structure:
 - 1) Install hangers plumb and free from contact with insulation or objects within ceiling plenum that are not part of supporting structural or suspension system. Splay hangers where required to miss obstructions and offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.
 - 2) Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with locations of hangers required to support standard suspension system members, install supplemental suspension members and hangers in the form of trapezes or equivalent devices:

- a) Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced installation standards.
 - 3) Do not attach hangers to steel roof deck.
 - 4) Do not attach hangers to permanent metal forms. Furnish cast in place hanger inserts that extend through forms.
 - 5) Do not attach hangers to rolled in hanger tabs of composite steel floor deck.
 - 6) Do not connect or suspend steel framing from ducts, pipes, or conduit.
 - b. Fire Resistance Rated Assemblies: Wire tie furring channels to supports.
 - c. Installation Tolerances: Install suspension systems that are level to within 1/8 inch in 12 feet (3 mm in 3.6 m) measured lengthwise on each member that will receive finishes and transversely between parallel members that will receive finishes.
- D. Grid Suspension Systems: Attach perimeter wall track or angle where grid suspension systems meet vertical surfaces. Mechanically join main beam and cross furring members to each other and butt cut to fit into wall track.
- E. Framing Assembly:
 - 1. Where studs are installed directly against exterior masonry walls or dissimilar metals at exterior walls, install isolation strip between studs and exterior wall:
 - a. Install studs so flanges within framing system point in same direction. Space studs in single layer application as indicated on drawings.
 - b. Install tracks (runners) at floors and overhead supports. Extend framing full height to structural supports or substrates above suspended ceilings, except where partitions are indicated to terminate at suspended ceilings. Continue framing around ducts penetrating partitions above ceiling:
 - 1) Door Openings - Screw vertical studs at jambs to jamb anchor clips on door frames; install runner track section (for cripple studs) at head and secure to jamb studs:
 - a) Install two studs at each jamb, unless otherwise indicated.
 - b) Install cripple studs at head adjacent to each jamb stud, with minimum 1/2-inch (12.7mm) clearance from jamb stud to allow for installation of control joint in finished assembly.
 - c) Extend jamb studs through suspended ceilings and attach to underside of overhead structure.
 - 2) Other Framed Openings: Frame openings other than door openings the same as required for door openings, unless otherwise indicated. Install framing below sills of openings to match framing required above door heads.
 - c. Installation Tolerance: Install each framing member so fastening surfaces vary not more than 1/8 inch (3 mm) from the plane formed by faces of adjacent framing.
- F. Sound Insulation: Install sound attenuation blankets before installing gypsum panels, unless blankets are readily installed after panels have been installed on one side.
- G. Gypsum Panels:
 - 1. Comply with ASTM C840. Examine panels before installation. Reject panels that are wet, moisture damaged, and mold damaged:
 - a. Install ceiling panels across framing to minimize the number of abutting end joints and to avoid abutting end joints in central area of each ceiling. Stagger abutting end joints of adjacent panels not less than one framing member.
 - b. Install panels with face side out. Butt panels together for a light contact at edges and ends with not more than 1/16 inch (1.5 mm) of open space between panels. Do not force into place.
 - c. Locate edge and end joints over supports, except in ceiling applications where intermediate supports or gypsum board back blocking is provided behind end joints. Do not place tapered edges against cut edges or ends. Stagger vertical

joints on opposite sides of partitions. Do not make joints other than control joints at corners of framed openings.

- d. Form control and expansion joints with space between edges of adjoining gypsum panels.
- e. Cover both faces of support framing with gypsum panels in concealed spaces, except in chases braced internally:
 - 1) Unless concealed application is indicated or required for sound, fire, air, or smoke ratings, coverage may be accomplished with scraps of not less than 8 sq. ft. (0.7 sq. m) in area.
 - 2) Fit gypsum panels around ducts, pipes, and conduits.
 - 3) Where partitions intersect structural members projecting below underside of floor/roof slabs and decks, cut gypsum panels to fit profile formed by structural members; allow 1/4-inch to 3/8-inch (6.4 mm to 9.5 mm) wide joints to install sealant.
- f. Isolate perimeter of gypsum board applied to nonload bearing partitions at structural abutments, except floors. Provide 1/4 inch to 1/2 inch (6.4mm to 12.7mm) wide spaces at these locations, and trim edges with edge trim where edges of panels are exposed. Seal joints between edges and abutting structural surfaces with acoustical sealant.
- g. Attachment to Steel Framing: Attach panels so leading edge or end of each panel is attached to open (unsupported) edges of stud flanges first.

H. Gypsum Board:

- 1. Install interior gypsum board where indicated on drawings.
 - a. Single Layer Application:
 - 1) On ceilings, apply gypsum panels before wall/partition board application to greatest extent possible and at right angles to framing, unless otherwise indicated.
 - 2) On partitions/walls, apply gypsum panels vertically (parallel to framing), unless otherwise indicated or required by fire resistance rated assembly, and minimize end joints. Stagger abutting end joints not less than one framing member in alternate courses of panels.
 - 3) Fastening Methods: Apply gypsum panels to supports with steel drill screws.
 - b. Multilayer Application:
 - 1) On partitions/walls, apply gypsum board indicated for base layers and face layers vertically (parallel to framing) with joints of base layers located over stud or furring member and face-layer joints offset at least one stud or furring member with base-layer joints unless otherwise indicated or required by fire-resistance-rated assembly. Stagger joints on opposite sides of partitions.
 - 2) On Z shaped furring members, apply base layer vertically (parallel to framing) and face layer either vertically (parallel to framing) or horizontally (perpendicular to framing) with vertical joints offset at least one furring member. Locate edge joints of base layer over furring members.
 - 3) Fastening Methods: Fasten base layers and face layers separately to supports with screws.

- I. Cementitious Backer Units: ANSI A108.11; install where indicated with 1/4-inch (6.4 mm) gap where panels abut other construction or penetrations. Where tile backing panels abut other types of panels in same plane, shim surfaces to produce a uniform plane across panel surfaces.

J. Exterior Gypsum Board Soffits:

- 1. Apply panels perpendicular to supports, with end joints staggered and located over supports:
 - a. Install with 1/4 inch (6.4 mm) open space where panels abut other construction or structural penetrations.

- b. Fasten with corrosion-resistant screws.
- K. Trim Accessories:
 - 1. For trim with back flanges intended for fasteners, attach to framing with same fasteners used for panels. Attach trim according to manufacturer's written instructions:
 - a. Control Joints: Install control joints according to ASTM C840 and in specific locations approved by Architect for visual effect.
 - b. Exterior Trim:
 - 1) Install in the following locations:
 - a) Cornerbead: Use at outside corners.
 - b) LC Bead: Use at exposed panel edges.
 - c. Interior Trim - Install in the following locations:
 - 1) Cornerbead: Use at outside corners, unless otherwise indicated.
 - 2) Bullnose Bead: Use at outside corners.
 - 3) LC Bead: Use at exposed panel edges.
 - 4) L Bead: Use where indicated or necessary.
 - 5) U Bead: Use at exposed panel edges.
- L. Gypsum Board Finishing:
 - 1. Treat gypsum board joints, interior angles, edge trim, control joints, penetrations, fastener heads, surface defects, and elsewhere required to prepare gypsum board surfaces for decoration. Promptly remove residual joint compound from adjacent surfaces:
 - a. Prefill open joints, rounded or beveled edges, and damaged surface areas.
 - b. Apply joint tape over gypsum board joints, except those with trim having flanges not intended for tape.
 - c. Gypsum Board Finish Levels - Finish panels to levels indicated below and according to ASTM C840:
 - 1) Level 1: Ceiling plenum areas, concealed areas, and where indicated.
 - 2) Level 2: Panels that are substrate for tile.
 - 3) Level 3: Surfaces be coated with drywall primer prior to final finishes. Heavy or medium texture finishes before final painting, or where heavy-grade wall coverings are to be applied as the final decoration. This level of finish is not recommended where smooth painted surfaces, or light to medium weight wall coverings as specified.
 - 4) Level 4: For surfaces receiving wall covering and flat paints.
 - 5) Level 5: For surfaces receiving gloss or semigloss paint and surfaces subjected to severe lighting. To be used in Kitchen areas and food service areas only.
 - d. Glass Mat Gypsum Sheathing Board: Finish according to manufacturer's written instructions for use as exposed soffit board.
 - e. Glass Mat Faced Panels: Finish according to manufacturer's written instructions.
- M. Installation Tolerances:
 - 1. Suspension System: Install suspension systems that are level to within 1/8 inch in 12 feet (3 mm in 3.6 m) measured lengthwise on each member that will receive finishes and transversely between parallel members that will receive finishes.
 - 2. Installation Tolerances, Suspension System: Install suspension systems level to within 1/8 inch in 12 feet (3 mm in 3.6 m) measured lengthwise on each member that will receive finishes and transversely between parallel members that will receive finishes.

3.5 PROTECTION

- A. Protect installed products from damage from weather, condensation, direct sunlight, construction, and other causes during remainder of the construction period.

- B. Remove and replace panels that are wet, moisture damaged, and mold damaged:
 - 1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
 - 2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

END OF SECTION 09 21 16

SECTION 09 30 00 TILING

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes requirements including but not limited to:
 - 1. Ceramic mosaic tile.
 - 2. Accessories required for indicated installation.
- B. Related Sections:
 - 1. Section 09 21 16: Gypsum Board Assemblies.
 - 2. Section 09 65 13.13: Resilient Base.

1.3 PERFORMANCE REQUIREMENTS

- A. Static Coefficient of Friction:
 - 1. Level Surfaces: Minimum 0.6.
 - 2. Ramp Surfaces: Minimum 0.8.
- B. Ceramic Tile Flooring should be stable, firm, and slip resistant, pursuant to 2022 CBC Section 11B-302.1.

1.4 SUBMITTALS

- A. Product Data: Technical data including data sheets, installation recommendation, and recommended joint widths.
- B. Shop Drawings - Show locations of each type of tile and tile pattern:
 - 1. Show widths, details, and locations of expansion, contraction, control, and isolation joints in tile substrates and finished tile surfaces.
- C. Samples - Submit samples showing full range of color and texture variations expected:
 - 1. Full size units of each type and composition of tile and for each color and finish required.
 - 2. Assembled samples mounted on a rigid panel, with grouted joints, for each type and composition of tile and for each color and finish required; minimum 12 inches (300 mm) square, but not fewer than four tiles. Use grout of type and in color or colors approved for completed work.
 - 3. Waterproof membrane in 6 x 6-inch sample.
 - 4. Thresholds in 6-inch (150 mm) lengths.
- D. Test Reports: Submit test reports from qualified independent testing laboratory indicating and interpreting test results relative to compliance of tile products with requirements for slip resistance.
- E. Maintenance Instructions: Submit maintenance instructions for each type of product specified.

1.5 QUALITY ASSURANCE

- A. Regulatory Requirements:
 - 1. Building Code: Comply with applicable requirements for the CBC for interior finishes.
 - 2. Surface Burning Characteristics - ASTM E84; identify products with appropriate markings of applicable testing agency:
 - a. Flame Spread Index: 25 or less.
 - b. Smoke Developed Index: 450 or less.
 - 3. Accessibility Requirements - Comply with applicable requirements:
 - a. Americans with Disabilities Act of 1990, as amended:
 - 1) ADA Title II Regulations & the 2010 ADA Standards for Accessible Design.
 - b. 2022 California Building Code (CBC) (CCR Title 24, Part 2, as adopted and amended by DSA):
 - 2) CBC Chapter 11B, Access to Public Buildings, Public Accommodations, Commercial Buildings and Public Housing.
- B. Source Limitations for Tile: Obtain tile of same type and color or finish from one source or producer. Obtain tile from same production run and of consistent quality in appearance and physical properties for each contiguous area.
- C. Source Limitations for Setting and Grouting Materials: Obtain ingredients of a uniform quality for each mortar, adhesive, and grout component from a single manufacturer and each aggregate from one source or producer.
- D. Source Limitations for Other Products - Obtain each of the following products specified in this Section through one source from a single manufacturer for each product:
 - 1. Stone thresholds.
 - 2. Waterproofing.
 - 3. Joint sealants.
 - 4. Cementitious backer units.
 - 5. Metal edge strips.
- E. Mockups:
 - 1. Build mockups to verify selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution:
 - a. Build mockup of each type of floor tile installation.
 - b. Build mockup of each type of wall tile installation.
 - c. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver and store packaged materials in original containers with seals unbroken and labels intact until time of use. Comply with requirements in ANSI A137.1 for labeling tile packages.
- B. Store tile and cementitious materials on elevated platforms, under cover, and in a dry location. Store aggregates where grading and other required characteristics can be maintained and contamination can be avoided. Store liquid materials in unopened containers and protected from freezing.
- C. Handle tile that has temporary protective coating on exposed surfaces to prevent coated surfaces from contacting backs or edges of other units. If coating does contact bonding surfaces of tile, remove coating from bonding surfaces before setting tile.

PART 2 PRODUCTS

2.1 MATERIALS

- A. ANSI Ceramic Tile Standard: Provide tile that complies with ANSI A137.1 for types, compositions, and other characteristics indicated. Provide tile complying with Standard grade requirements.
- B. ANSI Standards for Tile Installation Materials: Provide materials complying with ANSI A108, ANSI standards referenced by TCNA installation methods specified in tile installation schedules, and other requirements specified.
- C. Factory Blending: For tile exhibiting color variations within ranges, blend tile in factory and package so tile units taken from one package show same range in colors as those taken from other packages and match approved Samples.
- D. Mounting:
 - 1. For factory mounted tile, provide back or edge mounted tile assemblies as standard with manufacturer unless otherwise indicated:
 - a. Where tile is indicated for installation in swimming pools, on exteriors or in wet areas, do not use back- or edge-mounted tile assemblies unless tile manufacturer specifies in writing that this type of mounting is suitable for installation indicated and has a record of successful in-service performance.

2.2 TILE PRODUCTS

- A. Manufacturers are subject to compliance with requirements; provide products by one of the following:
 - 1. Ceramic Tile:
 - a. American Marazzi Tile, Inc.
 - b. American Olean; a Division of Dal-Tile Corporation.
 - c. Crossville, Inc.
 - d. Daltile.
 - e. Emser Tile.
 - f. Trinity Tile.
 - g. Interceramic.
 - h. Concept Surfaces, LLC.
- B. Ceramic Floor Tile - Factory mounted unglazed ceramic mosaic tile:
 - 1. Basis of Design Product/Manufacturer: As indicated in the Drawings.
 - 2. Type: As indicated in the Drawings.
 - 3. Module Size: Refer to Finish Schedule in the Drawings.
 - 4. Thickness: 1/4 inch (6.4 mm).
 - 5. Face: Plain with cushion edges.
 - 6. Surface: Smooth, without or slip resistant, with abrasive admixture.
 - 7. Dynamic Coefficient of Friction: Not less than 0.42.
 - 8. Location: As indicated in the Drawings.
 - 9. Grout Color: As indicated in the Drawings.
 - 10. Tile color: As indicated on Drawings or as selected by Architect.
- C. Ceramic Wall Tile - Glazed tile:
 - 1. Basis of Design Product/Manufacturer: **Daltile**
 - 2. Composition: Impervious natural clay tile.
 - 3. Module Size: 4 1/4 inches, square.
 - 4. Thickness: 5/16 inch (8 mm).
 - 5. Face: Plain with cushion edges.
 - 6. Surface: Matte glazed.
 - 7. Base: Six (6) inch high x Six (6) inch wide ceramic tile cove base to match wall tile.

8. Tile Color and Pattern: Refer to Drawings.
 9. Grout Color: Selected by Architect unless noted otherwise.
 10. Trim Units - Coordinated with sizes and coursing of adjoining flat tile where applicable matching characteristics of adjoining flat tile. Provide shapes selected from standard shapes:
 - i. Wainscot Cap for Thinset Mortar Installations: Surface bullnose, module size 1 inch by 1 inch (25.4 mm by 25.4 mm) or 2 inch by 1 inch (50.8 mm by 25.4 mm) or 2 inch by 2 inches (50.8 mm by 50.8 mm).
 - j. Wainscot Cap for Flush Conditions: Regular flat tile for conditions where tile wainscot is shown flush with wall surface above it, same size as adjoining flat tile.
 - k. External Corners for Thinset Mortar Installations: Surface bullnose, module size 1 inch by 1 inch (25.4 mm by 25.4 mm) or 2 inch by 1 inch (50.8 mm by 25.4 mm) or 2 inch by 2 inches (50.8 mm by 50.8 mm).
 - l. Internal Corners: Cove, module size 1 inch by 1 inch (25.4 mm by 25.4 mm) or 2 inches by 1 inch (50.8 mm by 25.4 mm).
 - m. Internal Corners: Field-buttet square corners. For coved base and cap, use angle pieces designed to fit with stretcher shapes.
 - n. Tapered Transition Tile: Shape designed to effect transition between thickness of tile floor and adjoining floor finishes of different thickness, tapered to provide reduction in thickness from 1/2 to 1/4 inch (12.7 to 6.4 mm) across nominal 4 inch (100 mm) dimension.
- D. Threshold - Fabricate to sizes and profiles indicated or required to provide transition between adjacent floor finishes:
1. Bevel edges at 1:2 slope, with lower edge of bevel aligned with or up to 1/16 inch (1.5 mm) above adjacent floor surface. Finish bevel to match top surface of threshold. Limit height of threshold to 1/2 inch (12.7 mm) or less above adjacent floor surface.
 2. Granite Thresholds - ASTM C615/C615M, with polished finish:
 - a. Description: Uniform, medium grained, black stone without veining.

2.3 WATERPROOF MEMBRANE

- A. Waterproof membrane complies with ANSI A118 and is recommended by the manufacturer for the application indicated. Include reinforcement and accessories recommended by manufacturer.
- B. Fluid Applied Membrane - Liquid latex rubber or elastomeric polymer:
1. Basis of Design - Laticrete 9235 Waterproofing Membrane. Subject to compliance with requirements, provide basis if design or comparable product by one of the following:
 - a. Laticrete International, Inc.
 - b. MAPEI Corporation.
 - c. TEC; H.B. Fuller Construction Products Inc.
- C. Fabric Reinforced, Fluid Applied Membrane - System consisting of liquid latex rubber or elastomeric polymer and continuous fabric reinforcement:
1. Basis of Design - Laticrete 9235 Waterproofing Membrane and reinforcing Fabric. Subject to compliance with requirements, provide basis if design or comparable product by one of the following:
 - a. Laticrete International, Inc.
 - b. MAPEI Corporation.
 - c. Merkrete by Parex USA, Inc.
- D. Latex Portland Cement Waterproof Mortar - Flexible, waterproof mortar consisting of cement based mix and latex additive:
1. Manufacturers are subject to compliance with requirements; provide products by one of the following:

- a. C-Cure.
 - b. MAPEI Corporation.
 - c. TEC; H.B. Fuller Construction Products Inc.
- E. Liquid Latex Waterproofing/Crack Isolation Membrane - Single Component, self-curing, load bearing liquid rubber polymer that forms a flexible seamless combined waterproofing membrane and crack isolation membrane compliance with ANSI A118:
- 1. Basis of Design - Hydroban by Laticrete International. Subject to compliance with requirements, provide basis of design or comparable product by one of the following:
 - a. Laticrete International, Inc.
 - b. MAPEI Corporation.
 - c. TEC; H.B. Fuller Construction Products Inc.

2.4 CRACK ISOLATION MEMBRANE

- A. Crack isolation membrane complying with ANSI A118 for standard performance and recommended by manufacturer for the application indicated. Include reinforcement and accessories recommended by manufacturer.
- B. Fabric Reinforced, Modified Bituminous Sheet - Self adhering, modified bituminous sheet with fabric reinforcement facing; 0.040-inch (1 mm) nominal thickness:
- 1. Manufacturers are subject to compliance with requirements; provide products by one of the following:
 - a. Custom Building Products.
 - b. MAPEI Corporation.
- C. Fluid Applied Membrane - Liquid latex rubber or elastomeric polymer:
- 1. Manufacturers are subject to compliance with requirements; provide products by one of the following:
 - a. Custom Building Products.
 - b. Laticrete International, Inc.
 - c. MAPEI Corporation.
 - d. Merkrete by Parex USA, Inc.
 - e. TEC; H.B. Fuller Construction Products Inc.
- D. Fabric Reinforced, Fluid Applied Membrane - System consisting of liquid latex rubber or elastomeric polymer and fabric reinforcement:
- 1. Manufacturers are subject to compliance with requirements; provide products by one of the following:
 - a. Bonsal American, an Oldcastle company.
 - b. Bostik, Inc.
 - c. Custom Building Products.
 - d. Laticrete International, Inc.
 - e. MAPEI Corporation.
 - f. Merkrete by Parex USA, Inc.

2.5 SETTING MATERIALS

- A. Dry Set Mortar (Thinset) - ANSI A108:
- 1. Mortar Bed - Proportions of 1 part Portland Cement to 5 parts sand:
 - a. Portland Cement: ASTM C150, Type 1.
 - b. Sand: ASTM C144.
 - c. Water: Potable.
 - 2. Manufacturers are subject to compliance with requirements; provide products by one of the following:
 - a. Custom Building Products.

- b. Laticrete International, Inc.
 - c. MAPEI Corporation.
 - 3. Wall Applications: Provide mortar complying with requirements for nonsagging mortar in addition to requirements in ANSI A108.
- B. Modified Dry Set Mortar (Thinset) - ANSI A118:
 - 1. Manufacturers are subject to compliance with requirements; provide products by one of the following:
 - a. Laticrete International, Inc.
 - b. MAPEI Corporation.
 - c. TEC; H.B. Fuller Construction Products Inc.
 - 2. Provide prepackaged, dry mortar mix combined with acrylic resin or styrene-butadiene-rubber liquid latex additive at site.
 - 3. Wall Applications: Provide mortar complying with requirements for nonsagging mortar in addition to requirements in ANSI A118.
- C. Improved Modified Dry Set Mortar (Thinset) - ANSI A118:
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Laticrete International, Inc.
 - b. MAPEI Corporation.
 - c. TEC; H.B. Fuller Construction Products Inc.
 - 2. Provide prepackaged, dry mortar mix combined with acrylic resin or styrene-butadiene-rubber liquid latex additive at Project site.
 - 3. For wall applications, provide mortar complying with requirements for nonsagging mortar in addition to the other requirements in ANSI A118.
- D. Modified Dry Set Mortar (Medium Bed): ANSI A118; product approved by manufacturer for application thickness of 5/8 inch (16 mm).
 - 1. Manufacturers are subject to compliance with requirements; provide products by one of the following:
 - a. Laticrete International, Inc.
 - b. MAPEI Corporation.
 - c. TEC; H.B. Fuller Construction Products Inc.
 - 2. Provide prepackaged, dry mortar mix combined with acrylic resin or styrene-butadiene-rubber liquid latex additive at Project site.
- E. Portland Cement Mortar (Thickset) Installation Materials - ANSI A108:
 - 1. Mortar Bed - Proportions of 1 part Portland Cement to 5 parts sand:
 - a. Portland Cement: ASTM C150, Type 1.
 - b. Sand: ASTM C144.
 - c. Water: Potable.
 - 2. Cleavage Membrane: Asphalt felt, ASTM D226/D226M, Type I (No. 15); or polyethylene sheeting, ASTM D4397, 4.0 mils (0.1 mm) thick.
 - 3. Reinforcing Wire Fabric: Galvanized, welded-wire fabric, 2 by 2 inches (50.8 by 50.8 mm) by 0.062-inch (1.57 mm) diameter; comply with ASTM A1064, except for minimum wire size.
 - 4. Expanded Metal Lath - Diamond mesh lath complying with ASTM C847:
 - a. Base Metal and Finish for Interior Applications: Uncoated or zinc-coated (galvanized) steel sheet, with uncoated steel sheet painted after fabrication into lath.
 - b. Base Metal and Finish for Exterior Applications: Zinc coated (galvanized) steel sheet.
 - c. Configuration over Studs and Furring: Flat.
 - d. Configuration over Solid Surfaces: Self furring.
 - e. Weight: 3.4 lb/sq. yd. (1.8 kg/sq. m).

5. Latex Additive: Styrene-butadiene-rubber water emulsion, serving as replacement for part or all of gaging water, of type specifically recommended by latex additive manufacturer for use with field mixed portland cement and aggregate mortar bed.
- F. Tile Setting Epoxy - ANSI A118, water cleanable; 100 percent solids epoxy grout:
 1. Manufacturers are subject to compliance with requirements; provide products by one of the following:
 - a. Polyblend Tile Grout with 100% Solids Epoxy; Custom Building Products.
 - b. SpectraLOCK PRO Stainless Grout; Laticrete International, Inc.
 2. Provide product capable of withstanding continuous and intermittent exposure to temperatures of up to 140 degrees F and 212 degrees F (60 degrees C and 100 degrees C), respectively, and certified by manufacturer for intended use.
 3. Color: Selected by Architect.
- G. EGP (Exterior Glue Plywood) Latex-Portland Cement Mortar (Thinset) - ANSI A118:
 1. Manufacturers are subject to compliance with requirements; provide products by one of the following:
 - a. Laticrete International, Inc.
 - b. MAPEI Corporation.
 - c. TEC; H.B. Fuller Construction Products Inc.
 2. Provide prepackaged, dry mortar mix combined with acrylic resin or styrene-butadiene-rubber liquid latex additive at Project site.

2.6 GROUT MATERIALS

- A. Sand Portland Cement Grout - ANSI A108, consisting of white or gray cement and white or colored aggregate as required to produce color indicated:
 1. Portland Cement: ASTM C150, Type 1.
 2. Lime: ASTM C206, Type S.
 3. Sand: ASTM C144.
- B. Commercial Cement Grout (Sanded Grout) - ANSI A118 for joints 1/8 inch (3.2 mm) or wider:
 1. Manufacturers are subject to compliance with requirements; provide products by one of the following:
 - a. Custom Building Products.
 - b. Laticrete International, Inc.
 2. Polymer Type: Acrylic resin or styrene-butadiene rubber in liquid latex form for addition to prepackaged dry grout mix.
- C. High Performance Tile Grout - ANSI A118:
 1. Manufacturers are subject to compliance with requirements; provide products by one of the following:
 - a. Custom Building Products.
 - b. Laticrete International, Inc.
 2. Polymer Type: Acrylic resin or styrene-butadiene rubber in liquid latex form for addition to prepackaged dry grout mix.
- D. Grout for Pregrouted Tile Sheets: Same product used in factory to pregrout tile sheets.
- E. Water Cleanable Epoxy Grout - ANSI A118:
 1. Manufacturers are subject to compliance with requirements; provide products by one of the following:
 - a. Polyblend Tile Grout with 100% Solids Epoxy; Custom Building Products.
 - b. SpectraLOCK PRO Stainless Grout; Laticrete International, Inc.
 - c. MAPEI Corp., Kerapoxy or Kerapoxy CQ Epoxy Grout.

2. Provide product capable of withstanding continuous and intermittent exposure to temperatures of up to 140 degrees F and 212 degrees F (60 degrees and 100 degrees C), respectively, and certified by manufacturer for intended use.

2.7 MISCELLANEOUS MATERIALS

- A. Trowelable Underlayments and Patching Compounds: Latex modified, portland cement-based formulation provided or approved by manufacturer of tile setting materials for installations indicated.
- B. Vapor Retarder Membrane: Polyethylene sheeting, ASTM D4397, 4.0 mils (0.1 mm) thick.
- C. Metal Edge Strips:
 1. Angle or L-shaped, height to match tile and setting bed thickness, metallic or combination of metal and PVC or neoprene base, designed specifically for flooring applications; stainless steel, ASTM A666, 300 Series exposed edge material.
 - a. Manufacturers are subject to compliance with requirements; provide products by one of the following:
 - 1) Blanke Corporation.
 - 2) Ceramic Tool Company, Inc.
 - 3) Schluter Systems L.P.
- D. Tile Cleaner: A neutral cleaner capable of removing soil and residue without harming tile and grout surfaces, specifically approved for materials and installations indicated by tile and grout manufacturers.
- E. Tile and Grout Sealer - Sealer for sealing grout joints and that does not change color or appearance of grout:
 1. Manufacturers are subject to compliance with requirements; provide products by one of the following:
 - a. Custom Building Products.
 - b. Summitville Tiles, Inc.
 - c. TEC; H.B. Fuller Construction Products Inc.
- F. Sealant: Silicone sealant; refer to Section 07 92 00.

2.8 MIXING MORTARS AND GROUT

- A. Mix mortars and grouts to comply with referenced standards and mortar and grout manufacturers' written instructions.
- B. Add materials, water, and additives in accurate proportions.
- C. Obtain and use type of mixing equipment, mixer speeds, mixing containers, mixing time, and other procedures to produce mortars and grouts of uniform quality with optimum performance characteristics for installations indicated.

PART 3 EXECUTION

3.1 PROJECT CONDITIONS

- A. Environmental Limitations: Do not install tile until construction in spaces is complete and ambient temperature and humidity conditions are maintained at the levels indicated in referenced standards and manufacturer's written instructions.

- B. Contractor is required to achieve the specified concrete moisture content prior to installation of all flooring materials or use a flooring manufacture approved moisture barrier prior to installation of all flooring products.
- C. Maintain temperatures at 50 degrees F or more in tiled areas during installation and for 7 days after completion, unless higher temperatures are required by referenced installation standard or manufacturer's instructions.

3.2 EXTRA MATERIALS

- A. Furnish extra materials that match and are from same production runs as products installed and that are packaged with protective covering for storage and identified with labels describing contents:
 - 1. Tile and Trim Units: Furnish quantity of full size units equal to 3 percent of amount installed for each type, composition, color, pattern, and size indicated.
 - 2. Grout: Furnish quantity of grout equal to 3 percent of amount installed for each type, composition, and color indicated.

3.3 EXAMINATION

- A. Examine substrates, areas, and conditions where tile will be installed for compliance with requirements for installation tolerances and other conditions affecting performance of the work:
 - 1. Verify substrates for setting tile are firm; dry; clean; free of coatings that are incompatible with tile setting materials, including curing compounds and other substances that contain soap, wax, oil, or silicone; and comply with flatness tolerances required by ANSI A108 for installations indicated.
 - 2. Verify concrete substrates for tile floors installed with thinset mortar comply with surface finish requirements in ANSI A108 for installations indicated:
 - a. Verify surfaces that received a steel trowel finish have been mechanically scarified.
 - b. Verify protrusions, bumps, and ridges have been removed by sanding or grinding.
 - 3. Verify installation of grounds, anchors, recessed frames, electrical and mechanical units of work, and similar items located in or behind tile has been completed.
 - 4. Verify joints and cracks in tile substrates are coordinated with tile joint locations; if not coordinated, adjust joint locations in consultation with Architect.
- B. Proceed with installation after correcting unsatisfactory conditions.

3.4 PREPARATION

- A. Fill cracks, holes, and depressions in concrete substrates for tile floors installed with adhesives or thinset mortar with trowelable leveling and patching compound specifically recommended by tile-setting material manufacturer.
- B. Where indicated, prepare substrates to receive waterproofing by applying a reinforced mortar bed that complies with ANSI A108 and is sloped 1/4 inch per foot (1:50) toward drains.
- C. Blending: For tile exhibiting color variations, verify tile has been factory blended and packaged so tile units taken from one package show same range of colors as those taken from other packages and match approved Samples. If not factory blended, either return to manufacturer or blend tiles at site before installing.

3.5 INSTALLATION

- A. Comply with TCNA *Handbook for Ceramic, Glass, and Stone Tile Installation* for TCNA installation methods specified in tile installation schedules. Comply with parts of the ANSI A108 series *Specifications for Installation of Ceramic Tile* that are referenced in TCNA installation methods, specified in tile installation schedules, and apply to types of setting and grouting materials used:
 - 1. For the following installations, comply with ANSI A108 series procedures for tile installation standards for providing 95 percent mortar coverage:
 - a. Exterior tile floors.
 - b. Tile floors in wet areas.
 - c. Tile floors consisting of tiles 8 by 8 inches (200 by 200 mm) or larger.
 - d. Tile floors consisting of rib-backed tiles.
- B. Extend tile work into recesses and under or behind equipment and fixtures to form complete covering without interruptions unless otherwise indicated. Terminate work neatly at obstructions, edges, and corners without disrupting pattern or joint alignments.
- C. Accurately form intersections and returns. Perform cutting and drilling of tile without marring visible surfaces. Carefully grind cut edges of tile abutting trim, finish, or built-in items for straight aligned joints. Fit tile closely to electrical outlets, piping, fixtures, and other penetrations so plates, collars, or covers overlap tile.
- D. Provide trim shapes where necessary to eliminate exposed tile edges.
- E. Where accent tile differs in thickness from field tile, vary setting bed thickness so tiles are flush.
- F. Jointing Pattern:
 - 1. Lay tile in grid pattern unless otherwise indicated. Lay out tile work and center tile fields in both directions in each space or on each wall area. Lay out tile work to minimize the use of pieces that are less than half of a tile. Provide uniform joint widths unless otherwise indicated:
 - a. For tile mounted in sheets, make joints between tile sheets same width as joints within tile sheets so joints between sheets are not apparent in finished work.
 - b. Where adjoining tiles on floor, base, walls, or trim are specified or indicated to be same size, align joints.
 - c. Where tiles are specified or indicated to be whole integer multiples of adjoining tiles on floor, base, walls, or trim, align joints unless otherwise indicated.
- G. Joint Widths - Unless otherwise indicated, install tile with the following joint widths:
 - 1. Ceramic Mosaic Tile: 1/8 inch (3.2 mm).
- H. Lay out tile wainscots to dimensions indicated or to next full tile beyond dimensions indicated.
- I. Expansion Joints:
 - 1. Provide expansion joints and sealant filled joints, including control, contraction, and isolation joints, where indicated. Form joints during installation of setting materials, mortar beds, and tile. Do not saw cut joints after installing tiles:
 - a. Where joints occur in concrete substrates, locate joints in tile surfaces directly above them.
- J. Thresholds:
 - 1. Install stone thresholds in same type of setting bed as adjacent floor unless otherwise indicated:
 - a. At locations where mortar bed (thickset) would otherwise be exposed above

- adjacent floor finishes, set thresholds in modified dry set mortar (thinset).
- b. Do not extend cleavage membrane waterproofing or crack isolation membrane under thresholds set in standard dry set, modified dry set or improved modified dry set mortar. Fill joints between such thresholds and adjoining tile set on cleavage membrane, waterproofing, or crack isolation membrane with elastomeric sealant.
- K. Metal Edge Strips: Install where exposed edge of tile flooring meets carpet, wood, or other flooring that finishes flush with top of tile.
- L. Floor Sealer: Apply floor sealer to grout joints according to floor sealer manufacturer's written instructions. As soon as floor sealer has penetrated grout joints, remove excess sealer and sealer from tile faces by wiping with soft cloth.
- M. Waterproofing:
- 1. Install waterproofing to comply with ANSI A108 and manufacturer's written instructions to produce waterproof membrane of uniform thickness that is bonded securely to substrate:
 - a. Allow waterproofing to cure and verify by testing that it is watertight before installing tile or setting materials over it.
- N. Crack Isolation Membrane:
- 1. Install crack isolation membrane to comply with ANSI A108 and manufacturer's written instructions to produce membrane of uniform thickness that is bonded securely to substrate:
 - a. Allow crack isolation membrane to cure before installing tile or setting materials over it.
- O. Floor and Paver Tile and Planks - Install tile to comply with requirements in the TCNA installation methods and ANSI A108 series of tile installation standards:
- 1. Back Buttering - For installations indicated, obtain 100 percent mortar coverage by complying with applicable special requirements for back buttering of tile in referenced ANSI A108 series of tile installation standards:
 - a. Exterior tile floors.
 - b. Tile floors in wet areas, including showers, tub enclosures, laundries, and swimming pools.
 - c. Tile floors composed of tiles 8 inches by 8 inches (203 mm by 203 mm) or larger.
 - d. Tile floors composed of rib backed tiles.
- P. Floor Tile - Install tile to comply with requirements in the TCNA installation methods and ANSI A108 series of tile installation standards:
- 1. Back Buttering - For installations indicated, obtain 100 percent mortar coverage by complying with applicable special requirements for back buttering of tile in referenced ANSI A108 series of tile installation standards:
 - a. Exterior tile floors.
 - b. Tile floors in wet areas, including showers, tub enclosures, laundries, and swimming pools.
 - c. Tile floors composed of tiles 8 inches by 8 inches (203 mm by 203 mm) or larger.
 - d. Tile floors composed of rib backed tiles.
 - 2. Tile Installation Method:
 - a. Interior Floor Installations, Concrete Subfloor:
 - 1) TCNA F125-Full; thinset mortar on crack isolation membrane.
- Q. Wall Tile Installation:
- 1. Install types of tile designated for wall installations to comply with requirements, including those referencing TCNA installation methods and ANSI setting bed standards:

- a. Back Buttering - For installations indicated, obtain 100 percent mortar coverage by complying with applicable special requirements for back buttering of tile in referenced ANSI A108 series of tile installation standards:
 - 1) Exterior tile wall installations.
 - 2) Tile wall installations in wet areas, including showers, tub enclosures, laundries, and swimming pools.
 - 3) Tile installed with chemical resistant mortars and grouts.
 - 4) Tile wall installations composed of tiles 8 inches by 8 inches (203 mm by 203 mm) or larger.
- a. Tile Installation Method, Wood or Metal Studs:
 - 1) TCNA W245; thinset mortar on glass-mat, water-resistant gypsum backer board.

3.6 ADJUSTING AND CLEANING

- A. Remove and replace tile that is damaged or that does not match adjoining tile. Provide new matching units, installed as specified and in a manner to eliminate evidence of replacement.
- B. Cleaning:
 - 1. On completion of placement and grouting, clean all ceramic tile surfaces so they are free of foreign matter:
 - a. Remove grout residue from tile as soon as possible.
 - b. Clean grout smears and haze from tile according to tile and grout manufacturer's written instructions but no sooner than 10 days after installation. Use only cleaners recommended by tile and grout manufacturers and only after determining that cleaners are safe to use by testing on samples of tile and other surfaces to be cleaned. Protect metal surfaces and plumbing fixtures from effects of cleaning. Flush surfaces with clean water before and after cleaning.

3.7 PROTECTION

- A. Protect installed tile work with kraft paper or other heavy covering during construction period to prevent staining, damage, and wear. If recommended by tile manufacturer, apply coat of neutral protective cleaner to completed tile walls and floors.
- B. Prohibit foot and wheel traffic from tiled floors for at least seven days after grouting is completed.
- C. Before final inspection, remove protective coverings and rinse neutral protective cleaner from tile surfaces.

END OF SECTION 09 30 00

SECTION 09 54 00 INTEGRATED CEILING ASSEMBLIES

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general conditions of Contract, including General and Supplementary Conditions and Divisions-01 Specification sections apply to work of this section.

1.2 SUMMARY

- A. Section Includes Ceiling Assemblies for a complete Project and references to other components including but not limited to a Continuous/Wall-to-Wall or Cloud installation.
- B. Continuous Wall to Wall Ceiling assembly:
 - 1. Acoustical ceiling panel
 - 2. Wire hangers, fasteners, main runners, cross tees, and wall angle moldings
 - 3. Perimeter Trim
- C. Related Sections
 - 1. Section 05 50 00: Metal Fabrications.
 - 2. Section 09 21 16: Gypsum Board Assemblies.
 - 3. Divisions 23 - HVAC Air Distribution
 - 4. Division 26 - Electrical
- D. References
 - 1. American Society for Testing and Materials (ASTM):
 - a. ASTM A 1008 Standard Specification for Steel, Sheet, Cold Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability
 - b. ASTM A 641 Standard Specification for Zinc-Coated (Galvanized) Carbon Steel Wire
 - c. ASTM A 653 Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process
 - d. ASTM C 645 Standard Specification for Metal Suspension Systems
 - e. ASTM C 636 Recommended Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels
 - f. ASTM C754 AND C1858 All installations should be in compliance with these tests.
 - g. ASTM D 3273 Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber
 - h. ASTM E 84 Standard Test Method for Surface Burning Characteristics of Building Materials
 - i. ASTM E 580 Installation of Metal Suspension Systems in Areas Requiring Moderate Seismic Restraint
 - j. ASTM C 423 Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method
 - k. ASTM E 1414 Standard Test Method for Airborne Sound Attenuation between Rooms Sharing a Common Ceiling Plenum
 - l. ASTM E 1264 Classification for Acoustical Ceiling Products
 - m. ASTM E3090 All references to suspension component property testing per this test method.
 - 2. California Building Code (CBC) All editions and parts.
 - 3. ASHRAE Standard 62.1-2004, Ventilation for Acceptable Indoor Air Quality
 - 4. NFPA 70 National Electrical Code

5. ASCE 7 American Society of Civil Engineers, Minimum Design Loads for Buildings and Other Structures
6. International Code Council-Evaluation Services - AC 156 Acceptance Criteria for Seismic Qualification Testing of Non-structural Components
7. International Code Council-Evaluation Services Report - Seismic Engineer Report
a. ESR 1289 - Armstrong Suspension Systems
8. California Department of Public Health CDPH/EHLB Emission Standard Method Version 1.1 2010
9. LEED - Leadership in Energy and Environmental Design is a set of rating systems for the design, construction, operation, and maintenance of green buildings

1.3 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: Minimum 6 x 6 inch samples of specified panel; 8 inch long samples of exposed wall molding and suspension system, including main runner and 4 foot cross tees.
- E. Certifications: Manufacturer's certifications that products comply with specified requirements, including laboratory reports showing compliance with specified tests and standards.

1.4 QUALITY ASSURANCE

- A. Single-Source Responsibility: Provide acoustical panel units and grid components by a single manufacturer.
- B. Fire Performance Characteristics: Identify acoustical ceiling components with appropriate markings of applicable testing and inspecting organization.
- C. Surface Burning Characteristics: As follows, tested per ASTM E 84 and complying with ASTM E 1264 Classification.
- D. Acoustical Panels: As with other architectural features located at the ceiling that may obstruct or skew the planned fire sprinkler pattern through possibly delay or accelerate the activation of the sprinkler or fire detection systems by channeling heat from a fire either toward or away from the device. Designers and installers are advised to consult a fire protection engineer, NFPA 13, or their local codes for guidance where automatic fire detection and suppression systems are present.
- E. Coordination of Work: Coordinate acoustical ceiling work with installers of related work including, but not limited to building insulation, gypsum board, light fixtures, mechanical systems, electrical systems, and sprinklers.
- F. Installer Qualification: Subcontractor is an experienced Installer that has reviewed and understands the system installation instructions thoroughly. Subcontractor will follow written installation instructions and utilize approved equipment and procedures for finishing installation.

- G. 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.

1.5 DELIVERY, STORAGE AND HANDLING

- A. Deliver acoustical ceiling units to project site in original, unopened packages and store them in a fully enclosed space where they will be protected against damage from moisture, direct sunlight, surface contamination, and other causes.
- B. Before installing acoustical ceiling units, permit them to reach room temperature and a stabilized moisture content. Store all material within temperature limits required by manufacturer.
- C. Handle acoustical ceiling units carefully to avoid chipping edges or damaged units in any way.

1.6 WARRANTY

- A. Acoustical 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 the following:
 - 1. Acoustical Panels: Manufacturer's defects in material
 - 2. Grid System: Rusting and manufacturer's defects
- B. Warranty Period:
 - 1. Acoustical panels: Ten (10) years from date of substantial completion
 - 2. Suspension: Ten (10) years from date of substantial completion
- 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.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers are subject to compliance with requirements; provide ceiling panels and grid systems by one of the following
 - 1. Armstrong World Industries, Basis of Design.
 - a. ACOUSTIBuilt.
 - 2. CertainTeed Corporation.
 - 3. USG Interiors.
 - 4. Approved Equal.
- B. Finish
 - 1. Joint Compound Finish by Others
 - 2. Spray Applied Finish by Armstrong World Industries, Inc.
- C. Suspension Systems and Washers
 - 1. Armstrong World Industries, Inc.
- D. Perimeter Systems
 - 1. Armstrong World Industries, Inc.

2.2 ACOUSTICAL CEILING UNITS

- A. Acoustical Panels
1. ACOUSTIBuilt Panels are 7/8" thick.
 2. Surface Texture: Fine
 3. Composition: Mineral Fiber
 4. Color: White (Fine Texture Finish for ACOUSTIBuilt panels)
 5. Size: 48 in x 72 in x 7/8 in - Item #2604
 6. Edge Profile: Tapered edges four sides
 7. Noise Reduction Coefficient (NRC): ASTM C 423; Panel 0.80 (UL)
 8. Ceiling Attenuation Class (CAC): ASTM C 1414; Panel 46 (UL), System up to 48
 9. Sabin: Cloud Applications: 0.80 Sabins/SF & 1.33 Sabins/SF with infill item 8200T10
 10. Articulation Class (AC): ASTM E 1111
 11. Flame Spread: ASTM E 1264; Class A
 12. Light Reflectance (LR) White Panel: ASTM E 1477; 0.87
 13. Dimensional Stability: HumiGuard Plus
 14. Recycle Content: Post-Consumer and Pre-Consumer – up to 75%
 15. Material Ingredient Transparency: Health Product Declaration (HPD); Declare Label
 16. Life Cycle Assessment: Third Party Certified Environment Product Declaration (EPD)
- B. Suspension Systems:
1. Armstrong Drywall Suspension Systems all main beams and cross tees shall be commercial quality hot-dipped galvanized steel
 - a. Main beam: manufactured main beam- 1-1/2" knurled face with ScrewStop™ reverse hem by 1-11/16 inches high. Drywall Main Beams are factory punched with cross tee routs, hanger wire holes, and SuperLock™ main beam clip for a strong secure connection and fast accurate alignment. Both ShortSpan and Drywall Main Beams are Heavy-duty performance per ASTM C635
 - b. HD8906 - 12ft HD Drywall Main Beam 1-1/2 in
 2. Cross Tees: manufactured cross tee- 1-1/2" knurled face with ScrewStop™ reverse hem by 1-1/2 inches high with factory punched cross tee routs and hanger wire holes and XL stake on clip for a strong secure connection.
 - a. XL8945P - 4ft Drywall Cross Tee
 - b. XL8965 – 6ft Drywall Cross Tee
 3. Wall Molding:
 - a. KAM12 - 12ft Knurled Angle Molding 1-1/4" Face
 4. Hanger wire: a Class 1 zinc coating, soft temper, pre-stretched, with a yield stress load of at least time three times the design load, but not less than 12-gauge.
 5. Fasteners (for Panel attachment)
 - a. #6 x 1-5/8" Fine thread or sharp point self-drilling drywall screws
 - b. Grip-Plate Washer for ACOUSTIBuilt panels (1-1/4" diameter) - #2119
- C. Perimeter Systems
1. Commercial quality extruded aluminum alloy 6063 trim channel, factory finished in baked polyester paint. Commercial quality galvanized steel unfinished T-bar connection clips; galvanized steel splice plates.
 - a. Color: White
 - b. Size: 120 in X 4 in (also available in 6")
 - c. Recycle Content: Post-Consumer - 50% Pre-Consumer - 0%
 - d. Acceptable Product: AXIOM One Piece for Drywall, 4in Straight – AX1PC4STR or Curved AX1PC4CUR as manufactured by Armstrong World Industries
 2. Axiom Trim Channel:
 - a. AX4STR 4in Axiom Classic Straight
 - b. AX1PC4STR 4IN One –Piece Drywall Trim
 3. Axiom Bottom Trim with tapping flange
 - a. AXBTASTR – Bottom Trim for ACOUSTIBuilt (also available in curved)

- 1) Axiom Accessories:
 - a) AXSPICE - Splice Plate
- D. Joint Compound
 - 1. Setting Compound: Lightweight setting-type drywall joint compound, Ultra lightweight drying-type drywall joint compound
 - 2. Joint Tape: Self-Adhesive mesh drywall joint tape
- E. Spray Applied Finish – Required Product: #2605WH Fine Texture Finish for ACOUSTIBuilt panels – White as manufactured by Armstrong World Industries.

PART 3 EXECUTION

3.1 PROJECT CONDITIONS

- A. Space Enclosure:
 - 1. Building areas to receive ceilings shall be free of construction dust and debris. Panels should be installed in areas where the building is enclosed and the HVAC is continuously functioning. This product is not recommended for exterior applications, where standing water is present, or where moisture will come into direct contact with the ceiling.
 - 2. HVAC should be designed, installed, and operated in accordance with ASHRAE Standard 62.1. It is also necessary for the area to be enclosed, for the HVAC systems to be functioning, and in continuous operations for the life of the product. Product is not intended for use where natural ventilation is part of the ventilation strategy and not recommended in areas where a differential plenum pressure exists.
- B. Alternate Construction Waste Disposal
 - 1. Reclaimed ceiling material must be kept dry and free from debris.
 - 2. Contact the Armstrong Recycle Center a consultant will verify the condition of the material and that it meets the Armstrong requirements for recycling. The Armstrong consultant will provide assistance to facilitate the recycling of the ceiling.
- C. Prior to installation, contact your Armstrong Installation Systems Specialist (ISS). Before installation, inspect previous work of all other trades. Verify that all work is complete and accurate to the point where this installation may properly proceed in strict accordance with framing shop drawings.
- D. If framing preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.
- E. The system installation is similar to a conventional drywall installation. However, there are key differences in both material substrate and methods of finishing and installation that make this system unique. Installers should review and follow all written directions of the installation instructions and view the installation video. [Click to follow to video access.](#)

3.2 PREPARATION

- A. Do not proceed with installation until all wet work such as concrete, terrazzo, plastering and painting has been completed and thoroughly dried out, unless expressly permitted by manufacturer's printed recommendations.
- B. Coordination: Furnish layouts for preset inserts, clips, and other ceiling anchors whose installation is specified in other sections.

- C. Furnish concrete inserts and similar devices to other trades for installation well in advance of time needed for coordination of other work.

3.3 INSTALLATION

- A. Follow manufacturer installation instructions:
 - 1. Armstrong Assembly and Installation Instructions (BPLA-299099)
- B. Controls joints are required following the standards used for gypsum board listed in ASTM C840, Section 20
 - 1. Ceilings with perimeter relief cannot exceed 50 LF and 2500 SF between control joints
 - 2. Ceilings without perimeter relief cannot exceed 30 LF and 900 SF between control joints
- C. Panel joints and fasteners are finished with tape and compound to create a flat surface. While the materials used to finish ACOUSTIBuilt panels are also used to finish drywall, the procedure has unique requirements.
- D. Joint compound coverage shall be limited to preserve the acoustical performance of the panels. Compound at panel joints shall not exceed 8 inch widths. Compound applied to field fasteners shall not exceed 4 inch by 4-inch areas. All compound shall be smooth and free of tool marks and ridges. Panels are to be finished with taping knives. Production tools, including boxes, are not permitted.
- E. Sanding and inspection: Throughout the sanding process, inspect the surface frequently for flatness. Direct a light across the ceiling to highlight unevenness that requires attention.
- F. Fine Texture Finish shall be applied in 4 coat process (additional coat may be used to achieve the desired finish) as called out in the installation instructions. Fine Texture Finish for ACOUSTIBuilt is applied in multiple coats, layered to achieve a uniform appearance and acoustical performance. It is strongly encouraged to practice spraying to ensure proper calibration and technique are achieved. Refer to the installation video.
 - 1. Must be applied with an air assist spray system (refer to manufacturers installation instructions for required equipment). The Fine texture finish is not intended for use with airless spray or to be manually applied by rolling.
 - 2. See Manufacturers installation instructions for correct pressure settings for spray system, finish preparation, spray calibration and spray procedure and technique.

3.4 ADJUSTING AND CLEANING

- A. Remove soot, dirt, and dust:
 - 1. Use a vacuum operating at low power with a soft brush or use a dry soot cleaning sponge.
- B. Clean exposed surfaces of acoustical ceilings, including trim, edge moldings, and suspension members.
 - 1. Comply with manufacturer's instructions for cleaning and touch up of minor finish damage.
 - 2. Remove any ceiling products that cannot be successfully cleaned and or repaired. Replace with attic stock or new product to eliminate evidence of damage.
- C. Before disposing of ceilings, contact the Armstrong Recycling Center at 877-276-7876, select option to review with a Armstrong consultant in the location of building where the ceilings will be removed.
 - 1. The consultant will verify the condition of the material and that it meets the Armstrong

- requirements for recycling.
- 2. The Armstrong consultant with provide assistance to facilitate the recycle of the ceiling.

3.5 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. Acoustical Ceiling Units: Furnish quality of full-size units equal to 5.0 percent of amount installed.
 - 2. Exposed Suspension System Components: Furnish quantity of each exposed suspension component equal to 2.0 percent of amount installed.

END OF SECTION 09 54 00

SECTION 09 65 13.13 RESILIENT BASE

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes requirements including but not limited to:
 - 1. Rubber base.
 - 2. Accessories necessary for a complete installation.

1.3 SUBMITTALS

- A. Product Data: Technical data for each type of product including manufacturer's installation instructions.
- B. Samples: Sample of Base Selected or Color Chart if none selected.
- C. Maintenance Data: Submit for inclusion in maintenance manuals.

1.4 QUALITY ASSURANCE

- A. Installer Qualifications: Entity having minimum 5 years documented experience who employs workers competent in techniques required by manufacturer for floor tile installation and seaming method indicated.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Store base and installation materials in dry spaces protected from the weather, with ambient temperatures maintained within range recommended by manufacturer, but not less than 50 degrees F (10 degrees C) or more than 85 degrees F (29 degrees C). Store floor tiles on flat surfaces.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Basis of Design Product:
 - 1. Manufacturers and tile series, pattern, and color selections are indicated in the Finish Schedule and are a basis of design. Subject to compliance with requirements, provide product indicated in Finish Schedule or comparable product by one of the following:
 - a. Flexco Floors.
 - b. Johnsite, a division of Tarkett Group.
 - c. Mannington Commercial.
 - d. Roppe.
- B. Rubber Base - ASTM F1861:
 - 1. Material: Rubber, vulcanized, Type TS, Group I, Styles A and B.
 - 2. Manufacturing Method: Group I (solid, homogeneous).
 - 3. Style: Topset cove; minimum 100 foot coil, cut to length required.

4. Minimum Thickness: 0.125 inch (3.2 mm).
 5. Color: Selected by Architect.
 6. Height: 4 inches, unless otherwise indicated on drawings.
 7. Outside Corners: Job formed.
 8. Inside Corners: Job formed.
- C. Adhesives: Water resistant type recommended by floor tile and adhesive manufacturers to suit floor tile and substrate conditions indicated.

PART 3 EXECUTION

3.1 FIELD CONDITIONS

- A. Maintain ambient temperatures within range recommended by manufacturer, but not less than 70 degrees F (21 degrees C) or more than 85 degrees F (29 degrees C), in spaces to receive floor tile during the following time periods:
1. 48 hours before installation.
 2. During installation.
 3. 48 hours after installation.
- B. After installation and until Substantial Completion, maintain ambient temperatures within range recommended by manufacturer, but not less than 55 degrees F (13 degrees C) or more than 95 degrees F (35 degrees C).
- C. Close spaces to traffic for 48 hours after installation.

3.2 EXAMINATION

- A. Examine substrates for compliance with requirements for maximum moisture content and other conditions affecting performance of the work:
1. Verify that finishes of substrates comply with tolerances and other requirements specified for other work and that substrates are free of cracks, ridges, depressions, scale, and foreign deposits that might interfere with adhesion of floor tile.
- B. Proceed with installation after correcting unsatisfactory conditions. Installation of resilient flooring and accessories indicates acceptance of surfaces and conditions.

3.3 PREPARATION

- A. Immediately before installation, sweep clean substrates to be covered by resilient base.

3.4 INSTALLATION

- A. Comply with manufacturer's written instructions for installing flooring. Scribe and cut flooring to butt neatly and tightly to vertical surfaces, permanent fixtures, and built in furniture including cabinets, pipes, outlets, edgings, thresholds, and nosings. Extend flooring into toe spaces, door reveals, closets, and similar openings.
- B. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on flooring as marked on substrates. Use chalk or other nonpermanent marking device.
- C. Resilient Base:
1. Comply with manufacturer's written instructions for installing resilient base. Apply resilient base to walls, columns, pilasters, casework and cabinets in toe spaces, and

other permanent fixtures in rooms and areas where base is required:

- a. Install resilient base in lengths as long as practical without gaps at seams and with tops of adjacent pieces aligned.
- b. Tightly adhere resilient base to substrate throughout length of each piece, with base in continuous contact with horizontal and vertical substrates.
- c. Do not stretch resilient base during installation.
- d. On masonry surfaces or other similar irregular substrates, fill voids along top edge of resilient base with manufacturer's recommended adhesive filler material.
- e. Preformed Corners: Install preformed corners before installing straight pieces.
- f. Job Formed Corners:
 - 1) Outside Corners: Use straight pieces of maximum lengths possible and form with returns not less than 3 inches (76 mm) in length.
 - 2) Form without producing discoloration (whitening) at bends.
 - 3) Inside Corners: Use straight pieces of maximum lengths possible and form with returns not less than 3 inches (76 mm) in length:
 - a) Miter or cope corners to minimize open joints.

END OF SECTION 09 65 13.13

SECTION 09 65 23 LUXURY VINYL TILE

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes requirements limited to:
 - 1. Luxury vinyl floor tile.
 - 2. Accessories necessary for a complete installation.
- B. Related Sections:
 - 1. Section 03 30 00: Cast-In-Place Concrete.
 - 2. Section 09 65 13.13: Resilient Base.

1.3 SUBMITTALS

- A. Product Data: Technical data for each type of product including manufacturer's installation instructions.
- B. Shop Drawings - For each type of floor tile. Include floor tile layouts, edges, columns, doorways, enclosing partitions, built in furniture, cabinets, and cutouts:
 - 1. Show details of special patterns.
- C. Samples - Full size units of each color and pattern of floor tile required:
 - 1. Luxury Vinyl Tile (LVT) flooring: Tile in each size and color selected and 12-inch-long piece of base material in each color selected for approval.
- D. Product Schedule: Submit for floor tile using same designations indicated on Drawings.
- E. Maintenance Data: Submit for inclusion in maintenance manuals.
- F. Reports: Certified Moisture Testing Results.
- G. Sample of luxury vinyl tile for Owner's approval must be submitted 7 days prior to bid date. Luxury Vinyl Tile must meet or exceed minimum specifications below.

1.4 WARRANTY

- A. Warranty to be sole source responsibility of the Manufacturer. Second source warranties and warranties that involve parties, other than the resilient manufacturer, are unacceptable.
- B. If the product fails to perform as warranted when properly installed and maintained, the affected area will be repaired or replaced.
- C. Warranty shall be for a period of not less than ten (10) years.
- D. The non-prorated ten (10) year minimum warranty shall cover against and specifically define the following:

1. Manufactured defects:
 - a. Free from manufactured defects in a period of warrant.
2. Wear:
 - a. Wear due to normal traffic.

1.5 DELIVERY

- A. Deliver goods to job site in manufacturer's bundles, clearly marked as to size, dye lot and materials.
- B. Schedule delivery to allow sufficient time for examination of materials by Owner five (5) days before installation begins.

PART 2 PRODUCTS

2.1 LUXURY VINYL TILE (LVT)

- A. Performance Requirements
 1. Class I - Interior Floor Finish per NFPA 101 6.5.2
 2. Critical Radiant Flux - Minimum 0.45 watts per square centimeter per NFPA 253 "Standard Method of Test for Critical Radiant Flux of Floors Covering Systems Using a Radiant Heat Energy Source".
 3. Class A Interior Finish Material per ASTM E84 - "Method of Test for Surface Burning."
 4. Characteristics of Building Materials:
 - b. Flame Spread – 0.
 - c. Smoke Developed – 450.

PART 3 EXECUTION

3.1 FIELD CONDITIONS

- A. Maintain ambient temperatures within range recommended by manufacturer, but not less than 70 degrees F (21 degrees C) or more than 85 degrees F (29 degrees C), in spaces to receive floor tile during the following time periods:
 1. 48 hours before installation.
 2. During installation.
 3. 48 hours after installation.
- B. After installation and until Substantial Completion, maintain ambient temperatures within range recommended by manufacturer, but not less than 55 degrees F (13 degrees C) or more than 95 degrees F (35 degrees C).
- C. Close spaces to traffic during floor tile installation.
- D. Close spaces to traffic for 48 hours after floor tile installation.
- E. Where demountable partitions, cabinets, and similar items are indicated for installation on top of resilient tile flooring, install tile before these items are installed.
- F. Do not install flooring over concrete slabs until slabs have cured and are sufficiently dry to bond with adhesive, as determined by flooring manufacturer's recommended bond and moisture test.

- G. Install flooring after other finishing operations, including painting, have been completed.

3.2 EXTRA STOCK

- A. Furnish extra materials matching products installed and packaged with protective covering for storage and identified with labels describing contents:
1. LVT Flooring: 1 percent of quality installed or 2 full unopened containers, whichever is greater.

3.3 EXAMINATION

- A. Examine substrates for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work:
1. Verify that finishes of substrates comply with tolerances and other requirements specified for other Work and that substrates are free of cracks, ridges, depressions, scale, and foreign deposits that might interfere with adhesion of floor tile.
- B. Proceed with installation after correcting unsatisfactory conditions. Installation of resilient flooring and accessories indicates acceptance of surfaces and conditions.

3.4 PREPARATION

- A. Prepare substrates according to floor tile manufacturer's written instructions to ensure adhesion of resilient products.
- B. Concrete Substrates - Prepare according to ASTM F710:
1. Verify substrates are dry and free of curing compounds, sealers, and hardeners.
 2. Remove substrate coatings and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by floor tile manufacturer. Do not use solvents.
 3. Alkalinity and Adhesion Testing: Perform tests recommended by floor tile manufacturer. Proceed with installation only after substrate alkalinity falls within range on pH scale recommended by manufacturer in writing, but not less than 5 or more than 9 pH.
 4. Moisture Testing - Proceed with installation only after substrates pass testing according to floor tile manufacturer's written recommendations, but not less stringent than the following:
 - a. Perform anhydrous calcium chloride test according to ASTM F1869. Proceed with installation only after substrates have maximum moisture-vapor-emission rate of 3 lb of water/1000 sq. ft. (1.36 kg of water/92.9 sq. m) in 24 hours.
 - b. Perform relative humidity test using in situ probes according to ASTM F2170. Proceed with installation only after substrates have a maximum **95** percent relative humidity level.
 5. Bond Test: Bond 3' x 3' panels spaced 50 feet apart throughout subfloor area. After moisture test proves floor acceptably dry, install panels using adhesive. If panels are securely bonded after 72 hours, subfloor is sufficiently clean of foreign materials for satisfactory installation of resilient flooring.
- C. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound; remove bumps and ridges to produce a uniform and smooth substrate.
- D. Do not install floor tiles until they are the same temperature as the space where they are to be installed:
1. At least 48 hours in advance of installation, move resilient floor tile and installation materials into spaces where they will be installed.

- E. Immediately before installation, sweep and vacuum clean substrates to be covered by resilient floor tile.

3.5 INSTALLATION

- A. Comply with manufacturer's written instructions for installing flooring. Scribe and cut flooring to butt neatly and tightly to vertical surfaces, permanent fixtures, and built in furniture including cabinets, pipes, outlets, edgings, thresholds, and nosings. Extend flooring into toe spaces, door reveals, closets, and similar openings.
- B. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on flooring as marked on substrates. Use chalk or other nonpermanent marking device.
- C. Lay out floor tiles from center marks established with principal walls, discounting minor offsets, so tiles at opposite edges of room are of equal width. Adjust as necessary to avoid using cut widths that equal less than one-half tile at perimeter:
 - 1. Lay tiles square with room axis.
- D. Match floor tiles for color and pattern by selecting tiles from cartons in the same sequence as manufactured and packaged, if so numbered. Discard broken, cracked, chipped, or deformed tiles:
 - 1. Lay tiles with grain running in one direction.
- E. Scribe, cut, and fit floor tiles to butt neatly and tightly to vertical surfaces and permanent fixtures including built in furniture, cabinets, pipes, outlets, and door frames.
- F. Extend floor tiles into toe spaces, door reveals, closets, and similar openings. Extend floor tiles to center of door openings.
- G. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on floor tiles as marked on substrates. Use chalk or other nonpermanent marking device.
- H. Install floor tiles on covers for telephone and electrical ducts, building expansion-joint covers, and similar items in finished floor areas. Maintain overall continuity of color and pattern between pieces of tile installed on covers and adjoining tiles. Tightly adhere tile edges to substrates that abut covers and to cover perimeters.
- I. Adhere floor tiles to flooring substrates using a full spread of adhesive applied to substrate to produce a completed installation without open cracks, voids, raising and puckering at joints, telegraphing of adhesive spreader marks, and other surface imperfections.
- J. Floor Tile - Comply with manufacturer's written instructions for installing floor tile:
 - 1. Lay out floor tiles from center marks established with principal walls, discounting minor offsets, so tiles at opposite edges of room are of equal width. Adjust as necessary to avoid using cut widths that equal less than one-half tile at perimeter:
 - a. Lay tiles square with room axis unless pattern indicated for an area.
 - 2. Match floor tiles for color and pattern by selecting tiles from cartons in the same sequence as manufactured and packaged, if so numbered. Discard broken, cracked, chipped, or deformed tiles. Lay tiles with grain running in one direction.
- K. Resilient Accessories - Comply with manufacturer's written instructions for installing resilient accessories:
 - 1. Resilient Molding Accessories: Butt to adjacent materials and tightly adhere to

substrates throughout length of each piece. Install reducer strips at edges of floor covering that would otherwise be exposed.

3.6 CLEANING AND PROTECTION

- A. Comply with manufacturer's written instructions for cleaning and protecting floor tile.
- B. Perform the following operations immediately after completing floor tile installation:
 - 1. Remove adhesive and other blemishes from exposed surfaces.
 - 2. Sweep and vacuum surfaces thoroughly.
 - 3. Damp mop surfaces to remove marks and soil.
- C. Protect floor tile from mars, marks, indentations, and damage from construction operations and placement of equipment and fixtures during remainder of construction period.
- D. Floor Polish: Remove soil, adhesive, and blemishes from floor tile surfaces before applying liquid floor polish. Apply two coat(s).
- E. Sealers and Finish Coats:
 - 1. Remove soil, visible adhesive, and surface blemishes from resilient terrazzo floor tile surfaces before applying liquid cleaners, sealers, and finish products:
 - a. Sealer: Apply two base coats of liquid sealer.
 - b. Finish: Apply two coats of liquid floor finish.
- F. Cover floor tile until Substantial Completion.
- G. Clean floor surfaces not more than 4 days before dates scheduled for inspections intended to establish date of Substantial Completion in each area of Project. Clean products according to manufacturer's written recommendations:
 - 1. Before cleaning, strip protective floor polish.
 - 2. Reapply polish to floor surfaces to restore protective floor finish according to flooring manufacturer's written recommendations.

END OF SECTION 09 65 23

SECTION 09 67 00 EPOXY FLOORING

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Work of this Section includes all labor, materials, equipment and services necessary to complete epoxy flooring incorporating color coated quartz aggregate and integral cove base as selected on drawings and/or specified herein.
- B. Related Sections:
 - 1. Section 03 30 00: Cast-In-Place Concrete.
- C. Reference Standards:
 - 1. ACI 302, 224, 503 and other applicable standards.

1.3 SUBMITTALS

- A. Product Data: Submit manufacturer's technical data application instructions and general recommendations for decorative colored quartz troweled epoxy flooring specified herein.
- B. Samples for initial selection purposes in form of manufacturer's color charts showing range of standard colors available.
- C. Submit 4" x 4" samples in colored quartz aggregate combination as selected.
- D. Material certificates signed by manufacturer certifying that the decorative colored quartz troweled epoxy flooring submitted complies with requirements specified herein.
- E. Maintenance Instructions: Submit manufacturer's written instructions for recommended maintenance practices.

1.4 QUALITY ASSURANCE

- A. Installer Qualifications: Engage an experienced installer or applicator who has specialized in installing resinous flooring types similar to that required for this Project and who is acceptable to manufacturer of primary materials.
- B. Single-Source Responsibility: Obtain epoxy component of flooring materials, including primers, resins, hardening agents, and finish or sealing coats, from a single manufacturer. Obtain color coated quartz aggregate from primary manufacturer of that product.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials in original packages and containers with seals unbroken and bearing manufacturer's labels containing brand name and directions for storage and mixing with other components.
- B. Store materials to comply with manufacturer's directions to prevent deterioration from

moisture, heat, cold, direct sunlight, or other detrimental effects.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Decorative colored quartz troweled epoxy flooring shall be **Dex-O-Tex, Decor-Flor** as manufactured by Crossfield Products Corp., in Rancho Dominguez, California and Roselle Park, New Jersey.

2.2 PROPERTIES

- A. Colors: As indicated, or if not otherwise indicated, as selected by Architect from manufacturer's standard color combinations.
- B. Physical Properties - Provide flooring system that meets or exceeds the listed minimum physical property requirements when tested according to the referenced standard test method in parentheses:
1. Typical Physical Properties At 75°F (24°C):
 - Compressive Strength** ASTM C579 10,500 psi
(Resin, Hardener & Aggregate)
 - Compressive Strength** ASTM D695 12,900 psi
(Resin & Hardener)
 - Tensile Strength** ASTM C307 1,800 psi
(Resin, Hardener & Aggregate)
 - Tensile Strength** ASTM D638 5,000 psi
(Resin & Hardener)
 - Abrasion Resistance** ASTM D4060
(CS17, 1000gr load, 1000 cycles)..... 0.04 gr
 - Flammability** ASTM D635 Self-Extinguishing
Bonded to Concrete

2.3 SUPPLEMENTAL MATERIALS

- A. Waterproofing Membrane: Type recommended or produced by manufacturer of epoxy resin composition flooring system for type of service and floor condition indicated.
- B. Anti-Microbial Additive: Incorporate antimicrobial chemical additive to control growth of algae, bacteria, fungi, mildew and mold.
- C. Moisture Mitigation System: Concrete, especially slab on grade should be tested in accordance with ASTM F1869. If pounds exceed flooring limit remedial action must be taken.
- D. Penetrating Liquid Floor Treatment:
1. Clear, chemically reactive, waterborne solution of inorganic silicate or silicate materials and proprietary components; odorless; that penetrates, hardens, and densifies concrete surfaces:
 - a. Basis-of-Design Product: Subject to compliance with requirements, provide Moxie International Inc.; **Moxie Shield 1500 Concrete Sealer or Moxie Shield MFSII Flooring Sealer**, P.O. Box 838 Loomis, CA 95650; Contact Manufacturer's representative: P:916-251-0825, F: 877-330-1930 Email: info@moxieshield.com

- b. Products shall comply with the requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

PART 3 EXECUTION

3.1 PROJECT CONDITIONS

- A. Environmental Conditions: Comply with epoxy resin composition flooring manufacturer's directions for maintenance of ambient and substrate temperature, moisture, humidity, ventilation, and other conditions required to execute and protect work.
- B. Lighting: Permanent lighting will be in place and working before installing decorative quartz epoxy flooring.

3.2 INSPECTION

- A. Examine the areas and conditions where decorative quartz epoxy flooring is to be installed and notify the Architect of conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions have been corrected by the Contractor in a manner acceptable to the Architect.

3.3 PREPARATION

- A. Substrate: Perform preparation and cleaning procedures according to flooring manufacturer's instructions for particular substrate conditions involved, and as specified. Provide clean, dry, and neutral substrate for flooring application.
- B. Concrete Surfaces: Shot-blast, grind or power scarify as required to obtain optimum bond of flooring to concrete. Profile should match published International Concrete Repair Institute (ICRI) Guideline No. 03731 Guide for Selecting and Specifying Concrete Surface Preparation for Sealers, Coatings and Polymer Overlays. Remove sufficient material to provide a sound surface, free of laitance, glaze, efflorescence, and any bond-inhibiting curing compounds or form release agents. Remove grease, oil, and other penetrating contaminants. Repair damaged and deteriorated concrete to acceptable condition. Leave surface free of dust, dirt, laitance, and efflorescence.
- C. Materials: Mix epoxy resin/hardener components when required and prepare materials according to flooring system manufacturer's instructions.

3.4 APPLICATION

- A. General: Apply each component of decorative colored quartz troweled epoxy flooring system according to manufacturer's directions to produce a uniform monolithic flooring surface of thickness indicated.
- B. Troweled Colored Quartz Troweled Flooring System: Mix resin, hardener and blended colored quartz aggregate per the manufacturer's instruction and place a sufficient amount of material to obtain the specified thickness.
- C. Grout coat: Grout the Troweled Colored Quartz Epoxy Flooring System to fill the indices (voids) in the system, which may require one or more grout coats depending on surface porosity.
- D. Finish or Sealing Coats: After grout coat(s) has cured sufficiently, apply finish coats of type

recommended by flooring manufacturer to produce finish matching approved submittal sample and in number of coats and spreading rates recommended by manufacturer.

- E. Finished floor shall be 3/16"-1/4" thick, uniform in color and free of excessive trowel marks.
- F. Cove Base: Apply cove base mix to wall surfaces at locations specified at a height of 4 inches unless otherwise indicated. Follow manufacturer's printed instructions and details including taping, mixing, priming, troweling, sanding, and top-coating of cove base.

3.5 CURING, PROTECTION, AND CLEANING

- A. Cure decorative quartz epoxy flooring materials according to manufacturer's directions, taking care to prevent contamination during application stages and before completing curing process. Close application area for a minimum of 24 hours.

END OF SECTION 09 67 00

SECTION 09 68 00 CARPETING

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes requirements including but not limited to:
 - 1. Carpet and pad.
 - 2. Rubber Base
 - 3. Accessories necessary for a complete installation.
- B. Related Sections:
 - 1. Section 03 30 00: Cast-in-Place Concrete.
 - 2. Section 09 30 00: Tiling.

1.3 PERFORMANCE REQUIREMENTS

- A. Pursuant to CBC Sections 11B-302.2 and 11B-303:
 - 1. Carpet shall be securely attached and shall have a firm, or no, cushion, pad, or backing. It shall have a level loop, textured loop, level cut pile, or level cut/uncut pile texture. Pile height shall be ½ inch maximum.
 - 2. Exposed edges shall be fastened to floor surfaces and shall have trim on the entire length.

1.4 SUBMITTALS

- A. Product Data - Technical data including installation recommendations for each type of substrate:
 - 1. Carpet: For each type indicated. Include manufacturer's written data on physical characteristics, durability, and fade resistance.
- B. Samples - For each products and for each color and texture required. Label each Sample with manufacturer's name, material description, color, pattern, and designation indicated on Drawings and in schedules:
 - 1. Carpet: 12 inch (300 mm) square Sample from approved color and product of carpet.
 - 2. Exposed Edge, Transition, and Other Accessory Stripping: 12 inch (300 mm) long Samples.
 - 3. Carpet Seam: 6 inch (150 mm) Sample.
 - 4. Mitered Carpet Border Seam: 12 inch (300 mm) square Sample. Show carpet pattern alignment.
 - 5. Carpet base and accessory samples.
- C. Product Test Reports: For carpet and carpet cushion, for tests performed by a qualified testing agency.
- D. Shop Drawings: Showing extent of product, seam direction, and location and type of carpet accessories. Submittal to indicate columns, doorways, enclosing walls or partitions, casework, and locations where cutouts are required.

- E. Maintenance Data - For carpet to include in maintenance manuals. Include the following:
 - 1. Methods for maintaining carpet, including cleaning and stain-removal products and procedures and manufacturer's recommended maintenance schedule.
 - 2. Precautions for cleaning materials and methods that could be detrimental to carpet and carpet cushion.

1.5 QUALITY ASSURANCE

- A. Regulatory Requirements:
 - 1. Fire Test Response Characteristics: Provide products with the critical radiant flux classification determined by testing identical products in accordance with ASTM E648. Critical Radiant Flux Classification: Class I, not less than 0.45 W/sq. cm.
 - 2. Accessibility Requirements - Comply with applicable requirements:
 - a. Americans with Disabilities Act of 1990, as amended:
 - 1) ADA Title II Regulations & the 2010 ADA Standards for Accessible Design
 - 2) 2010 ADA regulations.
 - b. 2022 California Building Code (CBC) (CCR Title 24, Part 2, as adopted and amended by DSA):
 - 1) CBC Chapter 11B, Access to Public Buildings, Public Accommodations, Commercial Buildings and Public Housing.
 - 3. AQMD - Air Quality Management District, Local Regulations.
 - 4. CRI – Carpet and Rug Institute Green Label Plus.
 - 5. Carpet shall have level loop, textured loop, or level-cut/uncutpile texture, firm cushion, pad or backing (or no cushion or pad) and maximum pile height of 1/2 inch in accordance with CBC Section 11B-302.2. Carpet edges shall comply with CBC 11B-302.2 and carpet trim to CBC Section 11B-303.
- B. Installer Qualifications: Installer having minimum 5 years' documented experience as a commercial carpet installer, who is certified by the International Certified Floorcovering Installers Association at the Commercial II or higher certification level.
- C. Contractor is required to achieve the specified concrete moisture content prior to installation of all flooring materials or use a flooring manufacture approved moisture barrier prior to installation of all flooring products.
- D. Pre-installation Conference

1.6 WARRANTY

- A. Written warranty in which manufacturer agrees to repair or replace components of carpet installation that fail in materials or workmanship within specified warranty period:
 - 1. Warranty does not include deterioration or failure of carpet due to unusual traffic, failure of substrate, vandalism, or abuse.
 - 2. Failures include, but are not limited to, more than 10 percent loss of face fiber, edge raveling, snags, runs, loss of tuft bind strength, dimensional stability, excessive surface wear, excess static discharge, and delamination.
 - 3. Warranty Period: 25 years from date of Substantial Completion.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Comply with CRI 104.
- B. Store in a dry location between 65 degrees F and 90 degrees F and a relative humidity below 65%. Protect from damage and soiling. Stack carpet rolls horizontally, elevated

above slab level on a flat surface, stacked no higher than two rolls.

- C. Store materials in area of installation for minimum period of 48 hours prior to installation.
- D. Protect carpet from damage, dirt, stains, and moisture.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Basis of Design - Carpet series and patterns indicated on Finish Schedule. Subject to compliance with requirements, provide products by one or more of the following:
 - 1. Tandus-Centiva. Basis of Design
 - 2. Mohawk Group.
 - 3. Shaw Contract Group
 - 4. Interface, LLC.
 - 5. Mannington Mills.
 - 6. Milliken & Company.
 - 7. Bentley Mills.
- B. Rubber Base:
 - 1. Basis of Design: Flexco Floors.
 - 2. Roppe.
 - 3. Johnsonite; a division of Tarkett Group.
 - 4. Mannington Commercial.
- C. Carpet:
 - 1. Performance:
 - a. Appearance Retention Rating: Severe traffic, 3.5 minimum according to ASTM D7330.
 - b. Critical Radiant Flux Classification: Not less than 0.45 W/sq. cm according to NFPA 253.
 - c. Dry Breaking Strength: Not less than 100 lbf (445 N) according to ASTM D2646.
 - d. Delamination: Not less than 4 lbf/in. (18 N/mm) per ASTM D3936.
 - e. Tuft Bind: Not less than 5 lbf (22 N) according to ASTM D1335.
 - f. Colorfastness to Crocking: Not less than 4, wet and dry, according to AATCC TM165.
 - g. Colorfastness to Light: Not less than 4 after 40 AFU (AATCC fading units) according to AATCC TM16, Option E.
 - h. Antimicrobial Activity: Not less than 2-mm halo of inhibition for gram-positive bacteria; not less than 1-mm halo of inhibition for gram-negative bacteria; no fungal growth; per AATCC TM174.
 - i. Electrostatic Propensity: Less than 3.5 kV according to AATCC TM134.
 - j. Emissions: Provide carpet that complies with testing and product requirements of CRI Green Label Plus.
 - k. Backing: Standard with manufacturer.
 - 2. Face Construction:
 - a. Width: Six (6) feet.
 - b. Construction: Level Loop.
 - c. Gauge: 1/13.
 - d. Pile Units per Inch: 8.2.
 - e. Pile Height Average: 0.117 inch.
 - f. Tuft Density: 104.96.
 - g. Cushion Roll Goods (RS), Total Weight: 81.0 ounces per square yard.
 - h. Fiber Content: TDX Nylon Type 6,6.

- i. Dye Method: 50% Solution Dyed/50% Yarn Dyed.
 - 3. Basis of Design - Powerbond Cushion Backing System by Tandus:
 - a. Primary Tufting Substrate: Synthetic nonwoven.
 - b. Fusion Coat: Sealant Vinyl.
 - c. Backing - Closed-Cell Vinyl Cushion:
 - 1) Weight: 35.5 ounces per square yard.
 - 2) Density: 18.5 lbs. per cubic foot.
 - 3) Thickness: 5/32 inch.
 - 4) Compression Set: Maximum 10 percent.
 - 5) Compression Deflection:
 - a) Maximum 7 lbs. per square inch at 25 percent.
 - b) Maximum 25 lbs. per square inch at 25 percent.
 - d. Adhesive System: Microencapsulated Tackfier applied to 100 percent during manufacturing.
 - 4. Total Product Weight - RS 83.0 ounces per square yard plus or minus 5 percent.
Product Testing Information:
 - a. Surface Flammability: Passes CPSC FF-1-70 (ASTM D2859).
 - b. Flooring Radiant Panel: Class 1 (mean average CRF: 0.45 watts per square centimeter or higher (ASTM E648).
 - c. Electrostatic Propensity: 3.0 kV or lower. Permanent Conductive Fiber (AATCC TM134).
 - d. Color(s): As selected by Architect.
 - e. Locations: Indicated on drawings.
 - 5. Manufacturer: Applause III manufactured by Tandus Commercial Floor Systems.
- D. Applied Soil Resistance Treatment: Standard with manufacturer.
- E. Antimicrobial Treatment: Standard with manufacturer.
- F. Adhesives: Water resistant, mildew resistant, nonstaining, pressure sensitive type to suit products and subfloor conditions indicated, complying with flammability requirements for installed carpet and is recommended by carpet manufacturer for releasable installation.
- G. Trowelable Leveling and Patching Compounds: Latex modified, hydraulic cement based formulation provided or recommended by carpet cushion manufacturer.
- H. Adhesives: Water resistant, mildew resistant, nonstaining type to suit products and subfloor conditions indicated, that complies with flammability requirements for installed carpet and is recommended or provided by carpet and carpet cushion manufacturers.
- I. Seam Adhesive: Hot melt adhesive tape or similar product recommended by carpet manufacturer for sealing and taping seams and butting cut edges at backing to form secure seams and to prevent pile loss at seams.
- J. Metal Edge/Transition Strips: Extruded aluminum with mill finish of profile and width shown, of height required to protect exposed edge of carpet, and of maximum lengths to minimize running joints and provide accessible transitions. (11B-302)
- K. Extra Carpet: After completion of the carpet installation, the carpet subcontractor shall provide an additional three (3) percent of total yards installed of each carpet specified to the Owner for future carpet replacement that may be required. This extra stock is to be unused rolls, tiles, and mats and does not include scraps.

PART 3 EXECUTION

3.1 FIELD CONDITIONS

- A. Comply with CRI 104 for temperature, humidity, and ventilation limitations.
- B. Environmental Limitations: Do not deliver or install carpet and carpet cushion until spaces are enclosed and weathertight, wet work in spaces is complete and dry, and ambient temperature and humidity conditions are maintained at occupancy levels during the remainder of the construction period.
- C. Do not install carpet and carpet cushion over concrete slabs until slabs have cured, are sufficiently dry to bond with adhesive, and have pH range recommended by carpet manufacturer.
- D. Where demountable partitions or other items are indicated for installation on top of carpet, install carpet before installing these items.

3.2 COORDINATION

- A. Contractor's responsibility to hire movers to move furniture as required for flooring installation. Coordinate with Owner and Architect regarding temporary furniture relocation.

3.3 EXAMINATION

- A. Examine substrates, areas, and conditions for compliance with requirements for maximum moisture content, alkalinity range, installation tolerances, and other conditions affecting carpet performance. Examine carpet for type, color, pattern, and potential defects.
- B. Concrete Subfloors -Verify that concrete slabs comply with ASTM F710 and the following:
 - 1. Slab substrates are dry and free of curing compounds, sealers, hardeners, and other materials that may interfere with adhesive bond.
 - 2. Prior to delivery of flooring materials, contractor shall conduct Calcium Chloride "dome" test to verify that concrete floors are dry with maximum moisture vapor emissions of 3 lbs. per 1000 square feet. in 24 hours, and exhibit negative alkalinity, carbonation or dusting. Apply moisture test in four (4) different areas of each floor location with at least one test for each 1,000 square feet of floor area.
 - 3. Prior to delivery of carpeting, conduct Relative Humidity Test Method in accordance with ASTM F2170 using a Wagner Rapid RH probe to verify relative humidity and surface pH of concrete floor slabs, the method:
 - a. Requires drilling holes at diameter not to exceed outside diameter of probe by more than 0.04 inch to depth equal to 40 percent of slab's thickness (elevated structural slab shall be tested at depth equal to 20 percent of slab thickness).
 - b. Place probe to full depth of test hole, place cap over probe.
 - c. Permit test site to acclimate, or equilibrate, for 72 hours prior to taking relative humidity readings.
 - d. Remove cap and press button on the probe to obtain reading.
 - e. Relative humidity readings for substrates receiving non-permeable flooring are 75% or lower.
 - 4. Testing shall require 3 tests in first 1,000 square feet, with one additional test per each additional 1,000 square feet of concrete slab surface.
 - 5. Alkalinity Testing: Concrete floors shall be tested for alkalinity prior to installation of flooring. Levels of pH shall not exceed written recommendations of flooring manufacturer or adhesive manufacturer, or both.
 - 6. Delivery of flooring materials and beginning of installation means acceptance of existing substrate and site conditions.
 - 7. Subfloor finishes comply with requirements specified in Section 03 30 00: Cast-In-

Place Concrete for slabs receiving carpet.

8. Subfloors are free of cracks, ridges, depressions, scale, and foreign deposits.
9. Install Vapor Emission Treatment Systems where tests reveal presence of more than acceptable moisture level in accordance with Test Method ASTM F1869 or ASTM F2170.

C. Proceed with installation after correcting unsatisfactory conditions.

3.4 PREPARATION

- A. Comply with CRI 104, Section 7.3 *Site Conditions; Floor Preparation* and with carpet manufacturer's written installation instructions for preparing substrates.
- B. Use trowelable leveling and patching compounds, according to manufacturer's written instructions, to fill cracks, holes, depressions, and protrusions in substrates. Fill or level cracks, holes and depressions 1/8 inch (3 mm) wide or wider, and protrusions more than 1/32 inch (0.8 mm), unless more stringent requirements are required by manufacturer's written instructions.
- C. Remove coatings, including curing compounds, and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, without using solvents. Use mechanical methods recommended in writing by carpet and cushion manufacturer.
- D. Broom and vacuum clean substrates to be covered immediately before installing carpet.

3.5 INSTALLATION

- A. Comply with CRI 104 and carpet and carpet cushion manufacturer written installation instructions for the following:
 1. Direct Glue Down Installation: Comply with CRI 104, Section 9 *Direct Glue Down Installation*.
 2. Stair Installation: Comply with CRI 104, Section 13 *Carpet on Stairs* for glue down installation.
- B. Comply with carpet manufacturer's written recommendations and Shop Drawings for seam locations and direction of carpet; maintain uniformity of carpet direction and lay of pile. At doorways, center seams under the door in closed position:
 1. Do not bridge building expansion joints with carpet.
 2. Cut and fit carpet to butt tightly to vertical surfaces, permanent fixtures, and built-in furniture including cabinets, pipes, outlets, edgings, thresholds, and nosings. Bind or seal cut edges as recommended by carpet manufacturer.
 3. Extend carpet into toe spaces, door reveals, closets, open-bottomed obstructions, removable flanges, alcoves, and similar openings.
- C. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on finish flooring as marked on subfloor. Use nonpermanent, nonstaining marking device.
- D. Install pattern parallel to walls and borders to comply with CRI 104, Section 15, *Patterned Carpet Installations* and with carpet manufacturer's written recommendations.
- E. Install in accordance with CBC Section 11B-302.2

3.6 CLEANING AND PROTECTING

- A. Perform cleaning operations immediately after installing carpet:
 - 1. Remove excess adhesive, seam sealer, and other surface blemishes using cleaner recommended by carpet manufacturer.
 - 2. Remove yarns that protrude from carpet surface.
 - 3. Vacuum carpet using commercial machine with face beater element.
- B. Protect installed carpet to comply with CRI 104, Section 16, *Protecting Indoor Installations*.
- C. Protect carpet against damage from construction operations and placement of equipment and fixtures during the remainder of construction period. Use protection methods indicated or recommended in writing by carpet manufacturer and carpet cushion manufacturer

END OF SECTION 09 68 00

SECTION 09 72 00 ACOUSTICAL WALL PANELS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Acoustic Wall Panels.
 - 2. Accessories.

1.3 SUBMITTALS

- A. Submit shop drawings and product data under provisions.
- B. Submit shop drawings showing installation and fastening detail requirements, all in accordance with the manufacturer's installation instructions and procedures.
- C. Provide product data on wall panels, describing physical and performance characteristics, sizes, and color.
- D. Submit two samples, 12 x 12 inches, illustrating color and texture of material.
- E. Submit manufacturer's installation instructions.
- F. Submit test data showing conformance with California Building Code, 2022 edition.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Store materials for 24 hours prior to installation to achieve temperature stability.
- B. Store product in a dry place. Do not let product come into contact with water.
- C. If covered, product must be allowed to breathe, so as to prevent moisture condensation.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Tectum Inc.

2.2 ACOUSTICAL WALL PANELS

- A. Tectum Fabri-Tough Wall Panel System, color as selected by Architect.
- B. Panels, 1" thick, square edge, cloth surface, color as selected by Architect.
- C. Incombustibility: Class A/ASTM E84, Flame spread <25 and smoke density <450.

- D. CBC Standard 8-2 fire test for non-sprinklered areas.

2.3 ACCESSORIES

- A. Fasteners and Metal Trim: As recommended by manufacturer for attachment to existing concrete masonry or wood framed walls.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify that surfaces are smooth and flat with maximum variation of 1/8 inch in 10 foot, and are ready to receive work of this section.
- B. Beginning of installation means acceptance of existing substrate.
- C. Installation:
 - 1. Install in accordance with manufacturer's instructions.
 - 2. Installation system shall be a concealed spline.
 - 3. Contractor shall remove, relocate and reinstall existing wall mounted items such as conduit, switches, clocks, speakers, outlets, etc. which are in conflict with the acoustic wall panel locations.
 - 4. Contractor shall provide and install extensions for items such as outlet and switch backboxes to remain in place where new acoustical wall panels are to be installed.
 - 5. Cut and trim acoustic wall panels around surface mounted items which are not shown to be or cannot physically be relocated.

END OF SECTION 09 72 00

SECTION 09 90 00 PAINTING AND COATING

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes requirements including but not limited to:
 - 1. Surface preparation and field painting of exposed items and surfaces.
 - 2. Field preparation and painting of factory primed metal products and fabrications.
 - 3. Accessories necessary for a complete installation.

1.3 DEFINITIONS

- A. Standard coating terms defined in ASTM D16 apply:
 - 1. Flat refers to a lusterless or matte finish with a gloss range below 15 when measured at an 85-degree meter.
 - 2. Eggshell refers to low sheen finish with a gloss range between 20 and 35 when measured at a 60-degree meter.
 - 3. Satin refers to a slightly higher sheen than eggshell and more reflective and durable finish and is less lustrous than semi-gloss.
 - 4. Semigloss refers to medium sheen finish with a gloss range between 35 and 70 when measured at a 60-degree meter.
 - 5. Full gloss refers to high sheen finish with a gloss range more than 70 when measured at a 60-degree meter

1.4 SUBMITTALS

- A. Product Data:
 - 1. Submit technical data and information for block fillers, primers, paints, and coatings, including label analysis and instructions for handling, storing, and applying each coating material proposed for use:
 - a. Indicate manufacturer's instructions for special surface preparation procedures, substrate conditions requiring special attention.
 - b. Material List: Provide inclusive list of required coating materials. Indicate each material and cross reference specific coating, finish system, and application. Identify each material by manufacturer's catalog number, series, and general classification.
 - c. Submit Zero VOC compliant products only.
- B. Samples:
 - 1. Submit for each type of paint system and in each color and gloss of topcoat:
 - a. Provide stepped samples, defining each separate coat, including block fillers and primers. Use representative colors when preparing samples for review. Resubmit until required sheen, color, and texture are achieved.
 - b. Provide list of material and application for each coat of each sample. Label each sample as to location and application.
 - c. Submit samples on following substrates for review of color and texture only:
 - 1) Concrete: Provide two 4-inch square samples for each color and finish.
 - 2) Concrete Masonry: Provide two 4" x 8" samples of masonry, with mortar joint

in the center, for each finish and color.

- 3) Painted Wood: Provide two 12-inch square samples of each color and material on hardboard.
 - 4) Ferrous and Nonferrous Metals: Provide two 4-inch square samples of flat metal and two 8 inch long samples of solid metal for each color and finish.
- C. Product List: Submit list of including each paint system, color, and location of application. Use same product and location designations indicated in Finish Schedule.

1.5 QUALITY ASSURANCE

- A. Regulatory Requirements:
1. Comply with Federal and State/Local toxicity and air quality regulations and with Federal requirements on content of for heavy metals including but not limited to: lead and mercury. Do not use solvents in paint products that contribute to air pollution.
 2. Performance and Durability:
 - a. ASTM D16 Standard Test Method for Load Testing Refractory Shapes at High Temperatures.
 - b. ASTM D2486 Standard Test Method for Scrub Resistance of Interior Wall Paint.
 - c. ASTM D2805 Standard Test Method for Hiding Power of Paints by Reflectometry.
 - d. ASTM D4828 Standard Test Method for Practical Washability of Organic Coatings.
- B. Applicator Qualifications: A firm or individual having minimum 5 years documented experience in applying paints and coatings similar in material, design, and extent to those indicated.
- C. Source Limitations: Obtain block fillers and primers for each coating system from the same manufacturer as the finish coats.

1.6 WARRANTY

- A. Written warranty signed by the manufacturer and the installer in which the manufacture and installer agree to repair or replace paint and primers that fail within specified warranty period:
1. Failures include, but are not limited to, the following:
 - a. Flaking or delamination of paint with the substrate.
 - b. Rust, scale, similar imperfections due to improper surface preparation.
 - c. Thinning or watering of paint beyond that considered acceptable of paint manufacturer.
 - d. Failure to achieve dry film thickness (DFT) recommended by manufacturer for each coat in a paint system.
 - e. Deterioration or loss of color of paint beyond normal weathering.
 2. Warranty Period: One year from date of Substantial Completion.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Store materials not in use in tightly covered containers in well ventilated areas with ambient temperatures continuously maintained at not less than 45 degrees F (7 degrees C):
1. Maintain containers in clean condition, free of foreign materials and residue.
 2. Remove rags and waste from storage areas daily.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Basis of Design is **Dunn Edwards Corporation** paints. Subject to compliance with requirements, provide first quality, 100% acrylic, commercial or industrial products of one of the specified manufacturers. Residential products are not permitted:
1. Proprietary Names: Paint Schedule is based on a single manufacturer for convenience. With exception to the paint used in the theater. Use of manufacturer's proprietary product names to designate colors or materials is not intended to imply that named products are required to the exclusion of comparable products of specified manufacturers. Furnish product technical data, including per cent solids by weight and volume; VOC content limits and emissions data; and certificates of performance for comparable paint products of specified manufacturer.
 2. Other Acceptable Paint Manufacturers:
 - a. Sherwin-Williams Co.
 - b. Vista Paint
 - c. Benjamin Moore & Co.
 - d. Dulux; Theater Black.
 3. Intumescent Paint:
 - a. Fire-Retardant paint for use over combustible wood and metal material in Buildings:
 - 1) FlameOff Coatings, Inc. (Basis of Design) www.flameoffcoatings.com:
 - a) No substitution.
 4. Concrete Floors – Sealed (Low Sheen Epoxy Acrylic)
 - a. Rust-Oleum, Convenience Products Corp., Vernon Hills, IL. (877) 385-8155
 - 1) Seal Krete Concrete Sealer
 - 2) Seal Krete Primer
 - 3) Seal Krete Epoxy seal and Decorative Flakes.
 - 4) Seal Krete – Clear Sealer
- B. Material Compatibility: Provide each paint system including block fillers, primers, and finish coats, that are compatible with one another and with substrates indicated under conditions of service and application, demonstrated by manufacturer based on testing and field experience.
- C. Material Quality: Provide manufacturer's best quality commercial paint material of the various coating types specified that are factory formulated and recommended by manufacturer for application indicated. Paint material containers not displaying manufacturer's product identification will not be acceptable. Residential quality paint products are not permitted.
- D. Chemical Components of Interior Paints and Coatings:
1. Provide products complying with limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24) and SCAQMD Rule1113:
 - a. Aromatic Compounds: Paints and coatings shall not contain more than 1.0 percent by weight of total aromatic compounds (hydrocarbon compounds containing one or more benzene rings).
 - b. Restricted Components: Paints and coatings shall not contain components restricted by the EPA and the SCAQMD.
 - c. Intumescent Paint - ASTM E84 and ASTM E263 (ASTM E119) for 2 hr. ICC-ES Listed:
 - 1) Wide Flange Columns: B1077-1.
 - 2) Tube Columns: B1077.
 - 3) Pipe Columns: B1077.
 - 4) Beams: GL-N609.
- E. Accessories: Materials not specifically indicated but required to achieve the finishes specified, of commercial quality.

- F. Patching Materials: Latex filler compatible with paint systems.
- G. Fastener Head Cover Materials: Latex filler.
- H. Theater Black: No Exceptions or alternates.

2.2 SOURCE QUALITY CONTROL

- A. Testing of Paint Materials:
 - 1. Owner reserves the right to invoke to engage the services of a qualified testing agency to sample paint materials:
 - a. Contractor will be notified in advance and may be present when samples are taken. If paint materials have already been delivered to site, samples may be taken at the site. Samples will be identified, sealed, and certified by testing agency.
 - b. Testing agency will perform tests for compliance with product requirements.
 - c. Owner may direct Contractor to stop applying paints if test results show materials being used do not comply with product requirements. Contractor shall remove noncomplying paint materials from Project site, pay for testing, and repaint surfaces painted with rejected materials. Contractor will be required to remove rejected materials from previously painted surfaces if, on repainting with complying materials, the two paints are incompatible.

PART 3 EXECUTION

3.1 FIELD CONDITIONS

- A. Apply waterborne paints when temperatures of surfaces to be painted and surrounding air are between 50 degrees F and 90 degrees F (10 degrees and 32 degrees C).
- B. Do not thin or add water to waterbased paints, including waterbased alkyds.
- C. Weather Conditions:
 - 1. Do not apply materials when surface and ambient temperatures are outside the temperature ranges required by the paint product manufacturer.
 - 2. Do not apply paint in snow, rain, fog, or mist; or when the relative humidity exceeds 85 percent; or at temperatures less than 5 degrees F (3 degrees C) above dew point; or to damp or wet surfaces.
 - 3. Minimum Application Temperatures for Water based Paints: Between 50 degrees F (10 degrees C) and 90 degrees F (32 degrees C).
- D. Apply solvent thinned paints when temperatures of surfaces to be painted and surrounding air are between 45 degrees F and 95 degrees F (7 degrees F and 35 degrees C):
 - 1. Minimum Application Temperature for Varnish Finishes: 65 degrees F (18 degrees C) for interior or exterior, unless required otherwise by manufacturer's instructions.
 - 2. Painting may continue during inclement weather if surfaces and areas to be painted are enclosed and heated within temperature limits specified by the manufacturer during application and drying periods.
- E. Provide lighting level of 80-foot candles (860lx) measured midheight at substrate surface.
- F. Labels: Do not paint over Underwriters Laboratories, Factory Mutual, other code required labels, or equipment name, identification, performance rating, or nomenclature plates.

3.2 EXTRA MATERIALS

- A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents:
 - 1. Paint: 2 percent, but not less than 1 gallon (3.8 L) of each material and color applied.

3.3 EXAMINATION

- A. Examine substrates and conditions for compliance with requirements for maximum moisture content and conditions affecting performance of the work.
- B. Test substrates after repairing and cleaning substrates but prior to application of paint and coatings:
 - 1. Maximum moisture content of substrates when measured with an electronic moisture meter as follows:
 - a. Concrete: 12 percent.
 - b. Fiber Cement Board: 12 percent.
 - c. Masonry (Clay and CMUs): 12 percent.
 - d. Wood: 15 percent.
 - e. Gypsum Board: 12 percent.
 - f. Plaster: 12 percent.
 - 2. Test cementitious and plaster cement/stucco for alkalinity (pH).
- C. Gypsum Board Substrates: Verify taped joints are tapes and finishing compound is sanded smooth.
- D. Plaster Substrates: Verify plaster has fully cured. Verify existing plaster is in good condition and can receive new paint coating.
- E. Spray Textured Ceiling Substrates: Verify surfaces are dry.
- F. Verify suitability of substrates, including surface conditions and compatibility, with existing finishes and primers:
 - 1. Verify previously painted surfaces can be stripped to bare substrate, repaired if necessary, and prepared to receive new paint system consisting of primer and two top coats at a minimum:
 - a. Note: Previously painted surfaces have failed to accept new paint systems. Determined cause of failure and take corrective measures to ensure each surface accepts new paint system. Failure of new paint system is not permitted.
- G. Commence paint and coating application after correcting unsatisfactory conditions and surfaces are dry. Application of coating indicates applicator's acceptance of surfaces and conditions.

3.4 PREPARATION

- A. Coordination of Work:
 - 1. Review work in which primers are provided to ensure compatibility of the total system for various substrates. Notify Architect of anticipated problems when using materials specified over substrates primed by others:
 - a. Preprimed Substrates: Inspect existing conditions in which primers are factory applied to ensure compatibility of the total system for each substrate. Notify Architect of anticipated problems when using the materials specified over factory primed or preprimed substrates.
 - b. Existing Painted Surfaces: Inspect previously painted surfaces to ensure compatibility of the existing paints with new paint system for each substrate. Notify

Architect of anticipated problems.

- c. Correct defects and clean surfaces affecting bond with paint system. Remove existing paints exhibiting loose surface defects showing signs of rust, scale, or delamination.
- d. Seal marks which may bleed through surface finishes.

B. Surface Preparation:

- 1. Clean and prepare surfaces to be painted according to manufacturer's written instructions for each particular substrate condition and as specified. Provide barrier coats over incompatible primers or remove and reprime. If removal is impractical or impossible because of size or weight of item, provide surface applied protection before surface preparation and painting:
 - a. Remove hardware and hardware accessories, plates, lighting fixtures, and similar items that are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface applied protection before surface preparation and painting. After completing painting operations in each space or area, reinstall items removed using workers skilled in the trades involved.
 - b. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface applied protection if any.
 - c. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.
 - d. Clean and prepare surfaces to receive paint according to manufacturer's written instructions for each substrate condition and as specified. Provide barrier coats over incompatible primers, existing paint or coating, or remove and reprime.
 - e. Correct defects and clean surfaces affecting bond with paint or coating system. Remove existing coatings exhibiting loose surface defects. Seal marks which may bleed through surface finishes.

C. Cleaning:

- 1. Before applying paint or surface treatments, clean substrates of substances that could impair bond of the various coatings. Remove oil and grease before cleaning. Schedule cleaning and painting so dust and contaminants from the cleaning process will not fall on wet, newly painted surfaces:
 - a. Remove incompatible primers, including factory applied primers, and reprime substrate with compatible primers or apply barrier coat as necessary to produce paint systems indicated.
 - b. Concrete Substrates: Remove release agents, curing compounds, efflorescence, and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces to be painted exceeds that permitted in manufacturer's written instructions.
 - c. Steel Substrates: Remove rust and loose mill scale. Clean using methods recommended in writing by paint manufacturer.
 - d. Galvanized Metal Substrates: Remove grease and oil residue from galvanized sheet metal fabricated from coil stock by mechanical methods to produce clean, lightly etched surfaces that promote adhesion of subsequently applied paints.
 - e. Aluminum Substrates: Remove surface oxidation.

D. Mildew and Mold Removal: Remove mildew and mold by high power washing (pressure range of 1500 to 4000 psi) with solution of trisodium phosphate and bleach. If substrate is too soft for high power washing, scrub substrate with solution. Rinse with clean water and allow surface to dry.

E. Protective Coverings: Provide protections for duration of the work, including covering furnishings and decorative items. Protect and mask adjacent finishes and components against damage, marking, overpainting, and injury. Clean and repair or replace damage caused by painting.

F. Renovated Surfaces:

1. Clean surface free of loose dirt and dust. Except at gypsum board surfaces, remove existing paint and coatings to bare substrate and prepare substrates to receive new paint system. Test substrate to verify it will bond with primer and receive new paint system without failure. If test fails, clean surface to base substrate and apply barrier coat. Retest to verify surface will accept new paint system:
 - a. Remove surface film preventing proper adhesion and bond.
 - b. Wash glossy paint with a solution of sal soda and rinse thoroughly.
 - c. Remove loose, blistered, and defective paint and varnish; smooth edges with sandpaper.
 - d. Clean corroded iron and steel surfaces.
 - e. Repair and blend into portland cement plaster.
 - f. Prime bare surfaces.
 - g. Tone varnished surfaces with stain bringing to uniform color.
 - h. If existing surfaces cannot be put in acceptable condition for finishing by customary cleaning, sanding, and puttying operations, notify Owner and do not proceed until correcting unsatisfactory conditions.

G. Cementitious Substrates:

1. Prepare concrete surfaces to receive paint. Remove efflorescence, chalk, dust, dirt, grease, oils, release agents, mold, mildew, and existing paint. Roughen as necessary to remove glaze. If hardeners or sealers have been used to improve curing, use mechanical methods of surface preparation:
 - a. Use abrasive blast cleaning methods if recommended by paint manufacturer.
 - b. Do not paint surfaces if moisture content or alkalinity of surfaces exceeds that permitted in manufacturer's written instructions:
 - 1) Determine alkalinity and moisture content of surfaces by performing appropriate pH testing. If surfaces are sufficiently alkaline to cause the finish paint to blister and burn, correct condition prior to application of paint.
 - 2) Anhydrous Calcium Chloride Test: ASTM F1869. Proceed with installation after substrates have maximum moisture-vapor-emission rate of 3 lb of water/1000 sq. ft. (1.36 kg of water/92.9 sq. m).
 - 3) Relative Humidity Test: Using in situ probes, ASTM F2170. Proceed with installation after substrates have obtained percent relative humidity level recommended by paint manufacturer.
 - 4) Perform additional moisture tests when recommended by manufacturer. Proceed with installation when moisture content complies with that permitted in manufacturer's written instructions.
 - 5) Remove stains caused by weathering of corroding metals with solution of sodium metasilicate after thoroughly wetting with water. Allow to thoroughly dry.
 - c. Clean concrete floors to receive paint or coating with a 5 percent solution of muriatic acid or etching cleaner. Flush floors with clean water to remove acid; neutralize with ammonia, rinse, allow to dry; vacuum before painting.

H. Ferrous Metals:

1. Clean ungalvanized ferrous metal surfaces that have not been shop coated; remove oil, grease, dirt, loose mill scale, and other foreign substances. Use solvent or mechanical cleaning methods that comply with SSPC recommendations:
 - a. Blast steel surfaces clean as recommended by paint system manufacturer and according to SSPC SP6/NACE No. 3.
 - b. Treat bare and sandblasted or pickled clean metal with a metal treatment wash coat before priming.
 - c. Touch up bare areas and shop-applied prime coats that have been damaged. Wire brush, clean with solvents recommended by paint manufacturer, and touch up with same primer as the shop coat.

- d. Review Intumescent paint manufacturer requirements and apply thickness recommended or min per hour rating. See drawings for rated requirements.
- I. Galvanized Ferrous Metal Substrates: Clean galvanized surfaces with nonpetroleum based solvents leaving surface free of oil and surface contaminants. Remove pretreatment from galvanized sheet metal fabricated from coil stock by mechanical methods to produce clean, lightly etched surfaces that promote adhesion of subsequently applied paints.
- J. Shop Primed Steel Substrates: Clean field welds, bolted connections, and areas where shop paint is abraded. Paint exposed areas with the same material as used for shop priming to comply with SSPC PA1 for touching up shop primed surfaces.
- K. Aluminum Substrates: Clean surfaces to remove oil, grease, surface oxidation, and contaminants in accordance with SSPC SP1 Solvent Cleaning. Lightly abrade surface with a nonmetallic pad.
- L. Masonry Substrates: Remove efflorescence and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces or mortar joints exceeds that permitted in manufacturer's written instructions.
- M. Plaster/Stucco Substrates:
 - 1. Remove contaminants, release agents, curing compounds, efflorescence, chalk, mold, mildew, and similar deterrents. Spot patch existing plaster to eliminate blisters, buckles, excessive crazing, and to check cracking, dryouts, efflorescence, sweat outs, and similar defects the prevent plaster from bonding with paint or coatings. Sand or texture repair or patch to match adjacent finish and to remove trowel marks and arises:
 - a. Fill hairline cracks, small holes, and imperfections with latex patching plaster. Make smooth and flush with adjacent surfaces. Wash and neutralize high alkali surfaces.
 - b. Deep Cracks: Clean out and fill deep cracks with latex patching plaster. Make smooth and flush with adjacent surfaces. Wash and neutralize high alkali surfaces.
 - c. Do not paint surfaces if moisture content or alkalinity of surfaces exceeds that permitted in manufacturer's written instructions. Test for alkali using litmus paper.
 - d. Allow patching and repair compounds to set and cure before painting.
- N. Gypsum Board Surfaces: Fill minor defects with filler compound. Spot prime defects after repair.
- O. Wood Substrates:
 - 1. Scrape and clean small, dry, seasoned knots, and apply a thin coat of white shellac or recommended knot sealer before applying primer. After priming, fill holes and imperfections in finish surfaces with putty or plastic wood filler. Sand smooth when dried.
 - 2. Sand surfaces that will be exposed to view and dust off.
 - 3. Prime, stain, or seal wood to be painted. Prime edges, ends, faces, undersides, and back sides of wood, including cabinets, counters, cases, and paneling.
 - 4. Seal tops, bottoms, and cutouts of unprimed wood doors with a heavy coat of varnish or sealer immediately on delivery.
 - 5. After priming, fill holes and imperfections in the finish surfaces with putty or plastic wood filler. Sand smooth when dried.
- P. Pipe Covering and Insulation: Clean to remove loose, foreign, and objectionable material before applying sealing coat.
- Q. Preparation of Substrates for Wallcovering:

1. Prime and seal substrate with release coat in accordance with wallcovering manufacturer's recommendations for substrate:
 - a. Assure compatibility with product of wall covering manufacturer.
 - b. Fill indentations in substrate and prime with opaque white primer before applying release coat.
 - c. Apply release coat in accordance with manufacturer's recommendations.
- R. Barrier Coat: Provide barrier coats over incompatible primers or remove and reprime. Notify Owner in writing of anticipated problems using specified finish coat material over previously coated substrates.
- S. Material Preparation:
 1. Mix and prepare paint materials according to manufacturer's written instructions:
 - a. Maintain containers used in mixing and applying paint in a clean condition, free of foreign materials and residue.
 - b. Stir material before application to produce a mixture of uniform density. Stir as required during application. Do not stir surface film into material. If necessary, remove surface film and strain material before using.
 - c. Do not use thinners for water-based paints.
 - d. Tinting: Tint each undercoat a lighter shade to facilitate identification of each coat where multiple coats of the same material are applied. Tint undercoats to match the color of the finish coat but provide sufficient differences in shade of undercoats to distinguish each separate coat.

3.5 APPLICATION

- A. Comply with manufacturer's written instructions and recommendations applicable to substrates and paint systems indicated:
 1. The term *exposed surfaces* includes areas visible when permanent or built in fixtures, grilles, convector covers, covers for finned tube radiation, and similar components are in place. Extend coatings in these areas to maintain system integrity and provide desired protection.
 2. Use applicators and techniques suited for paint and substrate indicated.
 3. Provide finish coats compatible with primers.
 4. Paint surfaces behind movable equipment and furniture same as similar exposed surfaces. Before final installation, paint surfaces behind permanently fixed equipment or furniture with prime coat only.
 5. Paint exposed surfaces (top, bottom, sides, edges, underneath). If an item or a surface is not specifically mentioned, paint the item or surface the same as similar adjacent materials or surfaces:
 - a. Field painting of exposed surfaces include bare and covered pipes and ducts (including color coding), hangers, exposed steel and iron supports, and surfaces of mechanical and electrical equipment that do not have a factory applied final finish.
 - b. Areas visible when permanent or built in fixtures, grilles, convector covers, covers for finned tube radiation, and similar components are in place.
 - c. Extend coatings in areas, as required, to maintain system integrity and provide desired protection.
 6. Paint interior surfaces of ducts with a flat, nonspecular black paint where visible through registers or grilles.
 7. Paint front and backsides of access panels, removable or hinged covers, and similar hinged items to match exposed surfaces.
 8. Do not paint over dirt, rust, scale, grease, moisture, scuffed surfaces, or conditions detrimental to formation of a durable paint film. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.
 9. Do not paint over dirt, rust, scale, grease, moisture, scuffed surfaces, or conditions

- detrimental to formation of a durable paint film. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.
10. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or surface imperfections. Cut in sharp lines and color breaks.
 11. Finish exterior doors on tops, bottoms, and side edges the same as exterior faces.
 12. Provide finish coats compatible with primers used.
 13. Sand lightly between each succeeding enamel or varnish coat.
- B. Items not to Receive Paint: Do not paint prefinished items, concealed surfaces, finished metal surfaces, operating parts, and labels.
- C. Applicators:
1. Apply paints and coatings by brush, roller, spray, or applicators recommended by manufacturer:
 - a. Brushes: Use brushes best suited for type of material applied. Use brush of appropriate size for surface or item being painted.
 - b. Rollers: Use rollers of carpet, velvet back, or high-pile sheep's wool recommended by manufacturer for material and texture required.
 - c. Spray Equipment: Use airless spray equipment with orifice size recommended by manufacturer for material and texture required.
- D. Minimum Coating Thickness:
1. Apply paint materials no thinner than manufacturer's recommended spreading rate to achieve dry film thickness indicated. Provide total dry film thickness of the entire system as recommended by manufacturer:
 - a. Measure film thickness on magnetic surfaces by use of Elcometer thickness gauge and on nonmagnetic surfaces by pit gauge or Tooke Gauge.
- E. Application:
1. Apply first coat to surfaces that have been cleaned, pretreated, or prepared for painting as soon as practicable after preparation and before subsequent surface deterioration:
 - a. The number of coats and film thickness required are the same regardless of application method. Do not apply succeeding coats until previous coat has cured as recommended by manufacturer.
 - b. Primers specified in painting schedules may be omitted on items that are factory primed or factory finished after removing rust and scale and priming or touching up surface sand if acceptable to topcoat manufacturers.
 - c. If undercoats, stains, or conditions show through final coat of paint, apply additional coats until paint film is of uniform finish, color, and appearance. Give special attention to ensure edges, corners, crevices, welds, and exposed fasteners receive dry film thickness equivalent to that of flat surfaces.
 - d. Allow sufficient time between successive coats to permit proper drying. Do not recoat surfaces until paint has dried and cured to where it feels firm and does not deform or feel sticky under moderate thumb pressure, and until application of another coat of paint does not cause undercoat to lift or lose adhesion.
- F. Mechanical and Electrical Work:
1. Painting of mechanical and electrical work is limited to items exposed in equipment rooms and occupied spaces:
 - a. Remove unfinished louvers, grilles, covers, and access panels on mechanical and electrical components and paint separately.
 - b. Prime and paint uninsulated and exposed pipes, conduit, boxes, insulated and exposed ducts, hangers, brackets, collars and supports, heat exchangers, tanks, ductwork, conduit, switchgear, and paintable insulation except where items are

- prefinished.
 - c. Paint interior surfaces of air ducts, and convector and baseboard heating cabinets visible through grilles and louvers with one coat of flat black paint, to visible surfaces. Paint dampers exposed behind louvers, grilles, and convector and baseboard cabinets to match face panels.
 - d. Paint both sides and edges of plywood backboards for electrical and telephone equipment before installing equipment.
 - e. Color code equipment, piping, conduit, and exposed duct work in accordance with requirements indicated. Color band and identify with flow arrows, names, and numbering.
 - f. Reinstall electrical cover plates, hardware, light fixture trim, escutcheons, and fittings removed prior to finishing.
 - g. Concealed Members: Wherever steel and metal parts to receive paint are built into and concealed by construction, paint as specified for exposed parts so finish painting is complete before members are concealed.
- G. Fire Suppression, Plumbing, HVAC, Electrical, Communication, and Electronic Safety and Security Work:
- 1. Painting is limited to items exposed in equipment rooms and occupied spaces:
 - a. Remove unfinished louvers, grilles, covers, and access panels on mechanical and electrical components and paint separately.
 - b. Prime and paint uninsulated and exposed pipes, conduit, boxes, insulated and exposed ducts, hangers, brackets, collars and supports, heat exchangers, tanks, ductwork, conduit, switchgear, and paintable insulation except where items are prefinished.
 - c. Paint interior surfaces of air ducts, and convector and baseboard heating cabinets visible through grilles and louvers with one coat of flat black paint, to visible surfaces. Paint dampers exposed behind louvers, grilles, and convector and baseboard cabinets to match face panels.
 - d. Paint both sides and edges of plywood backboards for electrical and telephone equipment before installing equipment.
 - e. Color code equipment, piping, conduit, and exposed duct work in accordance with requirements indicated. Color band and identify with flow arrows, names, and numbering.
 - f. Reinstall electrical cover plates, hardware, light fixture trim, escutcheons, and fittings removed prior to finishing.
- H. Block Fillers: Apply block fillers to concrete masonry block at rate to ensure complete coverage with pores filled.
- I. Prime Coats: Before applying finish coats, apply prime coat, recommended by manufacturer, to material required to be painted or finished and that has not been prime coated by others. Recoat primed and sealed surfaces where evidence of suction spots or unsealed areas in first coat appears, to ensure a finish coat with no burn through or defects due to insufficient sealing.
- J. Finish Coats:
- 1. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance without bleed through:
 - a. Pigmented (Opaque) Finishes: Completely cover surfaces as necessary to provide a smooth, opaque surface of uniform finish, color, appearance, and coverage. Cloudiness, spotting, holidays, laps, brush marks, runs, sags, ropiness, or surface imperfections is not acceptable.

- b. Transparent (Clear) Finishes: Use multiple coats to produce glass smooth surface film of even luster. Provide a finish free of laps, cloudiness, color irregularity, runs, brush marks, orange peel, nail holes, or other surface imperfections. Provide satin finish for final coats.
- K. Completed Work: Match approved samples for color, texture, and coverage. Remove, refinish, or repaint work not complying with requirements.
- L. Touch Up:
 - 1. Touch up marred, scraped, and blemished areas of surfaces which were factory primed or previously coated:
 - a. Prepare and touch up scratches, abrasions, and blemishes and remove foreign matter before proceeding with succeeding coats.
 - b. Touch up marred, scraped, and blemished areas of factory primed or previously coated surfaces.
 - c. Feather touch up coating overlapping minimum 2 inches onto adjacent unblemished areas producing smooth, uniform surface.
 - d. As soon after erection and installation as possible, touch up fasteners, welded surfaces and surroundings, field connections, and areas on which shop coat has been abraded or damaged with specified primer before corrosion and other damage occurs from exposure.

3.6 FIELD QUALITY CONTROL

- A. Dry Film Thickness (DFT) Testing:
 - 1. Tests for dry film thickness may be determined by using a Tooke Scale and microgroover, an electronic scanner, or the Owner may engage the services of a qualified testing and inspecting agency to inspect and test paint for dry film thickness:
 - a. Contractor shall touch up and restore painted surfaces damaged by testing.
 - b. If test results show that dry film thickness of applied paint does not comply with paint manufacturer's written recommendations, Contractor shall pay for testing and apply additional coats as needed to provide dry film thickness that complies with paint manufacturer's written recommendations.

3.7 CLEANING AND PROTECTION

- A. It is of the utmost importance to the AISD that the sites remain in a safe, clean, and well-maintained condition. At the end of each day, leave the site ready to use by staff and students. Protect staff and students and the learning environment throughout the work.
- B. Cleanup: At the end of each day, remove empty cans, rags, rubbish, and discarded paint materials from the site. After completion of painting work, clean glass, and paint-spattered surfaces. Remove spattered paint by washing and scraping without scratching or damaging adjacent finished surfaces.
- C. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.
- D. Provide *Wet Paint* signs to protect newly painted finishes. After completing painting operations, remove temporary protective wrappings provided by others to protect their work. After related work is complete, touch up and restore damaged or defaced painted surfaces. Comply with procedures specified in PDCA P1.
- E. At completion of painting activities, touch up and restore damaged or defaced painted

surfaces.

- F. Waste Management: Legally dispose of unused paint and paint containers in accordance with manufacturer's recommendations and environmental regulations.

PART 4 SCHEDULES

- A. The following is a schedule of typical painted items and does not specifically include every item that is to receive paint but should establish type and quality of finish for all items normally included in a complete paint job.
- B. Exterior Surfaces (Note: Exterior surfaces are divided into two (2) different categories, based upon color and level of graffiti resistance required. System 1 will be used when standard earthtone colors or neutral colors are specified, and System 2 will be used when bright colors (primary reds, yellows, and oranges) are specified and/or when a graffiti resistant coating is required:
1. Galvanized Metal:
 - a. Surface Preparation: Acid etch galvanized surfaces that have not weathered at least six (6) months prior to beginning painting operations. Krud Kutter Metal Clean and Etch.
 - b. Primer: One (1) coat ULTRASHIELD Interior/Exterior Galvanized Metal Primer (ULGM00).
 - c. Finish: Two (2) coats ENDURACOAT Interior/Exterior Semi-Gloss Industrial Paint (ENCT50).
 - d. Finish: Two (2) coats US Coatings EpoxyGrip 2300 1-2 Mils DFT.
 2. Un-galvanized Metal:
 - a. Primer: One (1) coat Interior/Exterior Acrylic Rust Preventative Metal Primer (ENPR00).
 - b. Finish: Two (2) coats ENDURACOAT Interior/Exterior Semi-Gloss Industrial Paint(ENCT50).
 3. Fiber-Cement Materials:
 - a. Primer: One (1) coat Eff-Stop Premium ESPR00 Masonry Primer.
 - b. Finish: Spartashield SSSL60 100% Acrylic Gloss.
 4. All piping in mechanical rooms shall be painted in their entirety, in the following colors:

Primer for Carbin Steel - Interior/Exterior Acrylic Rust Preventative Metal Primer (ENPR00)

 - a. Aristoshield ASHL70 High-Gloss Enamel:
 - 1) Gas lines: Orange
 - 2) Domestic cold water: White
 - 3) Domestic hot water: Pink
 - 4) Heating hot water: Red
 - 5) Condenser water: Green
 - 6) Chilled water: Blue
- C. Interior Surfaces:
1. Galvanized Metal:
 - a. Primer: One (1) coat Ultrashield Galvanized Metal Primer ULGM00.
 - b. Finish: Two (2) coats Aristoshield ASHL50 Semi-Gloss Enamel.
 2. Shop-Primed Ferrous Metals (Use for metal doors and frames and miscellaneous metal items):
 - a. Shop coat by others.
 - b. One (1) coat over Steel: Bloc-Rust Premium BRPR00 Rust Preventative Primer; Aluminum: Ultrashield Galvanized Metal Primer ULGM00.
 - c. Two (2) coats Aristoshield ASHL50 Semi-Gloss Enamel.

3. Gypsum Wallboard:
 - a. Primer: One (1) coat Vinylastic Premium VNPR00 Acrylic Wall Sealer.
 - b. Finish: Two (2) coats Spartawall Premium SWLL30 Acrylic Latex Eggshell.
 4. Primer Concrete and CMU (Enamel):
 - a. One (1) coat Smooth Blocfil Premium SBPR00 100% Acrylic Block Filler.
 - b. Finish: Two (2) coats Premium SWLL50 Acrylic Latex Semi-Gloss.
 5. Pipe and fittings, including but not limited to copper and brass, at kitchen areas (but excluding aluminum, stainless steel, nickel and chrome plated pipe and fittings):
 - a. Primer: One (1) coat; US Coatings EpoxyGrip 2300 1-2 Mils DFT.
 - b. Finish: Two (2) coats bright aluminum paint, US Coatings UreGrip 3000 VOC 2-3 Mils DFT per coat.
- D. Paint Types: Refer to the Finish Schedule in the Drawings.

END OF SECTION 09 90 00

SECTION 09 96 23 GRAFFITI-RESISTANT COATINGS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Preparation, materials, services, and equipment required in conjunction with the application of an anti-graffiti coating for interior/exterior concrete and masonry surfaces where shown on drawings.
- B. Related Sections:
 - 1. Section 03 30 00: Cast-in-Place Concrete.
 - 2. Section 04 22 00: Concrete Unit Masonry.
 - 3. Section 07 92 00: Joint Sealants.
 - 4. Section 09 90 00: Painting and Coating.

1.3 SUBMITTALS

- A. Product Data:
 - 1. Manufacturer's technical literature, specifications, and application instructions for the specified coating material for Architect's approval.
 - 2. Manufacturer's application instructions.
- B. Samples:
 - 1. Obtain either liquid or drawn down sample(s) of the specified coating for sample application and Architect's color approval. Sample application is covered in this Section. Approved sample will be basis for which all work will be judged.
- C. Certifications:
 - 1. Applicator's certification of qualifications as specified in Paragraph 1.4, A below.
 - 2. Manufacturer's certification that coating material to be applied is in conformance with federal, state and local environmental Volatile Organic Compounds (VOC) regulations.

1.4 QUALITY ASSURANCE

- A. Applicator Qualifications: Company specializing in performing the Work of this Section with minimum three (3) years' experience and approved by manufacturer. Provide a list of five (5) most recently completed projects where the coating material was used. Include the project name, location, architect, and method of application. Applicator shall state the intended use of the proper application equipment and that it has been well maintained.
- B. Mock-Up:
 - 1. Apply coating in accordance with manufacturer's application instructions as directed by the Architect to substrate material which matches actual job conditions. Determine the best method of application, optimum coverage rate, and number of coats required to produce the desired appearance.
 - 2. After sample treatment has cured in accordance with manufacturer's recommendations, verify the substrate is coated with sufficient material to produce the desired appearance and color.

3. Obtain Architect's approval of coverage appearance and color prior to full scale application. Approved sample will be basis for which all work will be judged.
- C. Pre-Application Meeting: Convene a pre-application meeting prior to the start of application of the specified material. Attendance shall be a representative of the application firm, the Architect, and the material manufacturer. Notify each of the attendees at least three (3) days prior to the meeting time.

1.5 WARRANTY

- A. The contractor and applicator shall jointly and severally warrant anti-graffiti coating material against failure in material and workmanship for a period of five (5) years from the date of application.
- B. Submit completed manufacturer's written "Request for Warranty Form" to manufacturer ten (10) days prior to application.
- C. After completion of the specified material, submit manufacturer's written "5 Year Warranty Application" to manufacturer for processing. Upon receiving validated warranty, submit copies to Architect and Owner.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to the job site in original sealed containers, clearly marked with manufacturer's name, brand name, and type of material and color or color formula. Verify the product matches that of the original sample applied on the mock-up wall.
- B. Store materials inside if possible, away from sparks and open flame. Store in a secure area to avoid tampering and contamination. Water based materials must be kept from freezing. Store and handle according to manufacturer's written instructions.

PART 2 PRODUCTS

2.1 APPROVED PRODUCT / MANUFACTURER

- A. Specifications are based on Prosco, Inc. 3741 Greenway Circle, Lawrence, KS 66046 Phone: (800) 255-4255; Fax: (785) 830-9797, Email: CustomerCare@prosoco **"Blok-Guard and Graffiti Control"**. Other manufacturers listed whose products meet or exceed those specified are approved for use on the Project. Other manufacturers must have a minimum of ten (10) years' experience manufacturing product meeting or exceeding the specifications and comply with Division 01 requirements regarding substitutions in order to be considered:
 1. "Chemprobe: Anti-Graffiti" manufactured by Tnemec, Inc.

2.2 COATING MATERIAL

- A. General - Water Based products shall be 100 percent acrylic. No fillers, extenders, or paraffins. All products shall have a range of 22 percent solids with a minimum of 18 percent acrylic resin:

TECHNICAL CHARACTERISTICS

<u>PROPERTY</u>	<u>RESULT / VALUE</u>	<u>TEST METHOD</u>
Form	Clear Liquid, petroleum odor	

Weight Per Gallon	10.62 lbs/gal	
Active content	15%	
Total Solids	15%	ASTM D2369
VOC content	<100 g/L	
Flash Point	100 deg.	
Freeze Point	,-22 deg.	
Shelf Life	1 Year (one)	

PART 3 EXECUTION

3.1 PROJECT CONDITIONS

- A. Surface Preparation: Surface must be free of cracks, dirt, oils, paint or other contaminants which may affect the appearance or performance of the coating material.
- B. Environmental Requirements:
 - 1. Air and substrate temperature must be above 50 degrees F or below 95 degrees F unless otherwise specified by manufacturer.
 - 2. Do not proceed with application if the substrate is wet or contains frozen water.
 - 3. Do not apply material when rain is predicted within 48 hours; or earlier than five (5) days after the substrate became wet.
 - 4. Do not apply materials in high or gusty winds.
- C. Protection:
 - 1. Special precautions should be taken to avoid vapor transmission (fumes) from entering the building being treated. Ventilation systems and fresh air intakes should be turned off and dosed.
 - 2. Protect shrubs, metal, wood trim, glass, asphalt and other building hardware during application from overspray.
 - 3. Do not permit spray mist or liquid to drift onto surrounding properties.

3.2 SCHEDULING

- A. Notify Architect not less than 48 hours before each application of coating is scheduled.

3.3 EXAMINATION

- A. Verify the following:
 - 1. The required joint sealants have been installed.
 - 2. New masonry and mortar has cured a minimum of 21 days.
 - 3. Surface to be treated is clean, dry and contains no frozen water.
 - 4. Environmental conditions are appropriate for application.

3.4 PREPARATION

- A. Protection:
 - 1. Special precautions should be taken to avoid vapor transmission (fumes) from entering the building being treated. Ventilation systems and fresh air intakes should be turned off and dosed.
 - 2. Protect shrubs, metal, wood trim, glass, asphalt and building hardware during application from overspray:
 - a. Do not permit spray mist or liquid to drift onto surrounding properties or parking lots.

3.5 APPLICATION

- A. Apply anti-graffiti coating in accordance with manufacturer's written application instructions.
- B. Apply material as supplied by the manufacturer. Do not dilute or thin.
- C. Mix material well just prior to application using a power mixer to assure color uniformity.
- D. Material must be applied using the proper application equipment, and the same technique used on the mock-up sample panel.
- E. Apply treatment evenly until a uniform color and appearance is achieved.

3.6 FIELD QUALITY CONTROL

- A. Contact Architect 48 hours prior to application so as to provide observation as required. The Architect or the Architect's representative shall observe the progress as the work proceeds.
- B. After coating has cured (minimum of 12 hours), verify color uniformity. Recoat all areas that are unacceptable.

3.7 CLEANING

- A. At completion, remove all excess material, debris, and waste resulting from this work from the job site. Dispose of containers in accordance with state and local environmental regulations.

END OF SECTION 09 96 23

SECTION 09 97 23 CONCRETE AND MASONRY COATINGS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Application of membrane type curing and sealing compound on concrete surfaces to remain exposed.
- B. Related Sections:
 - 1. Section 09 90 00: Painting and Coating.
 - 2. Section 09 96 23: Graffiti-Resistant Coatings.

1.3 DEFINITIONS

- A. Comparable Product: Product demonstrated and approved through submittal process, or where indicated as a produce substitution, to have the indicated qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics that equal or exceed those of specified product.

1.4 SUBMITTALS

- A. Application of membrane type curing and sealing compound on concrete surfaces to remain exposed.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to site in manufacturer's original, unopened containers and packaging, with labels clearly identifying product name and manufacturer.
- B. Store materials in a clean, dry area in accordance with manufacturer's instructions.
- C. Keep product from freezing.
- D. Avoid direct contact with this product as it may cause mild-to-moderate irritation of the eyes and/or skin.
- E. Protect materials during handling and application to prevent damage or contamination.
- F. Do not mix any compound containing solvent.
- G. Do not mix or agitate aggressively as foaming can occur.

PART 2 PRODUCT

2.1 MANUFACTURERS

- A. Basis of design is Vocomp-20, as manufactured by W.R. Meadows, Inc., or comparable

product approved by Architect:

1. Other manufacturers must have a minimum of five (5) years' experience manufacturing products meeting or exceeding the specifications and comply with Division 01 requirements regarding substitutions to be considered and have Architect's approval prior to its use on the Project:
 - a. Dayton-Superior Corp.
 - b. Euclid Chemical Company.

2.2 MATERIALS

- A. Typical, except as noted: Membrane type curing and sealing compound conforming to ASTM C309, Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete, Type I, Class B and complying with Sealtight Vocomp-20, as manufactured by W.R. Meadows, Inc., 2300 W. Valley Blvd., Pomona, CA 91768, Phone: (909) 469-2606, Fax: (909) 469-2611 or comparable product approved by the Architect.
- B. Exterior Non-slip Traffic Coating: Vocomp-20 as specified above, with "Sure-Step" slip-resistant additive as manufactured by W.R. Meadows, Inc., 2300 W. Valley Blvd., Pomona, CA 91768, Phone: (909) 469-2606, Fax: (909) 469-2611 or comparable product approved by the Architect.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Examine surfaces to receive curing and sealing compound. Notify architect if surfaces are not acceptable. Do not begin surface preparation or application until unacceptable conditions have been corrected

3.2 PREPARATION

- A. Protect adjacent surfaces not designated to receive curing and sealing compound.
- B. Clean and prepare surfaces to receive curing and sealing compound in accordance with manufacturer's instructions.
- C. Ensure concrete surface is clean and dry, with all stains, oil, grease, dust, and dirt removed.
- D. Concrete surface water should be dissipated when used on new concrete.
- E. Concrete surfaces should not be marred by walking workers.

3.3 APPLICATION

- A. Apply curing and sealing compound in accordance with manufacturer's instructions.
- B. Ensure product is mixed for optimum performance. Avoid aggressive mixing as foaming may occur.
- C. Use an industrial sprayer with a 5916 tip that produces a flow rate of 1/10 of one gallon per minute under 0.276 MPa (40 psi) of pressure.
- D. Spray on in a fine, fog pattern, without spurts and dribbles, to form a thin, continuous film.
- E. Alternatively apply using a lint-free roller or lamb's wool roller.

- F. Avoid puddling in low areas.

END OF SECTION 09 97 23

SECTION 10 14 00 GRAPHICS AND SIGNAGE

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes requirements including but not limited to:
 - 1. Room identification signs.
 - 2. Restroom signs.
 - 3. Misc. identification signs.
 - 4. Informational signs (not identification signs).
 - 5. Accessories necessary for a complete installation..
- B. Related Sections:
 - 1. Section 06 10 00: Rough Carpentry.
 - 2. Section 09 21 16: Gypsum Board Assemblies.

1.3 SUBMITTALS

- A. Product Data: Technical data for each type of signage.
- B. Shop Drawings:
 - 1. Submit fabrication and installation details and attachments to other work:
 - a. Show sign mounting heights, locations of supplementary supports to be provided by others, and accessories.
 - b. Show message list, typestyles, graphic elements, including raised characters and Braille, and layout for each sign at least half size.
 - c. Exterior applied signage on face of wall to include mounting brackets and support anchorage to fit condition.
- C. Samples: Submit one sample of each specified sign type, full-sized.

1.4 QUALITY ASSURANCE

- A. Field Inspections:
 - 1. All new tactile signage must be field inspected after installation per CBC 11B-703.1.1.2.
- B. Accessibility Requirements:
 - 1. Raised characters shall comply with CBC Section 11B-302.2.
 - a. Depth: It shall be 1/32-inch (0.8 mm) minimum above their background, shall be sans serif uppercase, and be duplicated in Braille.
 - b. Height: It shall be 5/8-inch (15.9 mm) minimum and 2 inches (51 mm) maximum based on the height of the uppercase letter "I." See CBC Section 11B-703.2.5.
 - c. Finish and Contrast: Characters and their background shall have a non-glare finish. Character shall contrast with their background with either light characters on a dark background or dark characters on a light background. See CBC Section 11B-703.5.1.
 - d. Proportions: It shall be selected from fonts where the width of the uppercase letter

“O” is 60% minimum and 110% maximum of the height of the uppercase letter “I.”
Stroke thickness of the uppercase letter “I” shall be 15% maximum of the height of the character. See CBC Sections 11B-703.22.4 and 11B-703.2.8.

- e. Character Spacing: Spacing between individual raised characters shall comply with CBC Section 11B-703.2.7 and 11B-703.2.8.
- f. Format: Text shall be in a horizontal format. See CBC Section 11B-703.2.9.
- g. Braille: It shall be contracted (Grade 2) and shall comply with CBC Sections 11B-703.3 and 11B-703.4. Braille dots shall have a domed or rounded shape and shall comply with CBC Table and Figure 11B-703.3.1.
- h. Mounting Height: Tactile characters on signs shall be located 48 inches minimum to the baseline of the lowest Braille cells and 60 inches maximum to the baseline of the highest line of raised characters above the finish floor or ground surface. See CBC Section and Figure 11B-703.4.4.
- i. Mounting Location:
 - 1) A tactile sign shall be located per CBC Section and Figure 11B-703.4.2 as follows:
 - a) Alongside a single door at the latch side.
 - b) On the inactive leaf at double doors with one active leaf.
 - c) To the right of the right-hand door at double doors with two active leaves.
 - d) On the nearest adjacent wall where there is no wall space at the latch side of a single door or at the right side of double doors with two active leaves.
 - e) So that a clear floor space of 18 inches x 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.
- j. Visual Characters: Shall comply with CBC Section 11B-703.5 and shall be 40 inches minimum above finish floor or ground.
- k. Pictograms: Shall comply with CBC Section 11B-703.6.
- l. Symbols of Accessibility: Shall comply with CBC Section 11B-703.7.
- m. Variable Message Signs: Shall comply with CBC Section 11B-703.8.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Manufacturers:
 - 1. Subject to compliance with requirements, provide products by one of the following:
 - a. Apco Signs
 - b. ASI Modulex, Inc.
 - c. Best Sign Systems, Inc.
 - d. InPro Corporation (IPC).
 - e. Mohawk Sign Systems.
 - f. Nelson-Harkins Industries.
 - g. Seton Identification Products.
 - h. Stamprite Supersine; a division of Stamp Rite Inc.
 - i. Vomar Products, Inc.
- B. Aluminum Castings: ASTM B26/B26M, alloy and temper recommended by sign manufacturer for casting process used and for type of use and finish indicated. Refer to drawings for location.
- C. Aluminum Sheet and Plate: ASTM B209, alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated. Refer to drawings for location.
- D. Aluminum Extrusions: ASTM B221, alloy and temper recommended by aluminum producer

and finisher for type of use and finish indicated.

- E. Acrylic Sheet: ASTM D4802, category standard with manufacturer for each sign, Type UVF (UV filtering).
- F. Plastic Laminate Sheet: NEMA LD 3, general purpose HGS grade, 0.048-inch (1.2-mm) nominal thickness.
- G. Vinyl Film: UV resistant vinyl film of nominal thickness indicated, with pressure sensitive, permanent adhesive on back; die cut to form characters or images indicated and suitable for exterior applications.
- H. Paints and Coatings for Sheet Materials: Inks, dyes, and paints that are recommended by manufacturer for optimum adherence to surface and are UV and water resistant for colors and exposure indicated.
- I. Accessories:
 - 1. Fasteners and Anchors:
 - a. As necessary for secure anchorage of signage, noncorrosive and compatible with each material joined, and complying with the following:
 - 1) Use concealed fasteners and anchors unless indicated to be exposed.
 - 2) Exposed Metal Fastener Components: Fabricated from same basic metal and finish of fastened metal unless otherwise indicated.
 - 2. Sign Mounting Fasteners:
 - a. Concealed Studs: Concealed (blind), threaded studs welded or brazed to back of sign material or screwed into back of sign assembly, unless otherwise indicated.
 - 3. Adhesive: Recommended by sign manufacturer.
 - 4. Two Face Tape: High bond, foam core tape, 0.045 inch (1.14 mm) thick, with adhesive on both sides.
 - 5. Bituminous Paint: Cold applied asphalt emulsion complying with ASTM D1187.

2.2 SIGNAGE

- A. Laminated Plastic Tactile Room, Restroom and Miscellaneous Identification Signs:
 - 1. Sign with smooth, uniform surfaces; with message and characters having uniform faces, sharp corners, and precisely formed lines and profiles; and as follows:
 - a. Laminated Sheet Sign:
 - 1) Photopolymer face sheet with raised graphics laminated over subsurface graphics to acrylic backing sheet to produce composite sheet:
 - a) Color(s): Selected by Architect from manufacture's full range of standard colors.
 - b. Sign Panel Perimeter:
 - 1) Finish edges smooth:
 - a) Edge Condition: Beveled.
 - b) Corner Condition in Elevation: Square.
 - c. Mounting at Walls: Stainless steel vandal-proof pin-in-head torx screws Surface mounted to wall with concealed anchors.
 - d. Mounting at Glazing: Clear silicone adhesive.
 - e. Text and Typeface, Panel and Photo Polymer Signs:
 - 1) Accessible raised characters and Braille. Finish raised characters to contrast with background color, and finish Braille to match background color:
 - a) Raised Characters: Refer to Drawings.
 - b) California Contracted Grade 2 Braille: Refer to Drawings.
 - c) Pictograms: Field height of minimum 6 inches; no characters or braille in pictogram field; nonglare, field contrast to pictogram, text descriptors below pictogram field

- d) Accessibility Symbols: Where used, symbols shall comply with CBC 11B-703.7.
- B. Solid Plastic Tactile Room, Restroom and Miscellaneous Identification Signs:
 - 1. 1/4-inch thick, Graphic Process Sand Carved with pre-drilled holes for mounting screws:
 - a. Sign Panel Perimeter:
 - 1) Edge Condition: Square cut.
 - 2) Corner Condition in Elevation: 3/8" radius.
 - b. Mounting at Walls: Stainless steel vandal-proof pin-in-head torx screws
 - c. Mounting at Glazing: Clear silicone adhesive
 - d. Text and Typeface:
 - 1) Accessible raised characters and Braille. Finish raised characters to contrast with background color, and finish Braille to match background color:
 - a) Raised Characters: Refer to drawings
 - b) California Contracted Grade 2 Braille: Refer to drawings
 - c) Pictograms: Field height of minimum 6 inches; no characters or braille in pictogram field; nonglare, field contrast to pictogram, text descriptors below pictogram field
 - d) Accessibility Symbols: Where used, symbols shall comply with CBC 11B-703.7.
 - e. Color: As selected by Architect from manufacture's full range of standard colors.
 - f. For exterior uses, fabricate signs from exterior grade materials with UV inhibitor.
- C. Cast Characters:
 - 1. Characters with uniform faces, sharp corners, and precisely formed lines and profiles:
 - a. Character Material: Cast aluminum.
 - b. Character Height: Indicated on Drawings.
 - c. Finishes:
 - 1) Baked Enamel or Powder Coat Finish: Color to be selected by the Architect from manufacture's full range of standard colors.
 - 2) Overcoat: Baked on clear coating.
 - d. Mounting: Concealed studs.
 - e. Typeface: Selected by Architect.
- D. Field Applied, Vinyl Character Sign:
 - 1. Prespaced characters die cut from 3 mil to 3.5 mil (0.076 mm to 0.089 mm) thick, weather resistant vinyl film with release liner on the back and carrier film on the front for onsite alignment and application:
 - a. Manufacturers:
 - 1) Subject to compliance with requirements, provide products by one of the following:
 - a) Allen Markings.
 - b) APCO Graphics, Inc.
 - c) Mohawk Sign Systems.
 - d) Seton Identification Products.
 - 2) Size: Indicated on Drawings.
 - 3) Substrate: Indicated on Drawings.

2.3 FABRICATION

- A. Provide sign assemblies according to requirements indicated:
 - 1. Preassemble signs and assemblies in the shop to greatest extent possible. Disassemble signs and assemblies as necessary for shipping and handling limitations. Clearly mark units for reassembly and installation; apply markings in locations concealed from view after final assembly.

2. Mill joints to a tight, hairline fit. Form assemblies and joints exposed to weather to resist water penetration and retention.
 3. Comply with AWS for recommended practices in welding and brazing. Provide welds and brazes behind finished surfaces without distorting or discoloring exposed side. Clean exposed welded and brazed connections of flux, and dress exposed and contact surfaces.
 4. Conceal connections if possible; otherwise, locate connections where they are inconspicuous.
 5. Internally brace signs for stability and for securing fasteners.
 6. Provide rebates, lugs, and brackets necessary to assemble components and to attach to existing work. Drill and tap for required fasteners. Use concealed fasteners where possible; use exposed fasteners that match sign finish.
 7. Castings: Fabricate castings free of warp, cracks, blowholes, pits, scale, sand holes, and other defects that impair appearance or strength. Grind, wire brush, sandblast, and buff castings to remove seams, gate marks, casting flash, and other casting marks before finishing.
- B. Brackets:
1. Fabricate brackets, fittings, and hardware for bracket mounted signs to suit sign construction and mounting conditions indicated. Modify brackets as necessary:
 - a. Aluminum Brackets: Factory finish brackets with baked enamel or powder coat finish to match sign background color unless otherwise indicated.

2.4 FINISH REQUIREMENTS

- A. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- B. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.
- C. Directional Finishes: Run grain with long dimension of each piece and perpendicular to long dimension of finished trim or border surface unless otherwise indicated.
- D. Organic, Anodic, and Chemically Produced Finishes: Apply to formed metal after fabrication but before applying contrasting polished finishes on raised features unless otherwise indicated.
- E. Aluminum Finishes:
1. Clear Anodic Finish: AAMA 611, Class I, 0.018 mm or thicker.
 2. Baked Enamel or Powder Coat Finish: AAMA 2603 except with a minimum dry film thickness of 1.5 mils (0.04 mm). Comply with coating manufacturer's written instructions for cleaning, conversion coating, and applying and baking finish.

PART 3 EXECUTION

3.1 FIELD CONDITIONS

- A. Field Measurements: Verify locations of anchorage devices and electrical service embedded in permanent construction by other installers by field measurements before fabrication and indicate measurements on Shop Drawings.

3.2 EXAMINATION

- A. Examine substrates, areas, and conditions for compliance with requirements for installation tolerances and other conditions affecting performance of signage work. Verify sign support surfaces are within tolerances to accommodate signs without gaps or irregularities between backs of signs and support surfaces unless otherwise indicated.
- B. Proceed with installation after correcting unsatisfactory conditions.

3.3 INSTALLATION

- A. Install signs using mounting methods indicated and according to manufacturer's written instructions:
 - 1. Install signs level, plumb, true to line, and at locations and heights indicated, with sign surfaces free of distortion and other defects in appearance.
 - 2. Install signs so they do not protrude or obstruct according to the accessibility standard.
 - 3. Interior Wall Signs:
 - a. Install signs on walls adjacent to latch side of door where applicable. Where not indicated or possible, such as double doors, install signs on nearest adjacent walls. Locate to allow approach within 3 inches (75 mm) of sign without encountering protruding objects or standing within swing of door:
 - 1) See drawings for the mounting height and location of each sign.
 - 4. Before installation, verify sign surfaces are clean and free of materials or debris that impair installation.
 - 5. Corrosion Protection: Coat concealed surfaces of exterior aluminum in contact with grout, concrete, masonry, wood, or dissimilar metals, with a heavy coat of bituminous paint.
- B. Mounting Height:
 - 1. Tactile characters on signs shall be located 48 inches minimum to the baseline of the lowest Braille cells and 60 inches maximum to the baseline of the highest line of raised characters above the finish floor or ground surface, pursuant to CBC Section and Figure 11B-703.4.1.
- C. Mounting Location:
 - 1. A tactile sign shall be located as follows, pursuant to CBC Section and Figure 11B-703.4.2:
 - a. Alongside a single door at the latch side.
 - b. On the inactive leaf at double doors with one active leaf.
 - c. To the right of the right-hand door at double doors with two active leaves.
 - d. On the nearest adjacent wall where there is no wall space at the latch side of a single door or at the right side of double doors with two active leaves.
 - e. So that a clear floor space of 18 inches 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. Mounting Methods:
 - 1. Exposed Fastener: Install vandal-resistant fastener; set screw head flush with sign face.
 - 2. Concealed Studs:
 - a. Using a template, drill holes in substrate aligning with studs on back of sign. Remove loose debris from hole and substrate surface:
 - 1) Masonry Substrates: Fill holes with adhesive. Leave recess space in hole for displaced adhesive. Place sign in position and push until flush to surface, embedding studs in holes. Temporarily support sign in position until adhesive fully sets.
 - 2) Thin or Hollow Surfaces: Place sign in position and flush to surface, install washers and nuts on studs projecting through opposite side of surface, and

- tighten.
3. Brackets: Remove loose debris from substrate surface and install backbar or bracket supports in position so that signage is correctly located and aligned.
 4. Shim Plate Mounting: Provide 1/8 inch (3 mm) thick, concealed aluminum shim plates with predrilled and countersunk holes, at locations indicated, and where other direct mounting methods are impractical. Attach plate with fasteners and anchors suitable for secure attachment to substrate. Attach signs to plate using method specified above.
- E. Visual Characters shall comply with CBC Section 11B-703.5 and shall be 40 inches minimum above finish floor or ground.
- F. Field Applied, Vinyl Character Signs: Clean and dry substrate. Align sign characters in final position before removing release liner. Remove release liner in stages and apply and firmly press characters into final position. Press from the middle outward to obtain good bond without blisters or fishmouths. Remove carrier film without disturbing applied vinyl film.
- G. Signs Mounted on Glass: Provide opaque sheet matching sign material and finish onto opposite side of glass to conceal back of sign.
- H. DSA Inspections: Signs and identifications or other information shall be field inspected after installation and approved by Division of the State Architect prior to the issuance of a final certificate of occupancy, or final approval where no certificate of occupancy is issued. The inspection shall include, but not limited to, verification that Braille dots and cells are properly spaced, and the size, proportion, and type of raised characters are in compliance with CBC, Section 11B-703.1.1.2.

3.4 ADJUSTING AND CLEANING

- A. Remove and replace damaged or deformed signs and signs that do not comply with specified requirements. Replace signs with damaged or deteriorated finishes or components that cannot be successfully repaired by finish touchup or similar minor repair procedures.
- B. Remove temporary protective coverings and strippable films as signs are installed.
- C. On completion of installation, clean exposed surfaces of signs according to manufacturer's written instructions and touch up minor nicks and abrasions in finish. Maintain signs in a clean condition during construction and protect from damage until acceptance by Owner.

END OF SECTION 10 14 00

SECTION 10 21 13 TOILET COMPARTMENTS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes requirements including but not limited to:
 - 1. Toilet partitions.
 - 2. Urinal screens.
 - 3. Entrance screens.
 - 4. Accessories necessary for a complete installation.
- B. Related Sections:
 - 1. Section 05 50 00: Metal Fabrications.
 - 2. Section 06 10 00: Rough Carpentry.
 - 3. Section 09 67 00: Epoxy Flooring.

1.3 SUBMITTALS

- A. Product Data: Technical data for each type of product including construction details, material descriptions, dimensions of individual components and profiles, and finishes.
- B. Shop Drawings - Submit plans, elevations, sections, details, and attachments to other work:
 - 1. Show locations of cutouts for compartment-mounted toilet accessories.
 - 2. Show locations of reinforcements for compartment-mounted grab bars.
 - 3. Show locations of centerlines of toilet fixtures.
 - 4. Show ceiling grid and overhead support or bracing locations.
- C. Samples: Submit for each type of unit with samples of hardware and accessories involving material and color selection.
- D. Maintenance Data: Submit data to include in maintenance manuals.

1.4 PERFORMANCE REQUIREMENTS

- A. Accessible Toilet Compartments:
 - 1. Wheelchair accessible compartment shall comply with CBC Section 11B-604.8.1.
 - 2. Toe clearance for at least one side partition of a wheelchair accessible compartment shall comply with CBC Section and Figure 11B-604.8.1.4. It shall be a minimum of 9 inches high above the finish floor, and a minimum of 6 inches deep beyond the compartment side face of the partition, exclusive of partition support members. It shall be a minimum of 12 inches high above the finish floor for children's use. Partition components at toe clearances shall be smoother without shop edges or abrasive surfaces. Toe clearance at the side partition is not required in a compartment greater than 66 inches wide.
 - 3. Ambulatory accessible compartments shall be provided where there are six or more toilet compartments, or where the combination of urinals and water closets total six or more fixtures. Such compartments shall be provided in the same quantity as wheelchair accessible compartments per CBC Section 11B-213.3.1 and shall comply

- with CBC Section 11B-604.8.2.
4. Door and door hardware for accessible compartments shall be self-closing and shall comply with CBC Section 11B-404 except that if the approach is to the latch side of an ambulatory compartment door, clearance between the door side of the compartment and any obstruction shall be 44 inches minimum. See CBC Figure 11B-604.8.2.
 5. A door pull complying with CBC Section 11B-404.2.7 shall be placed on both sides of the accessible compartment door near the latch.
 6. Ambulatory Accessible Toilet Compartment doors shall not swing into the clear floor space or clearance required for any fixture or into the minimum required compartment area. See CBC Section 11B-604.8.2.2.

1.5 QUALITY ASSURANCE

- A. Regulatory Requirements:
1. Accessibility Requirements - Comply with applicable requirements:
 - a. Americans with Disabilities Act of 1990, as amended:
 - 1) ADA Title II Regulations & the 2010 ADA Standards for Accessible Design.
 - b. CBC 2022 California Building Code (CCR Title 24, Part 2, as adopted and amended by DSA):
 - 1) CBC Chapter 11B, Access to Public Buildings, Public Accommodations, Commercial Buildings and Public Housing.
 2. Surface Burning Characteristics - Comply with ASTM E84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency:
 - a. Flame Spread Index: 25 or less.
 - b. Smoke Developed Index: 450 or less.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Manufacturers are subject to compliance with requirements; provide products by one of the following:
1. Solid Plastic (HDPE):
 - a. Accurate Partitions Corp.; ASI Group.
 - b. Ampco Products, LLC.
 - c. General Partitions Mfg. Corp.
 - d. Global Partitions; ASI Group.
 - e. Metpar Corp./Sanymetal
 - f. Scranton Products; Capitol Partitions, Comtec Industries.
- B. Aluminum Castings: ASTM B26/B26M.
- C. Aluminum Extrusions: ASTM B221.
- D. Stainless Steel Sheet: ASTM A666, Type 304, stretcher leveled standard of flatness.
- E. Stainless Steel Castings: ASTM A743/A743M.

2.2 PARTITION COMPONENTS

- A. Solid Plastic Partitions:
1. Style:
 - a. Toilet Partition: Floor anchored and overhead braced.
 - b. Entrance Screen Style: Floor supported and overhead braced.
 - c. Urinal Screen Style: Floor anchored and overhead braced.

- B. Door, Panel, Screen, and Pilaster Construction - Solid, high density polyethylene (HDPE) panel material, not less than 1 inch (25 mm) thick, seamless, with eased edges, no sightline system, and with homogenous color and pattern throughout thickness of material:
 - 1. Integral Hinges: Configure doors and pilasters to receive integral hinges.
 - 2. Heat Sink Strip: Continuous, stainless steel strip fastened to exposed bottom edges of solid plastic components to hinder malicious combustion.
 - 3. Color and Pattern: Selected by Architect.
 - 4. Pilaster Shoes and Sleeves (Caps) - Stainless steel:
 - a. Pilaster shall be attached to the floor by means of an 11 gauge stainless steel footer, with provisions for leveling, attached to two (2) 3/8 inch diameter stainless steel studs set into expansion shields. The floor connections are to be covered by a four (4) inch high stainless steel shoe, #4 finish.
 - b. Option Panels: 1/2 inch thick solid phenolic core with high pressure color surface on faces. Edges shall be burnished and slightly rounded.
- C. Urinal Screen Post: Post design of stainless steel matching the thickness and construction of pilasters or 1-3/4 inch (44 mm) square, aluminum tube with satin finish; with shoe and sleeve (cap) matching that on the pilaster.
- D. Brackets (Fittings):
 - 1. Stirrup Type: Ear or U-brackets, stainless steel.
 - 2. Full Height (Continuous) Type: Stainless steel.

2.3 HARDWARE AND ACCESSORIES

- A. Hardware and Accessories - Heavy duty operating hardware and accessories:
 - 1. Hinges: Minimum 0.062 inch (1.59 mm) thick, full door length, stainless steel continuous, cam type that swings to a closed or partially open position, allowing emergency access by lifting door. Mount with through bolts.
 - 2. Latch and Keeper: Heavy duty surface mounted cast stainless steel latch unit designed to resist damage due to slamming, with combination rubber faced door strike and keeper, and with provision for emergency access. Provide units that comply with regulatory requirements for accessibility at compartments designated as accessible. Mount with through bolts.
 - 3. Coat Hook: Heavy duty combination cast stainless steel hook and rubber tipped bumper, sized to prevent in swinging door from hitting compartment mounted accessories. Mount with through bolts.
 - 4. Door Bumper: Heavy duty rubber tipped cast stainless steel bumper at out swinging doors and entrance screen doors. Mount with through bolts.
 - 5. Door Pull: Heavy duty cast stainless steel pull at out-swinging doors that complies with regulatory requirements for accessibility. Provide units on both sides of doors at compartments designated as accessible. Mount with through bolts.
- B. Overhead Bracing: Continuous, extruded aluminum head rail with antigrip profile and in standard finish.
- C. Anchorages and Fasteners: Exposed fasteners of stainless steel, finished to match the being secured, with theft resistant type heads. Provide sex type bolts for through bolt applications. For concealed anchors, use stainless steel, hot dip galvanized steel, or rust resistant, protective coated steel compatible with related materials.

2.4 FABRICATION

- A. Fabricate toilet compartment components to sizes indicated. Coordinate requirements and provide cutouts for through partition toilet accessories where required for attachment of toilet accessories.

- B. Overhead Braced Units: Provide corrosion resistant supports, leveling mechanism, and anchors at pilasters to suit floor conditions. Provide shoes at pilasters to conceal supports and leveling mechanism.
- C. Floor Anchored Units: Provide corrosion resistant anchoring assemblies with leveling adjustment nuts at pilasters for structural connection to floor. Provide shoes at pilasters to conceal anchorage.
- D. Urinal Screen Posts: Provide corrosion resistant anchoring assemblies with leveling adjustment nuts at tops and bottoms of posts. Provide shoes and sleeves (caps) at posts to conceal anchorage.
- E. Door Size and Swings: Unless otherwise indicated, provide 24 inch (610 mm) wide, in swinging doors for standard toilet compartments and 36 inch (914 mm) wide, out swinging doors with a minimum 32 inch (813 mm) wide, clear opening for compartments designated as accessible.

PART 3 EXECUTION

3.1 PROJECT CONDITIONS

- A. Field Measurements: Verify actual locations of toilet fixtures, walls, columns, ceilings, and other construction contiguous with toilet compartments by field measurements before fabrication.

3.2 EXAMINATION

- A. Examine areas and conditions for compliance with requirements for fastening, support, alignment, operating clearances, and other conditions affecting performance of the work. Confirm location and adequacy of blocking and supports required for installation. Proceed with installation after correcting unsatisfactory conditions.

3.3 INSTALLATION

- A. Comply with manufacturer's written installation instructions. Install units rigid, straight, level, and plumb. Secure units in position with manufacturer's recommended anchoring devices:
 - 1. Maximum Clearances:
 - a. Pilasters and Panels: 1/2 inch (13 mm).
 - b. Panels and Walls: 1 inch (25 mm).
 - 2. Stirrup Brackets - Secure panels to walls and to pilasters with no fewer than three brackets attached at midpoint and near top and bottom of panel:
 - a. Locate wall brackets so holes for wall anchors occur in masonry or tile joints.
 - b. Align brackets at pilasters with brackets at walls.
 - 3. Full Height (Continuous) Brackets - Secure panels to walls and to pilasters with full height brackets:
 - a. Locate bracket fasteners so holes for wall anchors occur in masonry or tile joints.
 - b. Align brackets at pilasters with brackets at walls.
- B. Overhead Braced Units: Secure pilasters to floor and level, plumb, and tighten. Set pilasters with anchors penetrating not less than 1-3/4 inches (44 mm) into structural floor unless otherwise indicated in manufacturer's written instructions. Secure continuous head rail to each pilaster with no fewer than two fasteners. Hang doors to align tops of doors with tops of panels, and adjust so tops of doors are parallel with overhead brace when doors are in closed position. Attach wall brackets into solid backing/blocking and/or wall studs. No drywall anchors allowed.

- C. Floor Anchored Units: Set pilasters with anchors penetrating not less than 2 inches (51 mm) into structural floor unless otherwise indicated in manufacturer's written instructions. Level, plumb, and tighten pilasters. Hang doors and adjust so tops of doors are level with tops of pilasters when doors are in closed position.
- D. Urinal Screens: Attach with anchoring devices to suit supporting structure. Set units level and plumb, rigid, and secured to resist lateral impact. Attach wall brackets into solid backing/blocking and/or wall studs. No drywall anchors allowed.

3.4 ADJUSTING

- A. Hardware Adjustment: Adjust and lubricate hardware according to hardware manufacturer's written instructions for proper operation. Set hinges on in swinging doors to hold doors open approximately 30 degrees from closed position when unlatched. Set hinges on out swinging doors to return doors to fully closed position.

3.5 MAINTENANCE MATERIAL

- A. Furnish extra materials that match products installed and packaged with protective covering for storage and identified with labels describing contents and source:
 - 1. Door Hinges: One hinge(s) with associated fasteners.
 - 2. Latch and Keeper: One latch and keeper(s) with associated fasteners.
 - 3. Door Bumper: One bumper(s) with associated fasteners.
 - 4. Door Pull: One door pull(s) with associated fasteners.
 - 5. Fasteners: Ten fasteners of each size and type.

END OF SECTION 10 21 13

202SECTION 10 28 13 TOILET ACCESSORIES

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes requirements including but not limited to:
 - 1. Public use washroom accessories.
 - 2. Public use shower room accessories.
 - 3. Private use bathroom accessories.
 - 4. Healthcare accessories.
 - 5. Warm air dryers.
 - 6. Childcare accessories.
 - 7. Underlavatory guards.
 - 8. Custodial accessories.
 - 9. Accessories necessary for a complete installation.

1.3 PERFORMANCE REQUIREMENTS

- A. Sanitary Facility Elements:
 - 1. Elements of sanitary facilities shall be mounted at locations in compliance with CBC Sections 11B-602 through 11B-612.
 - 2. Grab bars in toilet facilities and bathing facilities shall comply with CBC Section 11B-609.
 - 3. Grab bars and any wall or other surfaces adjacent to grab bars shall be free of sharp or abrasive elements and shall have rounded edges. The space around the grab bars shall be as follows:
 - a. 1 ½ inches between the grab bar and the wall.
 - b. 1 ½ inches minimum between the grab bar and projecting objects below and at the ends.
 - c. 12 inches minimum between the grab bar and projecting objects above.
 - 4. Grab Bars to meet DSA IR 16-12 – Grab Bar Design and Connections: 2022 CBC.
 - a. Grab Bars shall be designed to resist a single concentrated load of 250 lbs. applied in any direction at any point on the grab bar such as to produce the maximum load effect.

1.4 SUBMITTALS

- A. Product Data:
 - 1. Technical Data including construction details, material descriptions, dimensions of individual components and profiles, and finishes:
 - a. Include anchoring and mounting requirements, including requirements for cutouts in other work and substrate preparation.
 - b. Include electrical characteristics.
- B. Samples:
 - 1. Full size, for each exposed product and for each finish specified:
 - a. Approved full size Samples will be returned and may be used in the Work.

- C. Product Schedule: Show types, quantities, sizes, and installation locations by room of each accessory required. Identify locations using room designations indicated.
- D. Maintenance Data: Submit for inclusion in maintenance manuals.

1.5 QUALITY ASSURANCE

- A. Accessibility Requirements:
 - 1. Comply with applicable requirements:
 - a. Americans with Disabilities Act of 1990, as amended:
 - 1) ADA Title II Regulations & the 2010 ADA Standards for Accessible Design
 - b. 2022 California Building Code (CBC) (CCR Title 24, Part 2, as adopted and amended by DSA):
 - 1) CBC Chapter 11B, Access to Public Buildings, Public Accommodations, Commercial Buildings and Public Housing.
- B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- C. Source Limitations: Obtain products from single source from single manufacturer.

1.6 WARRANTY

- A. Written warranty signed by manufacturer in which manufacturer agrees to repair or replace mirrors that fail in materials or workmanship within specified warranty period:
 - 1. Failures include, but are not limited to, visible silver spoilage defects.
 - 2. Warranty Period: 15 years from date of Substantial Completion.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Manufacturers:
 - 1. Toilet accessories schedule is based on Bobrick Washroom Equipment. Subject to compliance with requirements, provide products by one of the following:
 - a. AJW Architectural Products.
 - b. American Specialties, Inc.
 - c. Bobrick Washroom Equipment, Inc.
 - d. Bradley Corporation.
 - e. Brey-Krause Manufacturing Co.
 - f. GAMCO Specialty Accessories; a division of Bobrick.
 - g. Tubular Specialties Manufacturing, Inc.
- B. Stainless Steel: ASTM A666, Type 304, 0.031-inch (0.8-mm) minimum nominal thickness unless otherwise indicated.
- C. Brass: ASTM B19, flat products; ASTM B16/B16M, rods, shapes, forgings, and flat products with finished edges; or ASTM B30, castings.
- D. Steel Sheet: ASTM A1008/A1008M, Designation CS (cold rolled, commercial steel), 0.036-inch (0.9-mm) minimum nominal thickness.
- E. Galvanized Steel Sheet: ASTM A653/A653M, with G60 (Z180) hot dip zinc coating.
- F. Galvanized Steel Mounting Devices: ASTM A153/A153M, hot dip galvanized after

fabrication.

- G. Fasteners: Screws, bolts, and other devices of same material as accessory unit and tamper-and-theft resistant where exposed, and of galvanized steel where concealed.
- H. Mirrors: ASTM C1503, Mirror Glazing Quality, clear glass mirrors, nominal 6.0 mm thick.
- I. Electric Dryer:
 - 1. Product - Model RA5-974 by World Dryer:
 - a. Material: Cover made of 1/4" thick cast iron with porcelain enamel finish.
 - b. Motor shall be universal type, 1/10 HP at 7500 RPM. Dryers shall deliver 200 cubic feet per minute of air volume (7300 LFM).
 - c. Timer shall be electromechanical cam-style with 25 AMP rated switch to operate dryer for 30 second period on push button units.
 - d. Infrared sensor detects hands, initiates and terminates drying on automatic units.
 - e. Recessed units are made with cast iron covers and use a 16-gauge steel wall mounting box.
 - f. Hand dryers shall be listed under reexamination service of Underwriters Laboratories, Inc.

2.2 COMPONENTS

- A. Underlavatory Guard:
 - 1. Insulating pipe covering for supply and drain piping assemblies that prevent direct contact with piping and/or burns from piping; allow service access without removing coverings:
 - a. Product: Truebro LavShield Protective Lavatory Enclosure.
 - b. Material and Finish: Antimicrobial, molded plastic, white.
 - c. Provide at all lavatories.

2.3 FABRICATION

- A. Fabricate units with tight seams and joints, and exposed edges rolled. Hang doors and access panels with full length, continuous hinges. Equip units for concealed anchorage and with corrosion-resistant backing plates.
- B. Keys: Provide universal keys for internal access to accessories for servicing and resupplying. Provide minimum of six keys to Owner's representative.

PART 3 EXECUTION

3.1 COORDINATION

- A. Coordinate accessory locations with other work to prevent interference with clearances required for access by people with disabilities, and for proper installation, adjustment, operation, cleaning, and servicing of accessories.
- B. Deliver inserts and anchoring devices set into concrete or masonry as required to prevent delaying the Work.

3.2 INSTALLATION

- A. Install accessories according to manufacturers' written instructions, using fasteners appropriate to substrate indicated and recommended by unit manufacturer. Install units level, plumb, and firmly anchored in locations and at heights indicated.

- B. Grab Bars: Install to withstand a downward load of at least 250 lbf (1112 N), when tested according to ASTM F446.

3.3 ADJUSTING AND CLEANING

- A. Adjust accessories for unencumbered, smooth operation. Replace damaged or defective items. Remove temporary labels and protective coatings. Clean and polish exposed surfaces according to manufacturer's written recommendations.

PART 4 SCHEDULE

4.1 ACCESSORY SCHEDULE

- A. See fixture accessory schedule on Sheets A5.1.

END OF SECTION 10 28 13

SECTION 10 44 00 FIRE EXTINGUISHER AND CABINETS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes:
 - 1. Fire Extinguisher Cabinets.
 - 2. Fire Extinguishers
- B. Related Sections:
 - 1. Section 06 10 00: Rough Carpentry.

1.3 SUBMITTALS

- A. Product Data:
 - 1. Manufacturer's specifications and technical data to indicate specification compliance.
 - 2. Manufacturer's installation instructions.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Specifications are based on the products of named manufacturers. Other listed manufacturers who produce products equivalent to those specified are approved for use on the Project. Other manufacturers must have a minimum of five (5) years' experience manufacturing equivalent to those specified and comply with Division 01 requirements regarding substitutions to be considered:
 - 1. Larsen's Manufacturing Co.
 - 2. The Williams Bros. Corporation of America.
 - 3. J. L. Industries, Inc.
 - 4. Potter-Roemer.

2.2 MATERIALS

- A. Fire Extinguishers and Cabinets must comply with CBC Sections 11B-307, 11B-308, 11B-309, and 11B-403.
- B. Fire Extinguisher Cabinets (FEC):
 - 1. Size: 24 inches x 9-1/2 inches x 6 inches inside tub dimension.
 - 2. Type: Semi-recessed with 2-1/2 inch return trim rolled edge; ADA compliant.
 - 3. Tub Construction: 22 gauge min. steel with standard baked acrylic enamel interior finish.
 - 4. Door and Frame: 18 gauge min. 304 stainless steel door and frame with vertical decal lettering "FIRE EXTINGUISHER" in red color, unless directed otherwise by Architect.
 - 5. Glazing: clear acrylic "Duo" vertical glazing panel
 - 6. Hardware: Continuous concealed piano hinge constructed of material which matches door and trim material. Satin finish pull handle with cam cylinder lock with safety pull designed to release upon firm pull on handle (Larsen's "Larsen-Loc"™, J.L. Industries

"Saf-T-Lok"™; or equivalent).

7. Bracket: Hook type; Larsen's #1007, or equal.
8. Finish of Exterior: #4 Stainless steel.
9. Fire rating: as occurs, provide fire rated cabinet, for one or two hour rated conditions as indicated or required by specific location. Cabinet shall be tested and approved by Warnock Hersey to ASTM E814, and shall bear the Warnock Hersey label.

C. Fire Extinguishers (F.E):

1. Models/Types:
 - a. Multipurpose dry chemical with 10 lbs. capacity: C rating conforming to MP10 Series. UL Rating: 4A:80B:C.
 - b. Wet-Chemical Type, WC Series, (FE-K): UL-rated 2-A: K, 2.5-gal. (9.5-L) nominal capacity, with potassium carbonate-based chemical in stainless-steel container; with pressure-indicating gage.
2. Mounting: Provide eye brackets for direct wall mounting to hook and for mounting in Fire Extinguisher cabinets. Refer to drawings for location and quantity.
3. Provide initial inspection tag for each extinguisher.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Install fire extinguishers and cabinets in openings in accordance with manufacturer's printed instructions.
- B. Install fire extinguishers and cabinets where indicated on the drawings, or if not indicated, in locations required by governing code and as directed by Owner.

END OF SECTION 10 44 00

SECTION 10 51 26 PLASTIC LOCKERS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section relates to product and installation information of plastic lockers.

1.3 SUBMITTALS

- A. Product Data:
 - 1. Manufacturer's specifications and other data needed to prove compliance with the specified requirements.
 - 2. Manufacturer's installation instructions.
- B. Shop Drawings: Show all required field measurements, all details and elevations, plans and sections required to indicate all conditions, and dimensioned drawings of hardware.
- C. Samples:
 - 1. Actual samples or color charts indicating manufacturer's full line of colors for Architect's selection and approval.
 - 2. Actual samples of each item of hardware.
- D. Certification: Manufacturer's written certification indicating compliance with building code authorities having jurisdiction regarding to the use of the material on the Project as it applies to the use of "plastic in a commercial building".

1.4 WARRANTY

- A. Warrant the work specified herein for ten (10) years against becoming unserviceable or causing an objectionable appearance resulting from either defective or nonconforming materials or workmanship.
- B. Defects shall include, but not be limited to, the following:
 - 1. Rapid deterioration of finish.
 - 2. Loose or missing parts.
 - 3. Nonfunctioning components and mechanisms.
 - 4. Rust, delamination, warp, rot or breakage.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Specifications are based on products of named manufacturers. Other manufacturers must have a minimum of five (5) years' experience manufacturing products equivalent to those specified and substitution form to be considered:
 - 1. Lockers:
 - a. Solid Polymer (HDPE) LenoxLocker by Bradley Corp.; (800) 272-3539.
 - b. HDPE Solid Plastic Lockers by Third Dimension Division 10 Solid Plastic

Specialties; (570) 969-0623.

- c. Aquamax by List Industries, Inc.; (800) 776-1342.
 - d. Polylife® Lockers by Columbia Lockers (Div. of PSI, Inc.); (866) 337-7286.
 - e. Aquarian HDPE Lockers by Penco Products; (88) 562-1000.
 - f. Tufftec® Lockers by Scranton Products; (800) 445-5148.
2. Benches:
- a. Any approved locker manufacturer listed above.

2.2 LOCKER MATERIALS

- A. Panels:
- 1. Material: Solid Polymer high density polyethylene (HDPE) with homogeneous color throughout.
 - 2. Doors and frames: 1/2 inch thick.
 - 3. Sides, shelves, tops and backs: 3/8 inch thick.
 - 4. Slope tops: 1/4 inch thick.
- B. Hinges:
- 1. Stainless steel (Type 304 or better) or continuous solid plastic.
 - 2. Size: Minimum 2 inches, 14 gauge.
 - 3. Number: Three (3) for doors over 42 inches high.
 - 4. Plastic engraved number plates with two (2) colors.
 - 5. Latch Device: Continuous and/or padlockable.
 - 6. Padlock locking.
- C. Equipment:
- 1. Single tier lockers shall have one (1) hat shelf 10 inches below the top of locker.
 - 2. Single tier lockers 12 inches and larger in width shall have two (2) single prong wall hooks (solid plastic).
- D. Padlocks:
- 1. Types: Provide key controlled with back case stamping and control chart.
 - 2. Manufacturer: Master Lock Company, No. 1525 (as approved by Architect - submit samples).
 - 3. Color: As selected by Architect from manufacturer's standard colors.
- E. Schedule:
- 1. Type "H:"
 - a. Type: Solid Plastic Lockers - Double tier.
 - b. Size: 18 inches wide x 18 inches deep x 36 inches high (72 inches total height).
 - c. Doors: Solid with vents.
 - d. Locks: Combination lock.
 - e. Backs and Dividers: Solid.
 - f. Ends: Solid.
 - g. Base: As scheduled and detailed.
 - h. Top: Sloped.
 - i. Location: Natatorium.

2.3 SOLID POLYMER BENCHES

- A. Material: HDPE locker benches.
- B. Size: 1-3/8 inch thick x width and length shown on drawings.
- C. Pedestals: 16 inch high PVC pedestals located at 30 inches to 36 inches o.c. at locations

indicated on drawings.

- D. Attachment Hardware: Non-corrosive materials of type and size recommended by manufacturer to suit application.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Assemble and install lockers and benches in accordance with manufacturer's written instructions. Lockers shall have no sharp edges. Install lockers in the locations shown on the Drawings.
- B. Install number plates in order as shown on Drawings.
- C. Install locker doors to close smoothly and completely without binding. Ensure hinges do not bind.

END OF SECTION 10 51 26

SECTION 10 51 53 LOCKER ROOM BENCHES

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes requirements including but not limited to:
 - 1. Wood Benches.
 - 2. Accessories necessary for a complete installation.
- B. Related Sections:
 - 1. Section 03 30 00: Cast-In-Place Concrete.
 - 2. Section 05 50 00: Metal Fabrications.
 - 3. Section 09 90 00: Painting and Coating.

1.3 SUBMITTALS

- A. Product Data:
 - 1. Manufacturer's schedules, charts, literature, and illustrations to indicate the performance, fabrication procedures, product variations, and accessories.
 - 2. Manufacturer's installation instructions.
- B. Shop Drawings: Indicate size, material, and finish. Show location and installation procedures. Include details of joints, attachments and clearances.

1.4 QUALITY ASSURANCE

- A. Regulatory Requirements:
 - 1. Accessibility Requirements - Comply with applicable requirements:
 - a. U.S. Architectural and Transportation Barriers Compliance Board Americans with Disabilities Act Accessibility Guidelines for Buildings and Facilities (ADAAG) 2010.
 - b. 2022 California Building Code.
 - 1) Section 11B-225.2.1.
 - 2) Section 11B-811.
- B. Source Limitations - Obtain metal lockers and accessories from single source from single locker manufacturer:
 - 1. Obtain locks from single lock manufacturer.
- C. Preinstallation Conference: Conduct conference at site.

1.5 WARRANTY

- A. Warrant the work specified herein against defects in material and workmanship to the original purchaser for the life of the product.
- B. Defects shall include, but not be limited to, the following:
 - 1. Rapid deterioration of finish.
 - 2. Loose or missing parts.

3. Non-functioning components and mechanisms.
4. Rust, delamination, warp, rot or breakage.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers are subject to compliance with requirements; provide products by one of the following:
 1. ASI Storage Solutions, Inc.; (901) 312-6195.
 2. DeBourgh Manufacturing Co.; (800) 328-8829.
 3. List Industries, Inc.; (800) 776-1342.
 4. Penco Products, Inc.; (800) 562-1000.
 5. Republic Storage Systems Co., Inc.; (800) 477-1255.

2.2 LOCKER ROOM BENCHES

- A. Benches:
 1. Bench Material: Shall be laminated hardwood maple.
 2. Size: Shall be 9-1/2 inches deep x 1-1/4-inch-thick x lengths as shown on drawings.
 3. Finish: Manufacturer's two (2) coat clear acrylic finish.
- B. Pedestals:
 1. Manufacturer's heavy-duty cast iron pedestal supports not more than 6 feet-0 inches o.c., with provisions for attaching pedestals to bottom of bench and anchoring pedestals to floor.
 2. Height: 17-3/4 inches.
 3. Finish: Manufacturer's baked enamel finish in selected color by Architect to match lockers, unless noted otherwise.
- C. Anchorages: Provide screw fasteners for attaching each pedestal to bottom of bench and two (2) suitable anchors per pedestal for anchoring pedestals to floor.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Assemble and install locker room benches plumb, level, and flush in the locations shown on the drawings in accordance with the manufacturer's instructions.
- B. Install and anchor locker room benches to the floor and wall as instructed by the manufacturer.

END OF SECTION 10 51 53

SECTION 11 66 43 ELECTRONIC SCOREBOARD

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Single-sided LED basketball scoreboard.
- B. Reference Standards:
 - 1. Standard for Electric Signs, UL 48.
 - 2. Standard for CSA C22.2 #207.
 - 3. Federal Communications Commission Regulation Part 15.
 - 4. National Electric Code.

1.3 SUBMITTALS

- A. Product data: Submit manufacturer's product illustrations, data and literature that fully describe the scoreboards and accessories proposed for installation.
- B. Shop drawings: Submit mechanical and electrical drawings.
- C. Maintenance data: Submit manufacturer's installation, operation, and maintenance manuals.

1.4 QUALITY ASSURANCE

- A. For indoor use only.
- B. Source Limitations: Obtain each type of scoring equipment and electronic displays through one source from a single manufacturer.
- C. ETL listed to UL 48.
- D. NEC compliant.
- E. FCC compliant.
- F. ETL listed to CSA 22.2 #207.

1.5 WARRANTY

- A. Provide 5 years of no cost parts exchange including standard shipping on electronics parts and radios due to manufacturing defects.
- B. Provide toll-free service coordination.
- C. Provide technical online and phone support during Daktronics business hours.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Product delivered on site.
- B. Scoreboard and equipment to be housed in a clean, dry environment.

PART 2 PRODUCTS

2.1 MANUFACTURER

- A. Daktronics, Inc., 201 Daktronics Drive, P.O. Box 5128, Brookings, SD 57006-5128 or equal approved.

2.2 PRODUCT

- A. Daktronics BB-2155 single-sided basketball scoreboard displays period time to 99:59, HOME and GUEST scores to 199, PERIOD to nine, team FLS (fouls) to 19, PLYR (player) number to 99, player FOUL to nine, T.O.L. (time outs left) to nine and indicates possession and bonus. During the last minute of the period, scoreboard displays time to 1/10 of a second. Electronic captions automatically change when volleyball and wrestling modes are selected. Scoreboard can also score any sport requiring a clock, score and period function.

2.3 SCOREBOARD

- A. General information:
 - 1. Dimensions: 6'-0" (1.83 m) high, 10'-0" (3.05 m) wide, 0'-6" (152 mm) deep.
 - 2. Base weight: 275 lb (125 kg) – options may increase weight.
 - 3. Base power requirement: 350 W – options may increase wattage.
- B. Construction:
 - 1. All-aluminum construction.
 - 2. Scoreboard back, face, and perimeter: 0.063" (1.60 mm) thick.
 - 3. Cabinet withstands high-velocity impact from air-filled sports balls without the need for protective screens.
- C. Digits and Indicators:
 - 1. LED digit technology.
 - 2. UniView® (UV) – enhanced digits with diffusant lenses over the LEDs that blend the light for a uniform bar look and 140° viewing angle.
 - 3. Clock and score digits: 13" (330 mm) high.
 - 4. PERIOD, FLS, PLYR/FOUL and T.O.L. digits: 10" (254 mm) high.
 - 5. Bonus indicators: 4" (102 mm) high.
 - 6. Possession arrows: 3" (76 mm) high.
 - 7. Clock/colon, PERIOD, PLYR/FOUL and T.O.L. digits and bonus indicators: amber LEDs.
 - 8. Score and FLS digits and possession indicators: Red LEDs.
 - 9. Seven bar segments per digit.
- D. Vinyl Captions:
 - 1. Applied directly to scoreboard face.
 - 2. HOME and GUEST captions: 6" (152 mm) high.
 - 3. PERIOD and T.O.L. captions: 4" (102 mm) high.
 - 4. Color: standard white or others available upon request.
- E. Electronic Captions:
 - 1. FLS and PLYR/FOUL captions: 6" (152 mm) high.
 - 2. Color: amber LEDs.

- F. Horn:
 - 1. Vibrating horn mounted inside the scoreboard cabinet behind the face.
 - 2. Sounds automatically when period clock counts down to zero.
 - 3. Sounds manually as directed by operator.
- G. Power Cord:
 - 1. Cord is 11' (3.35 m) long.
 - 2. Cord plugs into a standard grounded outlet.
- H. Accessory Equipment:
 - 1. Vinyl striping applied around the clock and scoreboard face.
 - 2. Two 17" (432 mm) high, 21" (533 mm) wide aluminum panels in upper corners with vinyl logo/sponsor decoration.
 - 3. Standalone Time of Day (scoreboard acts as a clock when control console is unplugged/off).
 - 4. Advantage time option for wrestling mode – PLYR and FOUL digits reversed.
 - 5. Different sounding 12 VDC horn in place of buzzer horn.
 - 6. Hardware for suspension installation.

2.4 SCORING CONSOLE

- A. Console is an All Sport® 5000 controller.
- B. Scores multiple sports using changeable keyboard inserts.
- C. Controls multiple scoreboards, stats displays and shot clocks, including other All Sport 5000 controlled displays currently owned by customer.
- D. Recalls clock, score, and period information if power is lost.
- E. Runs Time of Day and Segment Timer modes.
- F. Console includes:
 - 1. Rugged aluminum enclosure to house electronics.
 - 2. Sealed membrane water-resistant keyboard.
 - 3. 32-character backlit LCD to verify entries and recall information currently displayed.
 - 4. Power cord that plugs into a standard grounded outlet; 6 watts max.
 - 5. Control cable to connect to the control receptacle junction box (wired system only).
 - 6. Hand-held switch for main clock start/stop and horn.
 - 7. Soft-sided carrying case.
- G. Accessory Equipment:
 - 1. 2.4 GHz spread spectrum radio system with frequency hopping technology and 64 non-interfering channels; system includes a transmitter installed inside the console and a receiver installed inside the scoreboard(s).
 - 2. Hard carrying case.
 - 3. Battery pack.

PART 3 EXECUTION

3.1 PROJECT CONDITIONS

- A. Environmental Limitations: Do not install scoring equipment until spaces are enclosed and weatherproof, wet work in spaces is complete and dry, and ambient temperature and humidity conditions are maintained at the levels indicated for project when occupied for its

intended use.

- B. Field Measurements: Coordinate scoreboard location and height with the customer. Verify dimensions by field measurements.
- C. Supply weight and mounting method for owner to verify that building structure is capable of supporting the scoreboard's weight in addition to the auxiliary equipment.

3.2 EXAMINATION

- A. Verify that mounting surface is ready to receive scoreboard. Verify that placement of conduit and junction boxes are as specified and indicated in plans and shop drawings.

3.3 INSTALLATION

- A. Power conduit, cables and outlet boxes to be provided and installed by the electrical contractor. Signal raceways, conduit and boxes to be provided by the electrical contractor. Electrical contractor is also responsible for any required wire and terminators between each scoreboard and control location.
- B. Mount scoreboards and interior displays to wall in location detailed and in accordance with manufacturer's instructions. Unit to be plumb and level.

3.4 INSTALLATION - CONTROL CENTER

- A. Provide boxes, cover plates and jacks as required to meet control specification requirements. Control cables to control panels shall be concealed.
- B. Test the operation of the scoreboard, controller and all control jacks; leave control unit in carrying case and other loose items with owner's designated representative.
- C. Conduct operator training on the scoreboard/controller operation

END OF SECTION 11 66 43

SECTION 12 24 13 ROLLER WINDOW SHADES

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes window shades:
 - 1. Manual operation – Default.
 - 2. Motorized operation – Use with District permission only.

1.3 WARRANTY

- A. Special Warranty:
 - 1. Manufacturer's standard form in which manufacturer agrees to repair or replace components of roller shades that fails in materials or workmanship within specified warranty period:
 - a. Warranty Period: Lifetime.
- B. Installer's Warranty: 1 year.

1.4 REGULATORY REQUIREMENTS

- A. Manual Window Shade Controls:
 - 1. Unless where exempt per CBC Section 11B-203.9 Employee Workstations, manual window shade controls in classrooms, assemblies and other areas are required to be accessible per CBC Section 11B-205 Operable Parts:
 - a. Operable parts and controls at unobstructed forward and side approach shall be located within 48" a.f.f. to top of device. For reach requirements at other conditions, comply with 11B-308 as they apply. Operable parts shall be operable with one hand and shall not require tight grasping, pinching or twisting of the wrist and shall have a maximum operable force of 5 pounds. Operable parts shall also comply with CBC sections 11B 308.2, 11B 308.3 and 11B-309.4.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Roller shades are subject to compliance with requirements. Provide either the named product or an equal product by one of the other manufacturers specified:
 - 1. MechoShade Systems, Inc. (District Standard) Sonny Flink 818-346-0308:
 - a. Local Contact: Don 805-481-2761.
 - 2. Draper Inc.
 - 3. Silent Gliss USA, Inc.
 - 4. Hunter Douglas.
 - 5. Or approved equal.

2.2 ROLLER SHADES

- A. Solar Shade Cloth:

1. ThermoVeil 1300 Series basket weave shadecloths in 2 non-directional 2 x 2 basket-weave. Uniform scrim effect at the window wall with appropriate densities for sun control.
 2. Content: 79% vinyl, 21% polyester core.
 3. UV Test 200 sun-fade hours: None
 4. 500 sun-fade hours: 5%.
 5. Openness Factor: $\pm 5\%$.
 6. Color: Selected from manufacturer's standard colors.
- B. Blackout Shadecloths:
1. ThermoVeil 0700 series, blackout material, washable and colorfast laminated and embossed vinyl coated fabric, 0.012 inches thick blackout material and weighing 0.81 lbs. per square yard, with a minimum of 62 threads per square inch.
 2. Content: 79% vinyl, 21% polyester core.
 3. Transparency: Opaque.
 4. Color: As selected by Architect from manufacturer's standard colors.

2.3 ACCESSORIES

- A. Roller Shade Pocket:
1. For recessed mounting in acoustical tile, or drywall ceilings as indicated on the Drawings:
 - a. Product: 1-1/2" by 6" clear anodized aluminum.
 - b. Provide either extruded aluminum and or formed steel shade pocket, sized to accommodate roller shades, with exposed extruded aluminum closure mount, tile support and removable closure panel to provide access to shades:
 - 1) Provide "Vented Pocket" such that there will be a minimum of four 1-inch diameter holes per foot allowing the solar gain to flow above the ceiling line.
 - c. Pocket Accessories: As indicated on the Drawings.
- B. Fascia:
1. Continuous removable extruded aluminum fascia that attaches to shade mounting brackets without the use of adhesives, magnetic strips, or exposed fasteners.
 2. Fascia shall be able to be installed across two or more shade bands in one piece.
 3. Fascia shall fully conceal brackets, shade roller and fabric on the tube.
 4. Provide bracket / fascia end caps where mounting conditions expose outside of roller shade brackets.
 5. Notching of Fascia for manual chain shall not be acceptable.
- C. Room Darkening Side and Sill Channels:
1. Extruded aluminum with polybond edge seals and SnapLoc-mounting brackets and with concealed fastening. Exposed fastening is not acceptable. Channels shall accept one-piece exposed blackout hembar with vinyl seal to assure side light control and sill light control.
 - a. MechoShade side channels, 1-15/16 inches wide by 1-3/16 inches deep, two-band center channels, 2-5/8 inches wide by 1-3/16 inches deep. The 2-5/8-inch double-center channels may be installed at center-support positions of multi-band-shade ElectroShades. MechoShade side channels 2-5/8 inch may be used as center supports for ElectroShades; shadebands up to 8 high. For shadebands over 8 feet, provide ElectroShade side channels.
 - b. ElectroShade side channels, 2-1/2 inches wide by 1-3/16 inches deep; two-band center channels 5 inches wide by 1-3/16 inches deep. The 2-5/8-inch double-center channels may be installed at center-support positions of multi-band-shade ElectroShades. MechoShade side channels 2-5/8 inches may be used as center supports for ElectroShades. Also provide for use with manually operated room

darkening MechoShades over 8 feet in height.

2.4 SHADE BAND

- A. Shade Bands:
 - 1. Construction of shade band includes the fabric, the hem weight, hem-pocket, shade roller tube, and the attachment of the shade band to the roller tube. Sewn hems and open hem pockets are not acceptable:
 - a. Hem Pockets and Hem Weights: Fabric hem pocket with RF-welded seams (including welded ends) and concealed hem weights. Hem weights shall be of appropriate size and weight for shade band. Hem weight shall be continuous inside a sealed hem pocket. Hem pocket construction and hem weights shall be similar, for all shades within one room.
 - b. Shade Band and Shade Roller Attachment:
 - 1) Use extruded aluminum shade roller tube of a diameter and wall thickness required to support shade fabric without excessive deflection. Roller tubes less than 1.55 inch in diameter for manual shades, and less than 2.55 inches for motorize shades are not acceptable.
 - 2) Provide for positive mechanical engagement with drive / brake mechanism.
 - 3) Provide for positive mechanical attachment of shade band to roller tube; shade band shall be made removable / replaceable with a "snap-on" snap-off" spline mounting, without having to remove shade roller from shade brackets.
 - 4) Mounting spline shall not require use of adhesives, adhesive tapes, staples, and/or rivets.
 - 5) Any method of attaching shade band to roller tube that requires the use of adhesive, adhesive tapes, staples, and/or rivets are not acceptable.

2.5 SHADE FABRICATION

- A. Fabricate units to completely fill existing openings from head to sill and jamb-to-jamb, unless specifically indicated otherwise.
- B. Fabricate shade cloth to hang flat without buckling or distortion. Fabricate with heat-sealed trimmed edges to hang straight without curling or raveling. Fabricate unguided shade cloth to roll true and straight without shifting sideways more than 1/8 inch in either direction per 8 feet of shade height due to warp distortion or weave design. Fabricate hem as follows:
 - 1. Standard concealed hem bar.

2.6 COMPONENTS

- A. Access and Material Requirements:
 - 1. Provide shade hardware allowing for the removal of shade roller tube from brackets without removing hardware from opening and without requiring end or center supports to be removed.
 - 2. Provide shade hardware that allows for removal and re-mounting of the shade bands without having to remove the shade tube, drive or operating support brackets.
 - 3. Use only Delrin engineered plastics by DuPont for all plastic components of shade hardware. Styrene based plastics, and /or polyester, or reinforced polyester will not be acceptable.
- B. Manual Operated Chain Drive Hardware and Brackets:
 - 1. Provide for universal, regular and offset drive capacity, allowing drive chain to fall at front, rear or non-offset for all shade drive end brackets. Universal offset shall be adjustable for future change.

2. Provide hardware capable for installation of a removable fascia, for both regular and/or reverse roll, which shall be installed without exposed fastening devices of any kind.
 3. Provide shade hardware system that allows for removable regular and/or reverse roll fascias to be mounted continuously across two or more shade bands without requiring exposed fasteners of any kind.
 4. Provide shade hardware system that allows for operation of multiple shade bands (multi-banded shades) by a single chain operator, subject to manufacturer's design criteria. Connectors shall be offset to assure alignment from the first to the last shade band.
 5. Provide shade hardware system that allows multi-banded manually operated shades to be capable of smooth operation when the axis is offset a maximum of 6 degrees on each side of the plane perpendicular to the radial line of the curve, for a 12 degrees total offset.
 6. Provide positive mechanical engagement of drive mechanism to shade roller tube. Friction fit connectors for drive mechanism connection to shade roller tube are not acceptable
 7. Provide shade hardware constructed of minimum 1/8-inch thick plated steel or heavier as required to support 150 percent of the full weight of each shade.
 8. Drive Bracket / Brake Assembly:
 - a. MechoShade Drive Bracket model shall be fully integrated with all MechoShade accessories, including, but not limited to: SnapLoc fascia, room darkening side / sill channels, center supports and connectors for multi-banded shades.
 - b. M5 drive sprocket and brake assembly shall rotate and be supported on a welded 3/8 inch steel pin.
 - c. The brake shall be an over-running clutch design which disengages to 90 percent during the raising and lowering of a shade. The brake shall withstand a pull force of 50 lbs. in the stopped position.
 - d. The braking mechanism shall be applied to an oil-impregnated hub on to which the brake system is mounted. The oil impregnated hub design includes an articulated brake assembly, which assures a smooth, non-jerky operation in raising and lowering the shades. The assembly shall be permanently lubricated. Products that require externally applied lubrication and or not permanently lubricated are not acceptable.
 - e. The entire M5 assembly shall be fully mounted on the steel support bracket, and fully independent of the shade tube assembly, which may be removed and reinstalled without effecting the roller shade limit adjustments.
 - f. Drive Chain: #10 qualified stainless steel chain rated to 90 lb. minimum breaking strength. Nickel plate chain shall not be accepted.
- C. Motorized Operating System:
1. Provide factory-assembled, shade-operator system of size and capacity and with features, characteristics, and accessories suitable for conditions indicated, complete with electric motor and factory-prewired motor controls, power disconnect switch, enclosures protecting controls and operating parts, and accessories required for reliable operation without malfunction. Include wiring from motor controls to motors. Coordinate operator wiring requirements and electrical characteristics with building electrical system:
 - a. Electrical Components: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
 - b. Electric Motor: Manufacturer's standard tubular, enclosed in roller.
 - c. Remote Control:
 - 1) Electric controls with NEMA ICS 6, Type 1 enclosure for recessed or flush mounting. Provide the following for remote-control activation of shades:
 - a) Individual Switch Control Station: Three-position,

- toggle-style, wall-switch-operated control station with open, close, and center off functions.
- b) Group Control Station: Three-position, rocker-style, wall-switch-operated control station with open, close, and center off functions for single-switch group control.
- c) Microprocessor Control: Electronic programmable means for setting, changing, and adjusting control features; isolated from voltage spikes and surges.
- d. Limit Switches: Adjustable switches interlocked with motor controls and set to stop shades automatically at fully raised and fully lowered positions.
- e. Operating Features:
 - 1) Group switching with integrated switch control; single faceplate for multiple switch cutouts.

PART 3 EXECUTION

3.1 ROLLER-SHADE INSTALLATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, operational clearances, accurate locations of connections to building electrical system, and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.
- C. Install roller shades level, plumb, and aligned with adjacent units, according to manufacturer's written instructions:
 - 1. Opaque Shadebands: Located so shadeband is not closer than 2 inches (50 mm) to interior face of glass. Allow clearances for window operation hardware.
- D. Electrical Connections: Connect motor-operated roller shades to building electrical system.
- E. Adjust and balance roller shades to operate smoothly, easily, safely, and free from binding or malfunction throughout entire operational range.
- F. Clean roller-shade surfaces after installation, according to manufacturer's written instructions.

END OF SECTION 12 24 13

SECTION 131100 - SWIMMING POOLS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. The BIDDING REQUIREMENTS, CONTRACT FORMS, AND CONDITIONS OF THE CONTRACT and applicable parts of DIVISION 1 - GENERAL REQUIREMENTS, as listed in the Table of Contents, be included in, and made a part of this Section.

1.2 SUMMARY OF WORK *(for general guidance-not inclusive)*

- A. Introduction
 - 1. Provide labor, materials, equipment, and services necessary to construct the pool and sprayground. This work must include the structure(s) and installation finishes as well as products listed in Part 2 of Section 131100.
- B. Work included in this section:
 - 1. It is the intent of this section to place the entire responsibility for the construction of the pool and sprayground (including the construction of the pool structures) under one vested Contractor. Under this section the Contractor will provide but is not necessarily limited to the following:
 - a. Provide equipment and services required for erection and delivery onto the premises the equipment or apparatus provided. Remove equipment from premises when no longer required.
 - b. Grade and replace load bearing or high plasticity index soil, pump and dewater as necessary to keep excavations free from water during construction and provide sub-surface drainage beneath the surge tanks as needed or required in the project geotechnical report. Reference Division 31 - Earthwork.
 - c. Provide and maintain proper shoring and bracing for existing utilities, sewers and building foundations where required for related excavations. Reference Division 31 - Earthwork.
 - d. Provide electrical conduit, wiring, junction boxes etc. to low voltage pool equipment within pool filter/chemical rooms per Division 26 - Electrical. (Low voltage is considered less than 110 V.)
 - e. Coordinate for required bonding and grounding of the pool shell, fittings, and equipment.
 - f. Provide necessary piping and valving as shown on the drawings and specified herein.
 - g. Provide individually sized housekeeping pads for each pool pump. Provide housekeeping pads for pool equipment as required in the drawings.
 - h. Provide the main drain hydrostatic relief systems and a sight sump as shown on the drawings. Reference Division 31 - Earthwork.
 - i. Construct the cast in place or pneumatically applied concrete pool shell and cast in place surge tank, balance tank, and sprayground slab. as described in these specifications and detailed on the drawings, including reinforcement steel, inserts, fittings, fiberglass or stainless-steel main drain sumps and embedded items (piping, anchors, etc.) for the pool and sprayground. Reference Division 3 - Concrete and Structural. Before commencing the placement of concrete, verify electrical bonding of the pool and sprayground embedded items and reinforcing steel. Also, coordinate and arrange required electrical, plumbing and or building inspections. Provide structure drainage around the pool as shown on the drawings. Backfill and compact fill around the pool structure, piping trenches and excavations required by this work. Reference Division 31 - Earthwork.
 - j. Provide a proprietary aggregate cementitious finish finish in the pool with a slip

resistant surface with a vertical tile band. Provide specialty tile for the perimeter tile deck markings, gutter nosing, wall targets, recessed steps, toe ledge, floor lane markings, depth markings and warning signs, and other tile installation within the pool structures. Reference Section 131103 - Swimming Pool Tile - including the tolerance requirements for the concrete substrate.

- k. Provide deck mounted anchors, sockets, and inserts for the pool and sprayground and coordinate construction locations for each.
- l. Provide fully assembled cleaning and maintenance equipment for the pool and sprayground as specified herein.
- m. Provide for the storage of pool related equipment, materials, and systems. Items are the responsibility of the Contractor until accepted by the owner.
- n. Obtain final acceptance by jurisdictional health departments.
- o. Start, test, calibrate and adjust mechanical equipment, electrical equipment, recirculation, chemical, and other supplied systems including deck, loose, maintenance, and safety equipment. Instruct the Owner's representative in the systems operation and maintenance as described herein.
- p. Provide the heating system for the pool. Include piping, heaters, heat exchangers, booster pumps, controls, gauges, thermostats, control valves and wiring required to draw water from the recirculation line, heat the water and return it back to the recirculation line and interlock with pool recirculation pumps.

C. Related work specified in other sections:

- 1. Section 131104 – Swimming Pool Cementitious Finish
- 2. Section 131103 – Swimming Pool Tile
- 3. Section 131106 – Swimming Pool Timing System
- 4. Section 131233 – Sprayground Features
- 5. The following work related to the swimming pools must be completed by other trades.
 - a. Provide, erect, and maintain necessary barricades, signs, lights, and flares for pool construction to protect workers and the public.
 - b. Provide and maintain proper shoring and bracing for existing utilities, sewers and building foundations where required for swimming pool related excavations. Reference Division 31 – Site Earthwork.
 - c. Provide the under-drain system beneath the pool and sprayground, as required.
 - d. Provide sub-surface drainage beneath the pump pits and backwash pits. Reference Division 31 - Earthwork.
 - e. Construct pump pit and backwash pit including reinforcement, inserts, wall sleeves, anchors, access hatches, and fittings. Reference Division 3 - Concrete.
 - f. Layout, excavate, remove from the construction site, replace, and grade materials as required beyond the limits of excavation of the pool structures to complete the work described in this section. Reference Division 31 - Earthwork.
 - g. Prior to concrete pours, verify electrical bonding of the pool embedded items. Coordinate and arrange required electrical, plumbing and or building inspections that must be performed on embedded items. Reference Division 26 - Electrical.
 - h. Provide sanitary sewer and storm drain connections. Reference Division 22 - Plumbing.
 - i. Provide the deck finish. Reference Division 32 - Exterior Improvements.
 - j. Provide rules and regulations signage as required by code. Reference Division 1 - General Requirements.
 - k. Provide chlorine resistant caulking (sealant) and backer rod on pool decks. Reference Division 7 - Thermal and Moisture Protection.

D. Related work specified in Plumbing section. Reference Division 22 - Plumbing. Work that must be completed by others.

- 1. Provide trench drains and/or area drains on pool deck.
- 2. Provide sanitary sewer piping from the filter room including floor drains, sumps, and

- sump pumps.
 - 3. Provide water service to hose bibbs, flush hydrant boxes and auto-fill bypass to air gap above fill funnels. Install the slow closing solenoid valves in the bypass auto-fill piping.
 - 4. Provide water meter on the fresh water supply line upstream of the manual fill valve and the install the slow closing solenoid valve.
- E. Related work specified in Mechanical section. Reference Division 23 – HVAC. Work that must be completed by others.
- 1. Provide gas service and connections for pool water heating.
 - 2. Provide air recirculation systems for pool related spaces.
- F. Related work specified in Electrical sections. Reference Division 26 – Electrical. Work that must be completed by others.
- 1. Provide power to the exhaust fans for the chemical rooms.
 - 2. Provide motor starters, auxiliary contacts, magnetic relays, emergency stops and other electrical control devices necessary for the complete operation of the pool systems. Provide power to Variable Frequency Drive pool pump starters and power from VFD to the pool pump motor.
 - 3. Ground and bond pool structures, fittings, and equipment in accordance with Article 680 of the N.E.C. Test and verify that the system electrical ground is true and solid. Provide certification to this effort.
 - 4. Obtain permits, inspections, and approvals of wiring including grounding and bonding of metal components associated with the pool in accordance with Local, State and National Electrical Codes.
 - 5. Provide power, conduits, electrical boxes, and wiring for the Contractor provided electronic timing and scoreboard system with multi-sport capability for race swimming, water polo, and pace clocks.
 - 6. Provide power, conduits, electrical boxes, and wiring for the underwater lights and junction boxes.
 - 7. Confirm electrical conduits that penetrate the pool shell are watertight and installed per N.E.C. Article 680.

1.3 QUALITY ASSURANCE

- A. The specifications and drawings illustrate and detail one (1) swimming pool system and one (1) sprayground system that are utilized for both competitive and recreational use. Certain technical aspects of the design are common only to pool systems planned for public use. Understanding these aspects, their functions and interaction through experience is vital to completing a successful operating system. It is a mandatory requirement that the Contractor have achieved such experience as a prerequisite for bidding on this project.
- 1. The Swimming Pool Contractor to refer to section 002113 – Instructions to Bidders for bonding requirements.
 - 2. The Swimming Pool Contractor must include a bid bond from an approved surety company registered in the State of CALIFORNIA certifying that the Swimming Pool Contractor has adequate bonding capacity to provide a bid for this project. The Swimming Pool Contractor must submit a copy of the bid bond for review prior to the Swimming Pool Contractor's selection.
 - 3. If the Contractor has not received prior written approval for this project or has not been included in the pre-approved list of Contractors, they must submit a list of projects meeting the aforementioned qualifications, including contact information of the General Contractor must be submitted for review and approval at least 10 days prior to bidding of the project. The Contractor must have completed at least five (5) public-use pools with individual water surface areas in excess of 12,000 square feet and a depth of 11'-6" or more within the past 10 years.
 - 4. The Contractor must submit prior to the start of construction the name of the on-site

Project Superintendent including their relevant experience. The Contractor's on-site Project Superintendent must have completed at least five (5) public-use pools with individual water surface areas in excess of 12,000 square feet and a depth of 8'-0" or more within the past 10 years. A list of projects meeting the aforementioned qualifications, including contact information of the General Contractor as well as Owner must be included with the experience submittal. Project Superintendent on the project cannot change unless written authorization has been provided by the Architect and Owner.

5. The Owner reserves the right to reject a bid if the evidence submitted by, or investigation of, the Contractor fails to satisfy the Owner that the Contractor is properly qualified to carry out the obligation of the contract and to complete the work described or if the Contractor does not have the qualifications stated herein. Subject to compliance with item 2 above on this specification.

1.4 REGULATORY AGENCY REQUIREMENTS AND ENGINEERING SERVICES

- A. The system must comply with necessary pre-construction approvals.
- B. Give necessary notices, obtain permits, and pay government fees, and other costs in connection with his work, including the filing of necessary as-built drawings, prepare documents (including any amendments to the approved construction documents) and obtain necessary approvals of governmental departments having jurisdiction over their work. Obtain required certificates of inspection for his work and deliver copies to the Owner and Architect before requesting acceptance and final payment for the work.
- C. Include in the work, without extra cost to the Owner, labor, materials, services, apparatus, or drawings in order to comply with applicable laws, ordinances, rules, and regulations, whether or not shown on drawings and/or specified.

1.5 COORDINATION AND CLARIFICATION

- A. Coordinate with other trades' work relating to this section.
- B. Must establish with other trades, having related work in this section, that work necessary to complete the pool(s) as shown on the drawings and in the specifications is included in the base bid and alternates to the Owner.
- C. If in doubt regarding the responsibility for work covered in this section and/or discovery of errors or omissions in the bidding documents, notify the Architect through channels established by the specifications and request a clarification ten (10) days prior to the bid date.

1.6 ALTERNATES

- A. Review the description of the alternates in Division 1 and on the drawings for possible effect upon work in this section. Alternates related to the work in this section are described in this division and on the bid proposal form.

1.7 CONTRACTOR'S ALTERNATE PROPOSAL

- A. Submit bid to the owner based on materials, equipment and methods as specified in this Section. No substitution of material will be allowed.
- B. It is the intent of the contract documents to encourage competition. The base proposal must include the construction methods and equipment as specified and detailed. Proposed system

substitutions must have prior written approval by the Architect.

- C. If there is a deviation from the basis of design equipment, confirm that engineering criteria are appropriate for the substituted equipment.
- D. Substitutions of specified construction methods and equipment must include a complete submittal as required by these specifications and drawings of appropriate scale incorporating required changes. Provide a list of at least ten (10) satisfactory installations comparable to this project that have been manufactured and installed under the manufacturer's current legal name. Submit a list of such projects with the name, address and current telephone number of the Owner's Operator and Architect of Record to the Architect on the bid date.
- E. Changes or modifications to the Contract Documents that are not authorized by the architect are the sole responsibility of the Contractor.

1.8 SUBMITTALS

- A. Submittals must be made in accordance with the requirements of Division 1 - General Requirements and in strict compliance with the following procedures and guidelines.
- B. One (1) set of shop drawings and engineering data must be tabbed, indexed, and referenced to the specifications, compiled into an electronic submittal, and submitted in two stages. The first stage must include items for the pool shell(s), reference swimming pool structural specifications. The second stage must be for remaining items. Each section of items must be prefaced by a cover sheet listing the items submitted within the section. Electronic submittals must be organized, numbered, and submitted in the same format and order as the project specifications. Only complete sets will be reviewed.
 - 1. Engineering data covering systems, equipment, structures, and fabricated materials, which will become a permanent part of the work under this contract, must be submitted for review. This data must include drawings and descriptive information in sufficient detail and scale to show the kind, size, arrangement, and operation of component materials and devices; the external connections, anchorage and supports required; performance characteristics; fabrication and dimensions needed for installation and correlation with other materials and equipment. A certification, in writing, must be provided indicating that equipment will fit in the space allotted and as shown on the drawings.
 - 2. Submittals regardless of origin must be stamped with the approval of the Contractor and identified with the name and number of this contract, Contractor's name, and references to applicable specification paragraphs and contract drawings. Each submittal must indicate the intended use of the item in the work. When catalog pages are submitted, applicable items must be clearly identified. The current revision, issue number, and date must be indicated on drawings and other descriptive data.
 - 3. The submittals will not be accepted from anyone but the Contractor. Submittals must be consecutively numbered in direct sequence of submittal and without division by subcontracts or trades.
 - 4. The Contractor's stamp of approval is a representation that the Contractor accepts full responsibility for determining and verifying quantities, dimensions, field construction criteria, materials, catalog numbers and similar data, and that he has reviewed or coordinated each submittal with the requirements of the work and the contract documents.
 - 5. Each submittal must include a statement prepared by the originator of the drawings and data, certifying compliance with the contract documents except for deviations, which are specifically identified.
 - 6. Deviations from the contract documents must be identified on each submittal and must be tabulated in the Contractor's letter of transmittal. Such submittals must, as pertinent to the deviation, indicate essential details of changes by the Contractor (including modifications to other facilities that may be a result of the deviation) and required piping and wiring

- diagrams.
7. The Contractor must accept full responsibility for the completeness of each submission, and, in the case of a resubmission, must verify that exceptions previously noted have been considered.
 8. The need for more than one resubmission, or a delay in obtaining review of submittals, will not entitle the Contractor to an extension of the contract time unless the delay of the work is directly caused by a change in the work authorized by a change order.
 9. Review of drawings and data submitted by Contractor will cover only general conformity to the drawings and specifications, external connections and dimensions that affect the layout. Review does not indicate a thorough review of dimensions, quantities, and details of the material, equipment, device, or item shown. Review of submittals does not relieve Contractor from responsibility for errors, omissions, or deviations, or responsibility for compliance with the contract documents.
 10. When the drawings and data are returned marked REJECTED, REVISE AND RESUBMIT or SUBMIT SPECIFIED ITEM, the corrections must be made as noted thereon and as instructed and six corrected copies (or one copy and one corrected reproducible copy) resubmitted.
 11. Resubmittals must bear the number of the first submittal followed by a letter (A, B, etc.) to indicate the sequence of the resubmittal. Resubmittals must be indexed, tabbed, referenced to the specifications, and bound in a three-ring binder and submitted at one time.
 12. When corrected copies are resubmitted, the Contractor must, in writing, direct specific attention to revisions and must list separately revisions made other than those called for on previous submissions.
 13. When the drawings and data are returned marked NO EXCEPTIONS TAKEN or MAKE CORRECTIONS NOTED, no additional copies are to be provided unless specifically requested to do so for record.
- C. Permits, Receipts and Test Reports
1. Provide the Architect with copies of permits and receipts for fee payments.
 2. Submit a sample format for each test report intended for use. Submit test reports required herein only on approved forms.
- D. Include complete product data indexed, tabbed, and referenced to specifications with 8 ½" x 11" cover sheet covering:
1. Paragraph 2.01 - Overflow System
 2. Paragraph 2.02 - Pumping Equipment
 3. Paragraph 2.03 - Filtration Equipment
 4. Paragraph 2.04 - Recirculation Fittings
 5. Paragraph 2.05 - Piping Systems
 6. Paragraph 2.06 - Chemical Treatment Systems
 7. Paragraph 2.07 - Chemistry Monitoring and Control Systems
 8. Paragraph 2.08 - Flow Meters
 9. Paragraph 2.09 - Water Level Controllers
 10. Paragraph 2.10 - Deck Equipment
 11. Paragraph 2.11 - Loose Equipment
 12. Paragraph 2.12 - Maintenance Equipment
 13. Paragraph 2.13 - Safety Equipment
 14. Paragraph 2.14 - Thermometers
 15. Paragraph 2.15 - Swimming Pool Finishes
 16. Paragraph 2.16 - Waterproofing
 17. Paragraph 2.17 - Sealants
 18. Paragraph 2.18 - Underwater Lights
 19. Paragraph 2.19 - Pool Cover
 20. Paragraph 2.20 - Pool Heaters

- E. Include engineering/construction drawings for the pool structure.
 - 1. Reference Division 3 - Concrete.
- F. Include engineering construction drawings for pool piping.
- G. Include separate submittal for all color selections required to be made by the Owner/Architect. Physical samples and/or mock ups must be provided as requested and submitted for review. The following items must be included:
 - 1. Sight Sump Frame and Cover
 - 2. Starting Platforms
 - 3. Lifeguard Chairs
 - 4. Pool Lift
 - 5. Competition Floating Lane Ropes
 - 6. Backstroke Flags
 - 7. Lane Line Storage Reels
 - 8. Movable Stanchions and Swag Lines
 - 9. Swimming Pool Cementitious Finish – Reference Section 131104
 - 10. Swimming Pool Tile - Reference Section 131103
 - 11. Sealants
 - 12. Pool Covers
 - 13. Sprayground Features - Reference Section 131233
- H. Reference Section 131104 - Swimming Pool Cementitious Finish
- I. Reference Section 131103 - Swimming Pool Tile
- J. Reference Section 131106 - Swimming Pool Timing System
- K. Reference Section 131233 – Sprayground Features

1.9 TESTING REPORTS

- A. Provide all testing reports as described in the specifications. Testing report(s) and any additional documentation of the test(s) must be submitted to the Architect within seven (7) days of the commencement of the test(s) unless otherwise noted. The following testing report(s) must be submitted for review/record:
 - 1. The pool piping must be capped and hydrostatically pressure tested prior to backfilling. Hydrostatic pressure tests must be performed by the Contractor and witnessed by the Owner, or a representative designated by the Owner.
 - 2. The pool, gutter, surge and balance tanks must be tested for water tightness prior to the application of any finishes. The water tightness test must be performed by the Contractor and witnessed by the Owner, or a representative designated by the Owner.
 - 3. domestic water must be analyzed prior to filling the pool after the application of the plaster finish. The Contractor must provide a domestic water analysis by a water testing agency to determine types and quantities of chemicals required to ensure calcium-balanced water immediately upon the completion of filling the pool(s). Refer to specification 131104.
 - 4. The slump of the plaster finish must be tested should a plastering machine be used. The Contractor to perform slump test to ensure slump does not exceed 2.5" when tested using a 2" by 4" by 6" high slump cone. Refer to specification 131104.
 - 5. Concrete test panels/cylinders must be tested for compressive strength. The Contractor to produce test panels/cylinders to be tested by a third-party testing agency provided by the Owner. Refer to specifications Division 3 – Concrete

1.10 OPERATION AND MAINTENANCE MANUALS AND CLOSE-OUT SUBMITTALS

- A. Detailed operation and maintenance information must be supplied for equipment requiring maintenance or other attention. The equipment supplier and/or the Contractor must prepare an operation and maintenance manual for equipment. Parts lists and operating, and maintenance instructions must be provided.
- B. Each operation and maintenance manual must include the following:
1. Equipment function and calibration, normal operating characteristics, and limiting conditions.
 2. Assembly, installation, alignment, adjustment and checking instructions.
 3. Operating instructions for startup, routine and normal operation, regulation, and control, shut down and emergency conditions.
 4. One (1) copy of instructional videos.
 5. One (1) copy of Safety Data Sheet forms for all pool chemicals provided.
 6. Operating cycles must be specifically described in outline format and in referenced detail. A wall-mounted color-coded piping flow diagram must be provided in the pool equipment room. The diagram must be engraved on laminated plastic with color-coded piping to match the color of coding on piping, and including valves identified with number on tags. The minimum size is 11-inch x 17 inch.
 7. Include manufacturer recommended maintenance schedule, parts lists, piping diagram (to agree with wall mounted diagram) and trouble-shooting information for pool mechanical equipment.
 8. Using reference to keyed valves and wall diagram, include specific written instructions for procedures that must be followed for the following:
 - a. Emptying and refilling the pool(s) including de-watering during the period that the pool(s) will be empty.
 - b. Water level control adjustment and chemical control operation.
 - c. Normal surge/balance tank operation and balancing.
 - d. Filter operation and backwashing; and
 - e. Super chlorination.
 9. Lubrication and maintenance instructions.
 10. Guide to "troubleshooting."
 11. Parts list and predicted life of parts subject to wear.
 12. Outline, cross section, and assembly drawings; engineering data and wiring diagrams.
 13. Test data and performance curves, where applicable.
 14. Specific written instructions for procedure for emptying and refilling the pool(s) including de-watering during the period that the pool will be empty. Provide a yellow warning sign 8-1/2 in. x 11 in., that must be mounted in the filter room, that reads:

WARNING

Prior to emptying Pool

Consult O & M Manuals for Procedures

Add another sign that reads:

Keep Caps, Plugs and Tops Tight Fitting to Prevent Escape of Fumes.

15. Additionally, provide the following signs mounted on the chemical room doors:
 - a. NFPA Hazard Diamond for each chemical stored in room.
 - b. Warning: Authorized Personnel Only Beyond This Point
 - c. Signage indicating location of associated Safety Data Sheet forms for all chemicals stored in room.
16. One set of applicable submittals must be included in each manual.

- C. The operation and maintenance manuals must be in addition to instructions or parts lists packed with or attached to the equipment when delivered, or which may be required by the

Contractor.

- D. Manuals and other data must be printed on heavy, first quality paper, 8-1/2 x 11-inch size with standard 3-hole punching and inserted in plastic covers. Drawings and diagrams must be reduced to 8-1/2 x 11 inches or 11 x 17 inches. Where reduction is not practical, larger drawings must be folded separately and placed in envelopes that are bound into the manuals. Each envelope must bear suitable identification on the outside.
- E. Six (6) bound volumes of each manual must be submitted. Parts lists and information must be assembled in substantial manuals and permanent, three-ring or three-post binders. Material must be assembled and bound in the same order as specified, and each volume must have a table of contents and suitable index tabs.
- F. Material must be marked with project identification. Non-applicable information must be marked out or deleted.
- G. Shipment of equipment will not be considered complete until the required manuals and data have been received.
- H. The Contractor must provide, assemble, and inventory all deck, loose, safety, and maintenance equipment including any loose mechanical equipment prior to the Owner taking possession of the pool(s). The Contractor must provide a checklist that has been signed by the Owner verifying receipt of all items listed in Part 2 - Products.

1.11 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. Deliver material in manufacturer's original, unopened containers and crates with labels intact and legible.
- B. Deliver materials in sufficient time and quantity to allow continuity of work and compliance with approved construction schedule.
- C. Handle materials in a manner to prevent damage.
- D. Store materials on clean raised platforms with weather protective coverings. Provide continuous protection of materials against damage or deterioration.
- E. Remove damaged materials from site.

1.12 WARRANTIES

- A. The Contractor warrants to the Owner and Architect that materials and equipment provided under the contract will be of good quality and new unless otherwise required or permitted by the contract documents, that the work will be free from defects not inherent in the quality required or permitted, and that the work will conform with the requirements of the contract documents. Work not conforming to these requirements, including substitutions not properly approved and authorized will be considered defective. The Contractor's warranty will exclude remedies for damage or defect caused by abuse, improper or insufficient maintenance, improper operations, modifications not executed by the Contractor or improper wear and tear under normal use. If required by the Architect, provide satisfactory evidence as to the kind and quality of materials and equipment.
- B. The Contractor must agree to repair or replace defective or non-complying work at no cost to the Owner upon written notification from the Owner within the warranty period. Pro-rated

warranties are not acceptable.

- C. Warranties must be for a period of one year from the date of substantial completion or the owner begins using the pool unless otherwise specified. Submit warranties covering, but not limited to the following:
1. Defects in material or workmanship of the pool and surge/balance tank structures causing a loss of water for a period of three (3) years.
 2. Defects in material, manufacture and installation of the filtration, backwash, chlorination, pH adjustments and cleaning systems, including controls for a period of one (1) year.
 3. Defects in material, manufacture or installation of the recirculating overflow system and interior coating of the gutter for a period of one (1) year.
 4. Manufacturer's minimum ten (10) year warranty against defective materials, components, and workmanship in the pool gutter grating system.
 5. Defects in material, workmanship, and installation of the pool pumps for a period of one (1) year.
 6. Manufacturer's minimum eighteen (18) month warranty against defective materials, components, and workmanship in the variable frequency drive system.
 7. Manufacturer's minimum fifteen (15) year warranty on the filter tank and lining against defective materials or workmanship of the tank and components. (Additional warranty time may be purchased from the manufacturer.) Prorated warranties are not acceptable.
 8. Defects in material, workmanship, and installation of the pool piping system and recirculation fittings for a period of three (3) years.
 9. Manufacturer's minimum one (1) year warranty against defective materials, components, and workmanship in the sanitizing feed system.
 10. Manufacturer's minimum one (1) year warranty against defective materials, components, and workmanship in the pH buffer feed system.
 11. Manufacturer's minimum one (1) year warranty against defective materials, components, and workmanship in the ultraviolet sanitizing system (excluding the UV lamps, quartz, and seals). Medium pressure ultraviolet bulbs must be warranted for a period of 8,000 hours. Intermittently operated lamps (≥ 1 on/off cycle per day) will be replaced free of charge should failure occur prior to 4,000 hours and replacement will be prorated between 4,000 and 8,000 hours.
 12. Manufacturer's minimum five (5) year warranty against defective materials, components, and workmanship in the pool chemical controller. ORP, pH, flow and temperature sensors must be covered by a standard two (2) year warranty. Other sensors and flow cell components must be covered by a standard one (1) year warranty.
 13. Manufacturer's minimum one (1) year warranty against defective materials, components, and workmanship in the pool water level control system.
 14. Defects in material, workmanship, and installation of loose, deck, maintenance, and safety equipment including deck anchors for a minimum period of one (1) year.
 15. Defects in material, workmanship, and installation of the pool cementitious finish against cracking and delamination for a period of three (3) years.
 16. Defects in material, workmanship, and installation of the tile finish against cracking and delamination for a period of five (5) years.
 17. Manufacturer's minimum fifteen (15) year systems warranty against defective materials, components and workmanship in the pool tile setting materials.
 18. Defects in material, workmanship and installation of the pool, surge/balance tank, gutter, and backwash pit waterproofing finish against delamination for a period of one (1) year.
 19. Manufacturer's minimum two (2) year warranty against defective materials, components, and workmanship in the pool underwater lights.
 20. Manufacturer's minimum ten (10) year warranty on the complete heat exchanger assembly. The titanium shell and tube heat exchanger must have a minimum five (5) year warranty. Parts must be covered by a standard one (1) year warranty.
 21. Manufacturer's minimum five (5) year warranty against defective materials, components and workmanship in the pool cover system and reels.

1.13 SYSTEM TRAINING

- A. A qualified representative of the Contractor performing work under this section must put the equipment into operation and instruct the Owner's representatives in the operation of this equipment to the Owner's satisfaction immediately after project's substantial completion.
- B. The Contractor's training representative must have completed the equipment/system's manufacturer's training requirements and be certified, by the manufacturer, to provide and teach system training.
- C. The representative from the Contractor must be either a CPO (Certified Pool Operator) or have an AFO (Aquatic Facility Operator) certification.
- D. Training periods to consist of 32 hours of on-site training and scheduled as follows:
 - 1. 16 hours of initial training on the complete swimming pool system. The 16 hours of initial training must be comprised of at least 4 hours of training on water chemistry analysis and adjustment. The water chemistry training will include in-depth review of the use of the Langelier index and its computation.
 - 2. The initial 16 hours of training must include information on the care, operation, adjustment, and maintenance of items provided by the Contractor under the "Part 2 – Products" section of this specification.
 - 3. 16 hours of training after the Owner's staff has had experience operating the system. This time may be requested after the pool has been placed in operation within a period of one (1) year from the time the pool was accepted by the Owner. The additional training must contain at least 2 hours of review of water chemistry.
 - 4. Provide a project specific video recording instruction manual in addition to the training sessions. The video instructions must be project specific and must include information on the care, operation, adjustment, and maintenance of items provided by the Contractor under the "Part 2 – Products" section of this specification. This video recording must be done separate from the Owner training.
 - 5. The Contractor must include one (1) copy of video recording instructions in each Operations and Maintenance Manual.

1.14 POOL FILL WATER QUALITY

- A. The Contractor shall furnish and provide, at its sole cost and expense, all water required for the initial filling of the swimming pool. In the event the pool must be refilled due to defects in workmanship, nonconformance with specifications, or failure of materials, the Contractor shall bear all costs associated with subsequent draining and refilling operations. No additional compensation or claims for reimbursement shall be permitted in connection with such obligations.
- B. Provide the necessary plant equipment so that the temperature of fill water will be within plus or minus 10 degrees of the ambient air and/or the pool structure at the time of filling. Extreme caution is urged if the temperature variance is greater than 10-degree F.
- C. Provide the necessary chemicals and to adjust and balance the water chemistry in the pools to the following levels:

pH	7.4 - 7.6
Calcium Hardness	200 - 400 PPM
Total Alkalinity	80 - 120 PPM
Langelier saturation index	-0.3 - +0.3
Total Dissolved Solids (TDS)	not to exceed 1,500 PPM

1.15 START-UP CHEMICALS

- A. The Contractor shall be solely responsible for the complete disinfection and chemical balancing of the pool water in accordance with all applicable codes, standards, and industry practices. This obligation shall include, without limitation, the engagement of a certified laboratory approved by the City to perform water quality testing, documentation, and verification of proper disinfection and chemical balance. The Contractor shall maintain the pool in proper chemical balance following the start up and for a period of ninety (90) calendar days following the City's written notice of full acceptance of the project. No exception to this requirement shall be permitted.
- B. Provide the Owner with sufficient quantities of the necessary chemicals to maintain the pool operation following the complete.
 - 1. The Contractor is required to provide chemical quantities as shown on the drawings for the following chemicals:
 - a. Sodium Hypochlorite
 - b. Muriatic Acid
 - c. CO₂
 - 2. The Contractor is required to provide chemical quantities as shown on the drawings for the following balancing chemicals:
 - a. Sodium Bicarbonate
 - b. Calcium Carbonate
 - c. Sodium Thiosulfate
- C. Chemicals must be provided to the Owner must include those required by the chemical feed systems provided.

1.16 RECORD DRAWINGS

- A. Provide a complete set of record drawings of the entire pool system(s) including sub-systems. Record drawings must be prepared in accordance with the requirements of Section 017839 and must be a complete, stand-alone set. The Contractor is permitted to obtain original documents and copy them for this purpose only. Provide a digital record set (latest version of AutoCAD or compatible software).

PART 2 - PRODUCTS

2.1 OVERFLOW SYSTEM

- A. It is the intent of the specifications that the perimeter overflow system and surface cleaning be maintained under conditions of normal operation and that no water be discharged to waste except when cleaning the filters or emptying the pool.
- B. Concrete Perimeter Overflow System
 - 1. A perimeter overflow system consisting of a continuous concrete and tile overflow channel must be provided as detailed and shown on the drawings for the pool. The bottom of the trough must be level throughout.
 - 2. The complete gutter trough interior, including the underside of the fully recessed gutter, must be coated with waterproofing. Refer to section 2.16. Areas not meeting the manufacturer's recommended thickness will be recoated without additional cost to the Owner.

2.2 PUMPING EQUIPMENT

- A. Proposed substitutions must include a mechanical drawing incorporating required changes in

layout, piping, and valves. The cost of such changes must be included in the price of the substitute. Confirm correct pump motor voltage prior to ordering pump. Sprayground pump motors (PP2 and PP3) must be capable of continuously running without overloading at points on the characteristic curve of the pump without overload or damage. The competition pool pump motor (PP1) shall be provided as listed on the drawing. Confirm by 1/4-inch scale shop drawing that the pumps provided will fit within the available space and can be reasonably removed for servicing.

1. Pumps must be certified by the National Sanitation Foundation (NSF) and bear the certification mark.
2. For the sprayground pumps (PP2 and PP3) powered with a VFD, the impeller must be trimmed to a maximum diameter based on the most limiting condition of either the diameter of the maximum non-overloading rated motor horsepower at the design point or a diameter resulting in 10% greater head than the specified head. Provide PP1 with 12.69in diameter impeller. Do not trim the impeller for PP1.
3. The pump motor must be totally enclosed, fan cooled (TEFC) and premium efficiency of the horsepower and speed specified. A pump requiring larger horsepower is not acceptable unless submitted as a substitute and approved by the engineer, in which case necessary electrical revisions must be coordinated and provided.
4. Provide an emergency shutoff switch for the pool and sprayground pumps. One (1) switch must be provided for each complete pool and sprayground system, including all recirculation and feature pumps. The system must include a clearly labeled emergency shutoff switch for pool and sprayground pumps per Article 680-38 of the NEC. Emergency switch must include tamper-resistant/weather-resistant cover and audible alarm. Architect to approve the location of the switches no less than 5'-0" from the pool or sprayground wall and within sight of pool or sprayground users. The wiring must be done per Division 26 and coordinated with the pool wiring.
 - a. Basis of Design: Pentair ComPool LX820, STI SS2202PO-EN with cover, or approved equal.
5. The entire pumping unit must be mounted on a base using cap screws to preserve the back-pull-out feature of the pump. Pumps must not be secured with floor studs or "all-thread." The pump base must be coated with the same epoxy coating as the pump. An OSHA approved guard must protect coupling and exposed rotating components of the pump and motor where required.
6. Recirculation and Feature Pumps – Metallic Components
 - a. Provide vertically mounted centrifugal pumps as shown on the drawings and described in these specifications. Each pump must be of a straight centrifugal, end suction, bronze fitted, close coupled type.
 - b. Pumps must be manufactured by Paco
 - c. Pump casing must be cast iron fitted with a replaceable bronze case wear ring. Mechanical seals must be provided specific for a chlorinated water application. Pump impeller must be enclosed type of cast bronze or 316L stainless-steel, statically, and dynamically balanced, and trimmed for the specified design conditions. If a VFD is used in conjunction with a pump, the impeller must be trimmed to the maximum diameter based on the rated motor horsepower. Bronze materials must be suitable for use in a chlorinated environment. Suction and discharge flanges must be provided and tapped for gauge connections. Provide steel or cast-iron bases with equivalent epoxy coating for corrosion protection.
 - d. Provide a fusion-bonded epoxy coating on wetted parts to protect pump internals from corrosion, including pump volute interior and complete pump impeller (bronze impellers only). Sandblast to bare, white metal. The thickness must be 8 to 12 mils (heavy film). Verify thickness by non-destructive testing. Coat parts as recommended by the manufacturer, including preheating parts to 400 degrees and electrostatic deposition or fluidized bed technique. Provide primers if required to resist chlorinated water <10 ppm. The coating must be Scotchkote 134 manufactured by Fusecote or approved equal.

- e. Provide a hair and lint strainer, for each pump, of fiberglass construction with a clear observation top in the sizes (or pipe sizes) indicated on the drawings. Verify and coordinate pipe and pump suction sizes in the field. Strainer must be of a low pressure drop full-open or a tapered eccentric reducing type. Straight reducing type strainers will not be acceptable without the addition of an approved tapered eccentric reducer between the strainer and the pump (in which case, sufficient space in the pump pit must be verified). Provide a stainless-steel basket with at least 4 times the free open area as the inlet pipe, and one spare basket with each strainer.
 - 1) Strainers must be manufactured by Fluidtrol Process Technologies, Inc.
 - f. Recirculation pumps must be provided by the same manufacturer. Confirm voltages prior to ordering pumps.
 - 7. Other System Pumps and Motors
 - a. Provide one (1) portable utility pump. The pump must be a 1 HP, 3600 RPM, 115-volt, 1 phase, 60 cycle unit capable of 60 GPM at 25 ft. TDH.
 - 1) Basis of Design: Pump must be a Godwin GSP10 or approved equal.
- B. Variable Frequency Drive Starters
 - 1. Provide variable frequency drive starters (VFD) for the pool pumps. VFDs must be SPCSN4X provided by Knorr Systems.
 - 2. Ensure that equipment is provided with the correct operating voltage and that interconnected electrical and electronic equipment must adequately communicate and operate the specified pumping equipment. Equipment installations must meet or exceed the requirements of the National Electric Code and other local and state regulations.
 - 3. Ensure that equipment is provided with NEMA type 4X enclosure.
- C. Pump Gauges
 - 1. Pressure gauges must be provided on the discharge of the pumps.
 - 2. Compound gauges must be provided at the intake port of the pumps, after the hair and lint strainer.
 - 3. Gauges must be liquid filled, 316L stainless-steel bourdon tube type with a minimum 2-1/2-inch diameter dial, high impact polypropylene or stainless-steel case, corrosion resistant white scale with black divisions and numerals, 300 Series stainless-steel heavy duty rotary bushed movement, black enameled balanced Micrometer pointer.
 - a. Basis of Design: Gauges must be manufactured by Weksler Instrument Corporation or approved equal.
 - 4. Scale ranges must be selected to indicate the normal system operating pressure of each system or location within the system. Pressure ranges must be calibrated in psig (0-60 psi) and compound gauge must be calibrated in inches of mercury (0-30 in Hg / 0-60 psi).
 - 5. A stainless-steel filter type pressure snubber must be provided for each pressure gauge consisting of a 3/8-inch diameter by 1/8-inch-thick micro metallic stainless-steel filter and placed in the line just before the pressure gauge. Provide isolation brass valves or brass gauge cocks at each gauge for easy replacement and maintenance.
- D. Vacuum Sensor
 - 1. The pump must be supplied with a vacuum transducer to allow the chemical controller to monitor vacuum pressure in the pump strainer.
- E. Pump Hoist Beam Trolley: Provide CM Series 632 close radius trolley by CM Industrial must be mounted on hoist I-beam at pool pump pit (refer to structural). Trolley must be sized adequately to provide hoist capabilities for pump/motor combinations located in the pump pit. Provide with double row ball bearing wheel design, bearings pre-packed with lifetime lubricant. Confirm trolley size is compatible with beam configuration. Minimum rated capacity of 3 tons.

2.3 FILTRATION EQUIPMENT

- A. The filter system must consist of high-rate pressure sand filter tanks as shown on the drawings. Every aspect and component of the filter system must be certified by the National Sanitation Foundation (NSF) and bear the certification mark. The filter must have an engraved metal data plate permanently affixed on the face of the system that describes operational data and instructions and indicates startup date.
- B. It is the intent of these specifications to describe a filtration system complete in every respect with accessory items and supplied and warranted by one manufacturer.
- C. Horizontally Oriented Fiberglass Tanks
 - 1. The filter tanks must be horizontally oriented single cell fiberglass tanks, minimum 42 inches in diameter. The filter system must be listed as approved by the National Sanitation Foundation prior to bid date.
 - a. Basis of Design: Fiberglass filters must be the product of Eko3. Valves must be provided for automated backwash one filter at a time.
 - 2. Filter tanks must incorporate components and features as described in this section.
 - 3. Two (2) saddle style bases must be provided for tank support. Tank supports and connections must be seismic rated to support the filter tank(s) for the appropriate seismic zone where the project is located. Access to the tank must be provided by a 14" x 18" manhole with two (2) curved yokes. Manhole seal must be complete with a one-piece 1/4" neoprene gasket and positioned so that internal pressure from the filter will augment the seal. No additional hardware or through bolts will be allowed.
 - 4. Each filter tank must be equipped with the necessary flanges and connections for the internal and external piping. Connections must be comprised of fiberglass flanges and schedule 80 PVC flanges.
 - 5. Tank connections 2 inches and smaller must be 150 lb. Type 316L stainless-steel threaded full couplings. Tank connections 3 inches and larger must be heavy steel bosses drilled and tapped on both sides to receive standard flanged fittings or Sch. 40 Type 316L stainless-steel nipples.
 - 6. The discharge from the automatic air release valve must be hard piped to waste. Each filter tank must have a means of releasing air. Each coupling or orifice must be provided with a slotted PVC sand retainer or stainless-steel strainer. An automatic air release system must be provided for each tank.
 - 7. The drain system must consist of a 3/4-inch 316L stainless-steel coupling mounted at the lowest point in the bottom head. This drain must be valved and piped to the nearest floor drain or backwash pit.
 - 8. Filter Piping - Internal
 - a. The lower internal distribution system must be a horizontal header/lateral arrangement. The header must be Schedule 80 PVC construction, capped on one end and flanged or threaded at the other end for field connection. Lateral connections must be spaced no more than 6 inches on centers and must be 1-1/2-inch FPT connections. Attachments to header must be solvent welded and thermo-welded to ensure integrity of connection.
 - b. Under drain system must be factory installed and constructed of extra heavy Schedule 80 high impact PVC. Multiple PVC main headers must be tapped and threaded to receive laterals.
 - c. Laterals must consist of 1-1/2-inch Schedule 80 PVC pipe with openings as required. Each lateral must be fabricated complete with socket cap on one end and male adapter on the other end. Both fittings must be solvent welded to the slotted pipe. Laterals must be designed and sized at the factory, so they are installed in the field and over the entire cross sections area of the filter.
 - d. The upper distributor must consist of PVC piping Schedule 80 and/or deflector plate per manufacturer standard design.

- e. Each filter must be supplied with a pressure equalizing upper internal distribution system consisting of a horizontal header/lateral arrangement. The header piping must be constructed of Schedule 80 PVC. The header/lateral piping and connections must be designed and sized to provide uniform distribution and unrestricted flow during the filtration and backwash cycles.
 - f. Upper laterals must be constructed of Schedule 80 PVC pipe with machine slotted openings or orifices. Machined slots or orifices must be clean, de-burred and free of obstructions that would not permit the free flow of water through the opening. Details of the lateral attachment to the header must be submitted for review and approval.
 - g. The lower and upper distribution systems must be properly supported and anchored. Hardware in wetted areas must be Type 316L stainless-steel or non-metallic. Tank interiors must be inspected prior to the media being placed in the filters.
9. Filter Piping - External (Face)
- a. External face piping must be Schedule 80 PVC pipe and fittings. Flanges must be located so as to allow for easy dismantling of face piping. Fittings must be solvent cemented.
 - b. Piping must be drilled and tapped where necessary to accommodate gauge tubing connectors.
 - c. Valves 3" and larger must be constructed with cast aluminum S12A alloy (as defined by ASTM B275) housing and fully coated with Rilsan on interior and exterior surfaces. Internal components include EPDM resilient lining, Rilsan coated ductile iron disc and 316L stainless-steel shaft. Valves must be rated for 150 psi bubble tight shutoff. Unless otherwise specified, nuts and bolts must be stainless-steel with stainless-steel washers and used when secured to PVC flanges. Systems incorporating solenoid, pneumatic, pressure amplified, hydraulic or multi-directional valves are not acceptable.
 - d. Standard accessory items must include sight glass rated for 50 psi with polycarbonate glass, remote mounted gauge panel with two 4½" diameter pressure gauges, ¼" petcocks, ¼" poly vent tubing with PVC compression adapters.
10. Backwash Control
- a. The filter manifold face piping must be designed to allow for one (1) filter tank to backwash at a time while the recirculation system is operating. An automatic backwashing system must be provided with the filter system.
 - b. Fully Automatic Backwashing System
 - 1) The automatic backwash controller must have an Underwriters Laboratory (UL) listing. The unit must consist of a computerized and reprogrammable microprocessor that can provide automatic functions necessary to initiate backwash, triggered by one of the following four modes: 1) differential pressure only; 2) time only, 3) differential pressure or time, 4) differential pressure and time together.
 - 2) The automatic backwash controller must have the capability of operating filtration systems made up of 1 to 10 filter tanks and must have an internal clock with rechargeable battery backup and liquid crystal display. The controller must be capable of reprogramming for: number of filters, time of each backwash, time between the backwash of each tank, pressure differential, backwash initiation point, time of day, day of week, and mode which initiates backwash. The input power must be 24-volt AC at 2 AMP minimum (50 watts) provided by an external step-down isolation class II transformer (provided by electrical – coordinate for installation). The controller must not be powered with more than 24 volts.
 - 3) Each filter tank must be provided with its own pneumatically operated backwash control valve. In the case of single tank systems, two valves must be provided. In addition, a backwash priority valve must be provided that will

- ensure sufficient system backpressure for adequate backwashing operation. The backwash controller must operate each of the valves, in sequence, automatically, to meet the programming requirements of the system.
- 4) Automatic backwashing system must be complete with both manual and auto activation capable of operating the entire backwash filter sequence. Provide factory setting and adjustment of controller to suit the requirements described herein and actual field conditions. If a backwash holding tank is required, verify tank capacity, and drain down requirements and provide dual float switch system and necessary interlocks to lock out backwashing of subsequent tank unless water level in holding tank has dropped to the low level, and to suspend backwashing if the high-level switch senses a holding tank high water condition, and to provide a high-water alarm in the case of overfilling of the tank. Submit factory control system for review.
 - 5) The automatic backwash controller must be provided with paddle-wheel type flow sensor, flow sensor saddle for effluent pipe size, and temperature probe. Both flow and temperature must be displayed in real-time on the controller's display screen.
 - 6) Basis of Design: To be provided as part of the BECSys 7 chemical controller
- c. Water connection to backwash system and booster pump system
- 1) A 3/8" minimum protected water connection must be provided to the backwash controller. Coordinate with manufacturer.
 - 2) A booster pump system (BPS) must be provided by the filter system manufacturer for the purpose of maintaining a consistent, adjustable water pressure for hydraulic actuation of the backwash control valves. The BPS must include a centrifugal pump, pressure sustaining tank, adjustable pressure switch, valves, required tubing / connectors and fittings and appurtenances for a complete and operable system.
11. Automatic Air Relief Valve
- a. A 1" valve must be provided to automatically and continuously release air in the filter. The valve must be fabricated of plastic with Buna-N seals. A plumbing kit must be provided with two (2) PVC ball valves to allow manual air relief and isolation of the automatic valve. Valves fabricated of cast iron, bronze or stainless-steel valves will not be accepted.
12. Filter Media
- a. The filter media shall consist of three material grades and conform to the following min/max sizes:
 - 1) Grade #1 – 0.4mm to 0.8mm
 - 2) Grade #2 – 0.7mm to 2.0mm
 - 3) Grade #3 – 2.0mm to 4.0mm
 - b. Filter media shall be manufactured of recycled green and brown glass only. Media manufactured from clear glass will not be accepted.
 - 1) Filter media shall be manufactured utilizing a 3-step process that chemically and thermally activates its surface area.
 - 2) Filter media shall have hydrophobic surface properties.
 - a) Non-activated and non-hydrophobic media will not be accepted.
 - 3) The filter media shall be self-sterilizing and bio-resistant.
 - 4) The media shall have been tested under strict ISO procedures and its performance independently verified and confirmed.
 - 5) The media shall be manufactured to meet the following criteria:
 - a) Undersized < 10%
 - b) Oversized < 10%
 - c) Uniformity coefficient between 1.4 – 1.8
 - d) Organic contamination < 1.7oz / ton
 - e) Colored (green/brown) glass: > 98%
 - f) Each filter tank shall be provided with the media sizes and quantities as per

- the manufacturer's recommendations.
- c. Qualifications: The media described herein shall be a product of a manufacturer regularly engaged in the fabrication of activated recycled green glass media for at least fifteen years.
 - d. Certification: Media shall be certified to NSF 50 and 61 for use in sand type filters.
 - e. Warranty: The media supplier shall guarantee that the media being furnished is of the correct capacity, that the installation is made in accordance with the drawings and operated in accordance with manufacturer's instructions, the system will perform to the prescribed functions correctly, the water entering the pool will be clear, free from suspended matter visible to the unaided eye, will not produce any toxic effect or impart undesirable taste, odors or colors, and will be sanitary to the satisfaction of all authorities having jurisdiction.
 - f. Startup: An authorized representative of the media supplier shall provide the supervisory services to fully instruct designated personnel in the operation, care, and maintenance of the filter media.
13. Support Media
- a. A Gravel support media of a hard-coarse aggregate with a sub-angular grain shape with a particle size of 1/8" x 1/4" must be used on the inside of the bottom head to the elevation where the filter media commences. The specific gravity must not be less than 2.5. Support media must be placed by hand to avoid damage to the underdrain system and leveled before the addition of the upper layer of filter media. Concrete under fill is not recommended. Support gravel must be delivered and stored in 100-pound bags (approximately one cubic foot) for ease of handling and elimination of possible contamination. Media must be free from minerals which can precipitate onto pool surfaces.
 - b. Sand must be a carefully selected grade of hard, uniformly graded silica material. Media must be naturally rounded particles of silica or milled angularly shaped particles of silica quartz. Sand must have a particle size between 0.45mm and 0.55 mm (#20). No more than 1.5% is allowed to pass through a #40 sieve (.0164"). Uniformity coefficient must not exceed 1.53. Specific gravity must be not less than 2.5. The filter must contain a minimum bed depth as recommended by the manufacturer. Systems which do not provide a minimum bed depth will not be accepted. Sand must be delivered and stored in 100-pound bags (approximately one cubic foot) for ease of handling and elimination of possible contamination. Media must be free from minerals which can precipitate onto pool surfaces.

2.4 RECIRCULATION FITTINGS

- A. Main drains must be PVC/Fiberglass box with PVC grating for the competition pool and 304 stainless-steel for the sprayground as sized on the drawings. Grate openings must not exceed 11/32 inch in width, providing an open flow area to allow water velocity not to exceed 1.5 fps for suction outlets. The grate must be PVC (competition pool) or stainless-steel (sprayground) and fit closely and flush with top surface of frame and secured to frame with vandal proof fasteners. The exposed edges of main outlets must be rounded and smooth, free of burrs and sharp edges. Main drain covers must comply with the Virginia Graeme Baker Act and ANSI/APSP-16 2017. Project specific shop drawings detailing piping port locations and sizes on each side of the main drain sump must be provided for each sump. Shop drawings must show port locations with caps/flanges to allow for testing.
- B. For the competition pool drains, provide a water bonding fitting PB-SK-20 manufactured by Perma-cast Swimming Pool Products or approved equal. Bonding fitting must be installed at the lowest point of the main drains.
- C. Provide a hydrostatic relief valve for the competition pool main drain and surge tank sump consisting of a 2" cyclac relief valve connected to an FPT commercial style Schedule 80

PVC collector tube. The collection tube must have seepage holes, 3/8 inch in diameter, and must be screwed securely to the valve body. The hydrostatic relief valve must be designed to seal with minimum pressure and must have a non-plugging, self-cleaning raised valve seat. The hydrostatic relief valve must be Hayward model #SP1056 with collector tube model #SP1055, Aquastar model #HVC101 or approved equal.

- D. Concrete dropout boxes (converters) must be concrete sumps with 12-gauge 316L stainless-steel frame and PVC grating and sized as shown on the plans. Grate openings must not exceed 11/32 inch in width, providing an open flow area to allow water velocity not to exceed 1.0 fps. The grate must be PVC and fit closely and flush with top surface of frame and secured to frame with vandal proof fasteners. Provide a no-leak seal flange at the midpoint of the boxes.
- E. Wall inlet fittings must be cyclac directional inlet Hayward model #SP-1421-D (3/4" opening) mounted in model #SP-1022S, Aquastar model #3301B (3/4" opening) or approved equal from Sta-Rite.
- F. Adjustable floor inlet fittings must be provided each consisting of an ABS plastic body and adjusting top plate with a positive locking device. A spanner wrench must be provided to facilitate flow adjustment. The inlet body must be provided with a 2-inch cyclac solvent weld connection and internal NPT threads to facilitate line pressure testing. Floor inlet fittings must be Sta-Rite model #8417-0200-black, Aquastar model #4DIV102 or approved equal.
- G. The sight sump frame and cover must provide access to the vertical sight sump standpipe as indicated in the plans. Sight sump frame and cover must be 12" x 12" PC style quazite polymer concrete enclosure model #PC1212BA12 with cover model #PC1212CA00. Cover must be provided with stainless-steel vandal-resistant fasteners. Cover color selected by the Owner/Architect. Standard color is concrete grey.
- H. Anti-vortex plates must be provided at the suction points of the main recirculation pumps in the surge/balance tanks. Each plate must be connected to the suction pipe via a PVC flange and must be 1/2 in. thick with minimum dimension of at least 2.5 times the connecting pipe diameter. The plate must be located 4 inches above the finished floor of the surge tank. Four (4) 3/4 in. stainless-steel threaded rods, nuts, anchor bolts and washers must be used to fix the offset distance and provide a secure base for the suction pipe. Manufactured fiberglass or PVC anti-vortex plates by Daldorado, Neptune-Benson or approved equal.

2.5 PIPING SYSTEMS

- A. General
 - 1. Provide recirculating piping between the pool/sprayground and the filter rooms, fill receptor and interconnecting piping to and from the chemical feed systems and chemical controller.
 - 2. Provide necessary pipe supports and support systems required to support associated piping and valves.
 - 3. Provide other tubing, conduit, or piping associated with equipment specified herein. Coordinate with other trades.
- B. Pipes
 - 1. Pipe routing as shown and detailed on the contract drawings is diagrammatic only and is not intended to show minor details or exact locations of piping systems. Installation is required and must be adjusted to accommodate interference and adjustments anticipated and encountered. Pipe sizes on plans refer to the nominal inside diameter of the pipe.

2. PVC swimming pool piping must be NSF approved and conform to the requirements of ASTM D-1785.
3. PVC pipes must be the product of one manufacturer. Approved manufacturers of PVC piping are Eslon, Harvel, and Chemtrol or approved equal.
4. Swimming pool piping above the floor or deck in the filter room must be Schedule 80 PVC.
5. Swimming pool piping below the filter room floor or deck must be NSF approved, Schedule 80 PVC.
6. Swimming pool piping under the pool floor must be NSF approved, Schedule 40 PVC and concrete encased. Transitions between Schedule 40 and Schedule 80 must be encased in concrete.
7. Below grade swimming pool piping not located beneath the pool floor can be backfilled with native granular material free of ice, clay, debris, organic matter, and rocks larger than 4" across their greatest dimension, and per recommendations indicated in the project geotechnical report.
8. The influent and effluent lines to the heat exchanger unit must be CPVC. Connections between metallic piping and/or equipment and PVC must be flanged.
9. PVC and CPVC fittings must be the product of one manufacturer. Molded fittings must be manufactured by Asahi, Eslon, Chemtrol, Harvel, Spear, Lasco or acceptable substitutes. Fabricated fittings must be manufactured by Harrison Machine, Plastinetics, or acceptable substitute.
10. Vertical sight sump piping must be NSF approved, Schedule 40 PVC. Horizontal sight sump piping must be NSF approved, Schedule 40 PVC that is perforated and wrapped with fabric and have 3/8" diameter holes located top and bottom on 4 ft centers. Horizontal sight sump piping must extend 1 ft minimum beyond the main drain.
11. Chemical feed lines from chemical feeders to recirculation piping must be Schedule 80 PVC piping. Piping must be hard piped into the recirculation piping via tee or saddle per the drawings. Required valves must be of PVC construction.
12. Splash collars for the fill funnels must be clear Schedule 80 PVC and manufactured from a Type I, Grade I PVC compound with a Cell Classification of 12454 per ASTM D1784. The pipe must be manufactured in compliance with ASTM D1785.
13. Y-strainers for piping sized 4" or smaller must be Hayward YS Series strainers with FPM O-rings or approved equal. Y-Strainers for piping sized 6" or larger must be Fluidtrol WYE Series strainers with EPDM gaskets or approved equal. Provide an extra perforated screen with each strainer.
14. Flanged plumbing connection hardware must be stainless-steel.
15. Materials must be installed by workmen thoroughly skilled in their trades and work must present a neat and mechanical appearance when complete. At no additional expense to the Owner, replace or correct work not judged acceptable by the Architect, Engineer, or Owner's representation.
16. Support hardware, brackets, fasteners, hangers, etc. furnished and installed in the surge tank must be 316L stainless-steel.
17. No installation allowed that will provide a cross-connection or interconnection between a distributing supply for drinking purposes and the swimming pool, or between the pool and a sanitary or storm water sewer system that will permit a backflow of water into the pool water system.
18. Piping must be hydrostatically (water) pressure tested for leaks before and after backfilling to guarantee water tightness. Pneumatic (air) pressure test not allowed.
19. Provide water seals for watertight penetrations of concrete walls and floor slabs.
 - a. Pool Concrete: Water seals must be coupling or sleeve type with a thermo welded or molded flange and the O.D. must be sized to 150% of the O.D. of the pipe. The thermo-welded type must be welded from both sides. Water seals must be located at the centerline of the wall or slab being penetrated prior to placing the concrete to assure a watertight seal. Manufactured fiberglass and PVC water seal fittings by Daldorado, A.S.A. Manufacturing, Aqalogic or approved equal.

- b. Pump Pit: Link seals must be provided in the sizes and quantities shown on the drawings and installed to provide flexible watertight penetration. Metal parts must be made of 316L stainless-steel. Links must form a continuous rubber seal that is tightened with a series of stainless-steel bolts to form a watertight seal. Link seals must be manufactured by GPT, Calpico Inc. or an approved equal. Xypex Patch'n Plug or approved equal must be used to seal pipe penetration. Link seals must be installed with either a cored hole or a Century Line pipe sleeve.
 - c. Surge Tank: Water seals must be coupling type with a thermo welded or molded flange and the O.D. must be sized to 150% of the O.D. of the pipe. The thermo-welded type must be welded from both sides. Water seals must be located at the centerline of the wall or slab being penetrated prior to placing the concrete to assure a watertight seal. Manufactured fiberglass and PVC water seal fittings by Daldorado, A.S.A. Manufacturing, Aqualogic or approved equal. Link seals are also acceptable with a cored hole or a Century Line pipe sleeve.
 - 20. Adhere to the applicable provisions in Division 22 - Plumbing, "General Provisions" and "Basic Materials and Methods" for installation of piping system.
 - 21. Mechanical equipment must be connected into the recirculation piping system must be connected utilizing flanged or union connections.
 - 22. Provisions must be made to purge pipes in the system.
 - 23. Concentric reducers must be fiberglass by MerMade Filter, Inc., or equivalent reducers of schedule 80 PVC construction.
- C. Pipe Hangers and Supports
 - 1. Manufacturer
 - a. Subject to compliance with these specifications, pipe hanger and support systems must be manufactured by Mason West, as indicated on the drawings.
 - 2. Wall Supports
 - a. Pipes 2-1/2 inches and smaller
 - 1) Steel offset "J" hook hanger.
 - b. Pipes 3 inches and larger
 - 1) Welded strut bracket and pipe straps.
 - 2) Welded steel bracket or with roller chair or adjustable steel yoke pipe roll.
 - 3. Floor Supports
 - a. Electroplated carbon steel adjustable pipe saddle and nipple attached to steel base stand sized for pipe elevation. Pipe saddle must be screwed or welded to an appropriate base stand.
 - 4. Vertical Supports
 - a. Steel riser clamp sized to outside diameter of pipe.
 - 5. Plastic Pipe Supports
 - a. V-Bottom clevis hangers with galvanized 18-gauge continuous support channel, to form a continuous support system for plastic pipes smaller than 1 inch or flexible tubing.
 - b. A vented and sloped continuous PVC Schedule 40 pipe no smaller than 1-1/2 inch outside diameter will be used to route flexible tubing with the appropriate pipe supports.
 - 6. Supplementary Structural Supports - Design and fabricate supports using structural quality steel bolted framing materials. Channels must be roll formed, 12-gauge ASTM A1011 SS Grade 33 steel, 1-5/8 inch or greater as required by loading conditions. Submit design for pipe tunnels, pipe galleries etc. for approval. Use clamps and fittings designed for use with the strut system.
- D. Hanger Attachments
 - 1. Upper Attachments
 - a. Beam Clamps
 - 1) Beam clamps must be used where piping must be suspended from building steel.

Clamp type must be selected on the basis of load supported and load configuration.

- 2) C-Clamps must be locknuts and cup point set screws. Top flange c-clamps must be used when attaching a hanger rod to the flange of structural steel. Refer to manufacturer's recommendations for set screw torque. Retaining straps must be used to maintain the clamp position on the beam where required.
- 3) Center load beam clamps must be used where specified. Forged steel beam clamps with cross bolt as required to fit beams.

E. Hanger Accessories

1. Hanger rods must be threaded on both ends or continuously threaded rods of circular cross section. Use adjustable lock nuts at upper attachments and hangers. No wire, chain, or perforated straps are allowed.

F. Hanger Finish

1. Indoor Finishes
 - a. Hangers must be zinc plated in accordance with ASTM B633 or must have an electro-deposited green epoxy finish.
 - b. Strut channels must be pre-galvanized in accordance with ASTM A653 SS Grade 33 G90 or must have an electro-deposited green epoxy finish.
 - c. Zinc Plated hardware is not acceptable for use in chemical rooms.

G. Valves

1. Valves 3 inches and larger must be lug style butterfly type valves, with Carbon Steel or Ductile Iron body, 150# SWP with stainless-steel shaft, stainless steel disc and replaceable EDPM or PTFE seat bonded to a rigid shaft and guaranteed for bubble tight shutoff from 27-inch vacuum to 150 PSI. Extended neck 2 inches beyond flanges for insulated piping must be provided with watertight gear operation. Valve components must be suitable for swimming pool chlorinated water service. Butterfly valves must be Bray Series 31, Milwaukee valve HP1LCS, or equivalent.
2. Valves smaller than 3 inches must be PVC true union ball valves, full port, three-piece construction, blowout-proof stem, Viton seal with socket end connectors.
3. Check valves must be a quick closing non-slam type, either self-aligning wafer or flanged type, of corrosion resistant materials suitable for use in a swimming pool environment. Provide check valves in accordance with the manufacturer's recommendations. Locate check valves at least 5 pipe diameters from pumps and fittings. Check valves must be Technocheck Corp., model 5050, with epoxy coated cast iron body and bronze swing plates on a stainless-steel spring, Colonial Valve model 601N or 601NP PVC valve with EPDM O-ring and stainless-steel spring or approved equal, for installation between 150 lb. flanges.
4. Modulating float valve in the surge tank must have PVC body and stainless-steel wafer disc. Hardware must be non-corrodible. The float-operated valves must be provided horizontally on the main drain lines in the surge tank(s). A valve must consist of non-corrosion components including shaft, float arm, pins, and floats. Valve must be suitable for mounting on a 125E class standard PVC flange. The float arm leverage weight and pivot lengths must be adjustable to obtain desired ratio of surge tank level change to pool gutter overflow level change. Two floats and a stabilizer required. Valve must be model 2-0020-231 by EPD.
5. Submerged valves up to 3 inches must be PVC true union ball valves. Submerged valves over 3 inches must be PVC bodied, wafer type, butterfly valves with stainless-steel handle extensions as required. Valves must be by approved manufacturers listed above. Submerged valves must be provided with stainless-steel connectors. The stem housing extensions must be properly supported and braced.
6. Valves located 7 feet or greater off the floor must be fitted with a chain operator.
7. Submerged valves, valves buried below grade, or valves not readily accessible, must be

- provided with a stainless-steel reach rod and handle.
8. Valve hardware must be 316L stainless-steel and meet ANSI hardware installation guidelines.

H. Pipe and Valve Identification

1. Exposed pool piping must be equipped with color coded flow directional arrows at thirty (30) inch intervals per local and state swimming pool health code. Verify that pool piping identification is in accordance with local and state health regulations.
2. Valves must be identified with minimum 1-1/2-inch diameter plastic laminate engraved tags with minimum 1/2-inch-high numbers. Tags must be fastened to valves with a nylon attachment (zip tie). Valves must be described as to their function and referenced in the operating instruction manual and wall mounted piping diagram that must be prepared.

2.6 CHEMICAL TREATMENT SYSTEMS

A. Sodium Hypochlorite (Liquid Chlorine)

1. Chemical feeders for chlorine must be diaphragm type pumps. Chemical feed pumps must be provided and connected to the filtered water return lines to the pool and sprayground as shown on the plans. The pumps must be capable of feeding a solution to the pools to maintain chlorine (12% sodium hypochlorite) level against the back pressure involved and must be fully adjustable while in operation.
2. Chemical feeders must be manufactured by LMI.
3. The pumps must be provided complete with fractional horsepower motor for 120V, 60 Hz current, plastic feed lines, and fitting necessary for connections to the pool system piping.
4. Chemical pumps must be electrically connected to and operated by the water chemistry controllers.
5. The chemical pumps must be affixed with a metallic stamped label indicating the chemical being pumped and the pool to which it is connected.
6. Wall mount or provide non-metallic shelf support for the chemical feed pumps.
7. Feeder systems must be provided with a check valve at the point of injection into the pool recirculation system.
8. Not Used
9. Provide "Vapor Shield" vent check valve for the bulk tank which seals container while allowing the liquid to remove via pump. The Vapor-Shield must prevent an internal vacuum and collapse of a sealed container and must prevent the pump from developing a vacuum-lock while attempting to remove the liquid from the sealed container. The Vapor-Shield must prevent the release of chlorine vapors. The Vapor-Shield body must be constructed entirely from schedule 80 PVC with 3/8" polypropylene tube fittings and factory-installed chlorine resistant viton sealant on threaded connections. The diaphragm and O-rings must be constructed of chlorine resistant viton. Nonmetallic or materials not rated appropriate for use with chlorine must not be used. The Vapor-Shield must be fitted with a 3/4" male NPT threaded fitting to allow for the installation onto a threaded bulkhead fitting located at the top of the bulk chlorine tank. The unit must be supplied with no less than fifteen (15) feet of 3/8" polyethylene tubing. Vapor shield chlorine vent must be Recreonics #52-095 or approved equal. An Acid Fume Scrubber, part #7747090, with refill reagent kit, #7747091, manufactured by ProMinent is an equal.
10. Bulk Chlorine Tank
 - a. Provide two (2) 500-gallon bulk chlorine solution tank in the chlorine room as shown on the drawings. The tank must be a double wall bulk tank constructed of polyethylene rigid support with top manway and vent. Tank must be 59" outside diameter by 71" high. The manufacturer must be Chemtainer, Industries, TC5971DC or approved equal.
 - b. The bulk chlorine tank must be provided with fittings for fill piping, venting, and

level sensors as shown on the drawings. Coordinate fitting locations at the top of the tank with manufacturer prior to ordering. Field cutting tank for additional piping penetrations will not be accepted.

- B. pH Buffering System (CO₂)
1. Shop drawings complete with a piping diagram depicting the location in which the CO₂ feeder is connected to the system must be provided and approved prior to installation. Installation of the system must be as specified in the manufacturer's directions with no exceptions taken.
 2. Bulk Storage
 - a. Provide a system for storing, regulating, and feeding carbon dioxide for pH control. The system must consist of CO₂ storage tank(s), a lockable fill box for bulk delivery, a pressure reducing/regulating system, a feed and rate of flow adjustment control system, injection system/mass transfer system, and valves, tubing, fittings, and appurtenances required for a complete and operable system.
 - b. Basis of Design: The bulk storage tank with remote fill box must be Taylor-Wharton Easy Carb Series or approved equal. The system is to include the following components:
 - 1) CO₂ Storage Tanks
 - a) Provide Three (3) 750 lb. mass storage tanks meeting ASME requirements, specifically designed and configured for use with CO₂. Two (2) tanks will be used for the competition pool and one (1) tank will be used for the sprayground. The tank(s) must be of an insulated, vacuum-jacketed double wall construction with a rated service pressure of at least 292 psig. The outer shell must be stainless-steel and given a 10-mil dry film thickness epoxy coating, the inner shell must be of stainless-steel. Bulk tanks must be provided with a seismic floor anchoring ring.
 - b) Each tank must include shut off and pressure regulating valves, gauges for accurate output pressure control, a 300-psig pressure relief valve, and must be provided with a dual pressure building/economizer regulator that includes a 7.5-amp, 120 VAC heater extending into the tank and the liquid CO₂. Tank(s) must be equipped with a quick fill venturi feed system to expedite tank filling and prevent excessive product waste.
 - c) Peak usage flow rate must be 40 pounds per hour and a continuous flow rate of 15 pounds per hour. Secure tank to building wall with a coped saddle and a 16 GA x 3" stainless-steel strap bolted to wall.
 - d) Fill tank with CO₂ for initial testing and operation and provide full tank(s) at the time of Owner acceptance.
 - 2) Remote Fill Box
 - a) Provide a remote fill station for each storage tank capable of filling at the rate of approximately 30 to 50 pounds per minute in a manner that does not require entry to the storage room containing the CO₂ tank(s). The length of tubing between remote fill box and bulk storage tank must not be more than 20', unless otherwise noted. Each fill station must consist of a flush mounted (recessed) lockable fill box located at the exterior of the building, as indicated, connected to the CO₂ system. It must include a quick disconnect and automatic closure coupling. Box must be 6" x 6" x 4" deep and constructed of painted 16 gauge galvanized or stainless-steel or sized to module with exterior masonry.
 - b) Each tank must be connected to an outside fill station, as indicated, with two lengths of 1/2 inch outside diameter copper tubing for the purpose: one to transfer liquid to the tanks from a bulk delivery vehicle, and the other from the relief valves to the outside of the building. Copper tubing from remote fill box to storage tank must be fitted with either double ferrule swage fittings, or silver soldered fittings.

- c) Following the remote fill installation, pressurize the system to 150 PSI with gaseous CO₂ through the fill connection to test for leaks. Pressure test must be Snoop Liquid Leak Detector from Nupro Co. or approved equal.
 - 3) Dual Tank Switchover System
 - a) Provide dual tank automatic switchover system with gauges.
 - 3. Not used.
 - 4. Mass Transfer System
 - a. Provide one mass transfer system, as described below, for each of the systems to receive CO₂. Feed must be totally diffused and made to go fully into solution without evidence of CO₂ bubbling where water is open to atmosphere.
 - 1) Tubing connection between bulk storage tank/multi-cylinder storage tanks and mass transfer system must be one of two methods: pressure rated 3/8" poly/tygon tubing (in runs over 10' enclosed PVC conduit) or 1/2 OD copper double ferrule swage fittings, or silver soldered fittings; refer manufacturer. The complete system must be certified per NSF/ANSI Standard 50.
 - a) Provide system for the pool(s); a pre-plumbed and pre-wired, skid mounted, high efficiency CO₂ feed and mass transfer system capable of feeding from 0 to 170 SCFH of CO₂. System to include a 1 HP stainless-steel / Noryl booster pump, motor starter, mass transfer venture style polyethylene injector, 12 to 15-gallon FRP contact chamber with interior diffusers, 120 VAC / 24 VAC transformer, adjustable feed rate flow controller, 24 VAC solenoid valve, feed indicator light, and fittings, unions, valves, tubing, connectors, and appurtenances required for a complete and operable installation. Skids must be of non-corrosive materials and provided with drilled legs for bolting to the floor. Unit must be model pH-MTS as manufactured by EKO3 or approved equal.
- C. pH Buffering System (Muriatic Acid)
- 1. Chemical feeders for muriatic acid must be diaphragm type pumps. Chemical feed pumps must be provided and connected to the filtered water return lines to the poolband sprayground as shown on the plans. The pumps must be capable of feeding a solution to the pool and sprayground to maintain pH level against the back pressure involved and must be fully adjustable while in operation.
 - 2. Chemical feeders must be manufactured by LMI.
 - 3. The pumps must be provided complete with fractional horsepower motor for 120V 60 Hz current, plastic feed lines, and fitting necessary for connections to pool system piping.
 - 4. The chemical pumps must be electrically connected to and operated by the water chemistry controllers.
 - 5. The acid pumps must be affixed with a metallic stamped label indicating the chemical being pumped and the pool to which it is connected.
 - 6. Provide non-metallic wall mounted shelf support for the chemical feeder(s).
 - 7. Provide "Vapor Shield" vent check valve for the acid drum/tank which seals container while allowing the liquid to remove via pump. The Vapor-Shield must prevent an internal vacuum and collapse of a sealed container and must also prevent the pump from developing a vacuum-lock while attempting to remove the liquid from the sealed container. The Vapor-Shield must prevent the release of acid vapors. The Vapor-Shield body must be constructed entirely from schedule 80 PVC with 3/8" polypropylene tube fittings and factory-installed acid resistant viton sealant on threaded connections. The diaphragm and O-rings must be constructed of acid resistant viton. Metallic or materials not rated appropriate for use with acid should not be used. The Vapor-Shield must be fitted with a 3/4" male NPT threaded fitting to allow for the installation onto common five (5) through fifty-two (52) gallon acid shipping container caps and lids. The unit must be supplied with no less than fifteen (15) feet of 3/8" polyethylene tubing. Vapor Shield must be Recreonics #52-095 or approved equal. An

Acid Fume Scrubber, part #7747090, with refill reagent kit, #7747091, manufactured by ProMinent is an equal.

8. Bulk Acid Tank
 - a. Provide one (1) 350-gallon bulk acid solution tank in the chlorine room as shown on the drawings. The tank must be a double wall bulk tank constructed of polyethylene rigid support with top manway and vent. Tank must be 52" outside diameter by 56" high. The manufacturer must be Chemtainer, Industries, TC5256DC or approved equal.
 - b. The bulk chlorine tank must be provided with fittings for fill piping, venting, and level sensors as shown on the drawings. Coordinate fitting locations at the top of the tank with manufacturer prior to ordering. Field cutting tank for additional piping penetrations will not be accepted.
9. Provide bulk acid tank with Acid Vapor Recovery System by Knorr Systems.

D. Ultraviolet Dechloramination and Disinfection System

1. Medium Pressure UV
 - a. Ultraviolet Disinfection Equipment: Must operate within the UVC electromagnetic spectrum emitting wavelengths in the range of 200nm to 400nm. This required wavelength will provide constant disinfection/inactivation of bacteria, algae, molds, viruses, and destruction of Monochloramines, Trichloramines, and Dichloramines. Ultraviolet Lamp/Chamber and Spectra Touch Control Panel by Evoqua Technologies Ltd. or approved equal. Deviations/exceptions must be provided in writing to and approved by the designer prior to the bid date.
 - 1) Ultraviolet disinfection equipment by Aquionics and Prominent are approved equals.
 - b. The UV System must have a MET or equivalent (ETL, CSA, or UL) listing, be NSF-50 2016 certified including Section 14.18 (crypto inactivation) and 3rd party validated to the USEPA UVDGM 2006 Guidelines.
 - 1) Equipment General Description: The Ultraviolet System must be provided in a complete package to include a stainless-steel chamber, Spectra Control System located in NEMA 12 (IP52) rated panel, Medium Pressure Bulb(s) designed to emit wavelengths within the UVC electromagnetic spectrum, automatic wiper system, and Project Commissioning by a Certified Ultraviolet Technician.
 - c. Wafer (WF) Units: Ultraviolet manufacturer to offer unit capability of a horizontal OR vertical installation application using state of art design and direct flow through characteristics. Unit must be a medium pressure system with 94% UVT at the indicated design flow rate. Systems validated or designed for flows based on 98% UVT are not acceptable. Chamber and Control Cabinet must be as indicated on the drawings.
 - d. Ultraviolet Lamp
 - 1) Ultraviolet lamp must be medium pressure high intensity. Lamp must be designed to emit continuous Ultraviolet wavelengths in the range of 200nm to 400nm. This will provide optimal disinfection benefits and destruction of the Monochloramine, Dichloramine, and Trichloramine compounds. The lamp(s) must remain unaffected by temperature variance of 0 degrees F (-17 C) to 200 degrees Fahrenheit (93 degrees Celsius).
 - 2) The lamp system must provide a constant dose of not less than 60 mJ/cm² until the end of the lamp life for indoor applications and not less than 40 mJ/cm² for outdoor disinfection and this must be based on constantly monitoring the full recirculating flow rate, not on a side stream treatment. The system must be equipped with infinitely variable power control of the lamp intensity & dose. Power stepping not acceptable. The lamps must be capable of turndown to 30% of the nominal rated power.
 - 3) The lamp must be connected via means of a plug connector and must have a mechanical interlock to prevent lamp removal when lit for safety reasons.

- e. Ultraviolet Reactor
 - 1) The unit must be constructed of 316L stainless-steel electropolished and passivated to prevent corrosion within the harsh pool environment.
 - 2) The Ultraviolet chamber must come complete with the following equipment: Ultraviolet intensity monitor factory calibrated to provide intensity in mW/cm², monitors providing percentage of lamp output not acceptable. It must include a built-in alarm system to notify the operator when the output level drops below the required level of 60 mJ/cm² for indoor pools or 40mJ/cm² for outdoor pools (or operator set dosing levels).
 - 3) UV Reactor will be a validated system with third party testing to a recognized international standard such as the USEPA DGM.
 - 4) Ultraviolet temperature monitoring system must be provided to maintain system integrity in the event of flow interruptions to the chamber.
 - 5) Ultraviolet chamber must come complete with annealed quartz sleeve with "O" ring seals for water tightness. The system must be complete with advanced seal arrangement to reduce the risk of quartz over-compression on the seal face.
- f. Automatic Wiper System
 - 1) An automatic cleaning system must be provided for cleaning of quartz sleeve and Ultraviolet monitor probe. The system must travel the entire length of the quartz sleeve twice per desired cleaning cycle. Precision molded wiper rings must be provided to ensure thorough quartz tube cleaning and quartz tube protection. The wiper cycle must be user selectable and adjustable within a range of 5 minutes to 24 hours depending on anticipated application and deposit build-up.
 - 2) The wiper system must have the following characteristics:
 - a) The system must utilize direct drive with square faced coupling and acme threaded shaft to prevent slippage and pin shearing. Systems utilizing shear pins or complicated gear boxes will be unacceptable.
 - b) The wiper power supply must be 24-volt DC for improved safety. Higher voltage not acceptable.
 - c) System must incorporate Direct Shaft Encoding for positional location. Systems relying on external limit switches or internally located magnets will be unacceptable.
 - d) The wiper interval must be operator selectable with optional override switch.
 - e) Wiper faults must be indicated on the control system display.
 - f) Wiper System to utilize "Intelligent Operation" for automatic start-up commissioning.
 - 3) Records wiper position at chamber ends. Position must be fixed and not dependent on a timed interval or component striking end of chamber.
 - 4) Establish a travel run without using limit switches to ensure system integrity and longevity.
- g. UV Strainer
 - 1) The UV system must be provided with a downstream strainer to protect against the possibility of lamp/quartz breakage traveling downstream.
- h. Ultraviolet Control System
 - 1) The control cabinet must be a SPECTRA control unit and or pre-approved equal.
 - 2) The power must be controllable to provide full power, half power and infinite variable power based on real time interface with changes in UVT, Flow Rate or Combined Chloramines. The power panel must house the electronic ballasts required to ignite and power the lamps.
 - 3) Three levels of operation must be provided to meet the needs of the operator and pool environment: Simple Control (start, stop and reset), Full Parameter Display, and Customized Operator Configuration.
 - 4) Modes of operation must be password protected to secure system critical setup

functions. Touch Control system must have clearly identifiable start, stop, and reset icons (suitable for gloved operation) with Running and Fault LCD indicators.

- 5) The display must include the following:
 - a) Ultraviolet calculated dose
 - b) Ultraviolet intensity (as a percentage and mW/cm^2)
 - c) Lamp Current
 - d) Flow rate (as gallons per minute or m^3/hour)
 - e) Chamber Temperature
 - f) Operation hour meter
 - g) Fault indicators to include Lamp fault, low UV & temperature alarm, ground fault trip, wiper fault.
 - h) Alarm functions must have a simple text message display to assist in fault finding.
- i. Ultraviolet Control System Interface
 - 1) The Control system must have a minimum of the following system interface control:
 - a) Remote operation
 - b) Process interrupt features (from valves & flow meters)
 - c) Low UV dose
 - d) Flow meter input.
 - e) Auto-Restrike.
 - f) Half to full power UV setting with 24 hour/7-day settable timer.
 - g) Variable power/Dose pacing interface
 - 2) Control system must have built in data-logging capabilities to record the following information:
 - a) UV intensity required.
 - b) UV intensity measured.
 - c) Lamp current
 - d) Chamber Temperature
 - e) Flow Rate
 - f) Time and date stamp, every alarm generated.
- j. Manufacturers must maintain spare or replacement parts in the USA for the same day or not longer than next day delivery in North America.

2.7 WATER CHEMISTRY MONITORING AND CONTROL SYSTEMS

- A. A programmable pool chemical automation system must be provided for continuous monitoring and control of the pool(s) water chemistry and related disinfection equipment. The installation of the system must be per the manufacturer's specification. A factory trained/authorized representative must provide training to the Owner and the training must be video recorded. Water chemistry controllers must be provided by ProMinent Fluid Controls, BECS Technology, SB Control Systems, or a technically equal system capable of providing equal performance for operating functions.
 1. The water chemistry control systems for the pool and sprayground must feature and be capable of the following. Water chemistry controllers without these capabilities and features will not be considered equal. Water chemistry control system requirements are based upon the following products: BECSys7.
 - a. Continuous, real-time monitoring and control of pH and ORP.
 - b. The controller must be capable of interfacing with an alkalinity meter, which provides a reading of the total alkalinity of the body of water being controlled.
 - 1) The alkalinity meter must provide monitoring of pool water total alkalinity by performing a flowing water titration, utilizing a single reagent. The alkalinity meter must report the total alkalinity reading to the water chemistry controller for display, data logging, remote access, alarm notifications and alkalinity control. Installation

of the system must be per the manufacturer's specification and no exceptions must be allowed. A factory trained/authorized representative must provide training to the owner. The specified meter is a BECSys Alkalinity Meter manufactured by BECS Technology, Inc.

- 2) The water chemistry controller must interface to the alkalinity meter via low-voltage, digital RS485 connection. Parameter changes made via the water chemistry controller user interface must be transmitted by the water chemistry controller to the alkalinity meter. The controller must provide user-programmable settings for low alkalinity and high alkalinity, which will activate a corresponding alarm when the total alkalinity reading exceeds these settings. The controller must monitor, display, and data log total alkalinity to 1 ppm resolution.
- 3) The alkalinity reagent must be specifically formulated to include no more than 3% hydrochloric acid. Alkalinity reagent must be available from the alkalinity meter manufacturer via the same distribution channel as the alkalinity meter.
- 4) The alkalinity meter must utilize a dedicated pH sensor with the following characteristics:
 - a) 0-14 sensing range.
 - b) ABS body with ½" NPT process connection.
 - c) minimum of 32 milliliters of inorganic electrolyte gel; organic electrolytes, susceptible to breakdown in the presence of strong oxidants, are not considered equal.
 - d) a porous Teflon liquid junction to provide a stable, low impedance reference contact, and to prevent fouling and clogging of the liquid junction.
 - e) a silver/silver chloride (Ag/AgCl) reference element.
 - f) a general-purpose glass membrane pH sensing element.
 - g) operating temperature range of 0 - 80 degrees C.
 - h) operating pressure range of 0 - 100 psig.
- c. Free chlorine, total chlorine, combined chlorine in PPM, system flow rate, TDS, water chemistry balance calculations, water temperature, system pressure differential and other readings and control as deemed necessary for the project per this section.
- d. The controller must have the ability to monitor and control the UV treatment system.
- e. The controller must have the ability to call for pH from both CO₂ and Muriatic acid systems on a user programmable time-of-day schedule to alternate between feeding CO₂ or acid.
- f. Monitor of the chemical level in the bulk chlorine and bulk acid tanks.
- g. The controller must manage the recirculation pump with a programmable Fireman Cycle feature, which automatically turns off the Heater, UV, and Auxiliary systems prior to shutting off the recirculation pump.
- h. Management of the recirculation pump on/off status.
- i. Monitor of strainer vacuum to calculate TDH, Dirty Strainer Warning, High Vacuum Alarm, and Programmable Emergency Off condition.
- j. Controller calculates Filter Differential Pressure from influent and effluent pressures. Actuation of backwash events based on pressure differential.
- k. Monitor of the water level in the backwash tank and adjustment of backwash procedure based on water level.
- l. Management of the heater on/off status based on real-time water temperature reading.
- m. Management of the water level in the surge/balance tank and must provide programming to lock out chemical feed during potable water fill events.
- n. Monitor makeup water consumption, with totalizer resettable by operator.
- o. The utilization of simultaneous ORP and PPM (bracketing) control for managing both the quantity and quality of the sanitizer/oxidizer. Controllers that do not have the ability to control simultaneously to ORP and PPM control points or that utilize an alternate chlorine set point or boost function will not be considered equal.

- p. Actuating outputs in the following operator selectable modes: off, manual, automatic, proportional and must have a manual on fail-safe timer to ensure that if the controller is left in manual mode, the controller will revert back to automatic mode to prevent an over-feed event.
- q. Programmable events can be time set to occur daily, weekly, or monthly.
- r. Remote monitoring of the recirculation flow rate of the system when installed with compatible magmeters.
- s. Provide use of flow signal as a supplemental chemical feed interlock to prevent the dosing of chemicals during a system low flow/no flow condition.
- t. Provide conductivity sensor for the purpose of TDS control via the assignment of one of the controller relays to control a field supplied dump valve.
- u. The controller must continuously monitor data-log while being monitored and control via two-way remote communication.
- v. The controller must continuously calculate and display the Langelier Saturation Index and Ryznar Index using either sensor data and/or manual input for pH, temperature, total alkalinity, and calcium hardness.
- w. Programmable high and low alarm levels for control functions with operator-selectable feed lockout and alarm buzzer options.
- x. Performance and Certifications
 - 1) The controller system must be NSF/ANSI 50 listed for automatic controller equipment for swimming pools, spas, and other recreational water facilities.
 - 2) The controller system must be certified to UL61010/IEC61010 standards.
 - 3) The controller must automatically activate the appropriate chemical feeders in order to maintain the sanitizer/oxidizer level:
 - a) Within +/- 0.1 parts per million (PPM) or +/- 10 mV (millivolts) of oxidation reduction potential (ORP)
 - b) The pH within +/- 0.1 pH unit of the set points selected by the operator.
 - c) Set point and calibration levels must be adjustable with a keypad mounted on the front panel of the unit as well as the remote interface.
 - d) The controller must use pH sensor with +/- 0.04 accuracy in the operational range of 6.8 – 8.2 as certified by NSF.
 - e) An ORP sensor with an accuracy of +/- 3% mV as certified by NSF
 - f) A free chlorine and total chlorine sensor that operates in a range of 0.1 parts per million (PPM) up to 10.0 parts per million (PPM) within a 9% accuracy as tested by NSF or another third-party certifying agency.
- y. System Supply
 - 1) The controller must be factory supplied with:
 - a) ORP, pH, temperature, and free chlorine and total chlorine sensors.
 - b) A relay capable of being named and programmed for controlling a UV system dosing based on a real-time combined chlorine as calculated by the readings from an amperometric free chlorine and total chlorine sensor.
 - c) Line-voltage and control wiring must be performed in a separate NEMA 4X enclosure that precludes access to the controller electronics. This enclosure must be engineered, manufactured, and supplied by the controller manufacturer.
 - d) A temperature sensor for automatic control of the heater.
 - e) A flowrate sensor to measure system flowrate.
 - f) A TDS sensor to monitor total dissolved solids.
 - g) Level sensors to monitor acid and sodium hypochlorite tank levels.
 - h) Level sensors to monitor tank level in the surge/balance tank.
 - i) Level sensors to monitor, display, and data log backwash events.
 - j) A vacuum and pressure transducer to monitor pump strainer vacuum and TDH.
 - k) Influent and effluent pressure transducers to monitor filter tank delta P.
 - l) Makeup water flow meter. Refer to 2.08 D.

- z. Hardware
 - 1) The controller must have:
 - a) A minimum of seven (7) fully configurable digital inputs.
 - b) A minimum of four (4) fully assignable digital outputs.
 - c) A minimum of nine (9) configurable analog inputs.
 - d) A minimum of five (5), 115 VAC fully assignable relays.
 - e) The controller must be capable of expanded capabilities with an optional input/output expansion card kit.
 - f) High voltage field wiring must be through a separate NEMA 4X factory engineered and supplied enclosure that precludes direct access to controller electronics. High voltage connections must be clearly identified, and a field wiring diagram must be provided with the controller for the Contractor's reference. Controller high-voltage relay assignment parameters must be programmed at the factory prior to delivery to installation location.
 - g) The controller must include a sensing flow cell that is hydraulically designed to allow verified correct flow and consistent pressure across sensors. Flow cell will be clear PVC that is modular in concept and have the flexibility to add supplementary water chemistry sensors as desired. The sensing flow cell must include a safety flow switch sensor, water spigot, and isolation valves.
- aa. Communications
 - 1) The controller must have as a standard feature:
 - a) The controller must include the capability of ethernet connection and secondary wireless communication.
 - b) The controller must allow full two-way remote communication and full control of parameters.
 - c) Accessibility with a standard internet browser using a fully interactive Ethernet TCP/IP graphical interface that includes security access codes.
 - d) Real-time monitor/control with real-time auto polling, data logging, email and text alarms and providing both graphical and report formats via a personal computer, smartphone, or tablet device.
 - e) The controller must have the ability to facilitate email or text alarm notifications, historical graphing, and real-time control via a personal computer, smartphone, or tablet device.
 - f) The controller must have the ability to export a .csv file once per day with reading type, time, and reading. The export must be done via email and must include the controller serial number. Export data must include ORP, Free Available Chlorine, Total Chlorine, Combined Chlorine, pH, and Temperature.
 - g) The controller must have the ability to allow software upgrades and programming as needed in the field.
- bb. The controller must communicate with the Building Automation System.
- cc. Commissioning and Manuals
 - 1) The control system must be provided with on-site start-up operator training performed by a representative trained and authorized by the controller manufacturer.
 - 2) The manufacturer must supply an operation and maintenance manual describing features, operating instructions, maintenance procedures and replacement parts.
 - 3) Installation of the system must be per the manufacturer's specification with no exceptions allowed. A factory trained/authorized representative must provide training to the owner and the training must be video recorded.

2.8 FLOW METERS

- A. Recirculation flow meter (2 required) must be provided according to the manufacturer in the

filtered water return lines to each of the pools. The flow sensor must be the GF Signet 2551 insertion magmeter. Provide the coaxial cable from the sensor to the display/transmitter. Flow meter accuracy must be +/- 2% of reading.

- B. Backwash piping flow meter (2 required) must be a pilot, impact ball, variable area type with one piece, impact resistant machined acrylic plastic body. GPM scale must be permanently etched or imprinted on the meter. Flow rate indicator must be of stainless-steel material. The scale range must be appropriate for a specific flow rate. Pipe size to accommodate backwash rate. The backwash piping flow meter must be BLUE-WHITE series F-300 or approved equal.
- C. Refill flow meter (2 required) must be provided on dilution piping to backwash tank. Flow meter must be one-piece meter body of injected molded polysulfone adapters, viton o-ring seals, and 316L stainless-steel floats and float guide, impact resistant machined acrylic plastic body. GPM scale must be permanently etched or imprinted on the meter. Flow rate indicator must be of stainless-steel material. The scale range must be appropriate for a specific flow rate. The manufacturer must be BLUE-WHITE model #F-45750L-12, 3/4" M/NPT @ 1.0 to 10.0 GPM or approved equal.
- D. Make Up Water flow meter (2 required) must be provided according to the manufacturer on the domestic fill lines to the pool and sprayground. The flow sensor must be the GF Signet 2551 insertion magmeter with 4-20mA signal. Flow meter accuracy must be +/- 2% of reading.

2.9 WATER LEVEL CONTROLLERS

- A. In Tank Water Level Controller
 - 1. Provide a water level sensing and control system for the pool and sprayground that will monitor the water level in the surge tank and automatically activate the auto water make-up control valve. The controller must have a low voltage interlock with auto water make-up solenoid valve and the high-level shutoff solenoid valve and must provide adjustable time delay for increasing level and manual override. The water level control package must be part of the chemical controller, BECSys7, and SLS Sensor (Coordinate the specific length(s) of cable required for each controller prior to ordering). Refer to drawings for additional information.
 - 2. Wiring from the sensor to the controller must be provided and must be connected to the terminal points mounted within a corrosion resistant, nonmetallic NEMA 4X enclosure. Wiring connections must be made through the bottom of the enclosure. The enclosure size must be no less than 8" wide x 5" high x 4" deep. The access door must be the entire front face panel of the enclosure. Confirm location in field.
 - 3. Discharge of make-up water must be into a fill funnel and piping to the pool and sprayground surge/balance tank. Refer to the drawings for additional information.
- B. Solenoid Valves
 - 1. Provide a make-up water solenoid valve, normally closed, epoxy coated, flanged, globe type ductile iron body with bronze trim and heavy lid spring and optional Y strainer. Interlock with automatic water level control system. Refer to the drawings for additional information including size of pipe. Solenoid must be by ClaVal 136-01.
 - 2. Provide a solenoid valve for the high-level sensor, normally opened, epoxy coated, flanged, globe type ductile iron body with bronze trim and heavy lid spring and optional Y strainer. Refer to Plumbing drawings for pipe size. Interlock with automatic water level control system. Refer to the drawings for additional information. Solenoid must be by ClaVal 136-01.

2.10 DECK EQUIPMENT, INSERTS & ANCHOR SOCKETS

- A. The following items must be supplied unless otherwise noted. Proprietary names are to designate performance only. Equal products will be accepted.
1. Grab rails must be provided as required in the quantities and to the dimensions as shown on the drawings. Grab rails must be fabricated of one continuous length of polished and buffed tubing. The tubing must be ASTM-A-554 grade 304L stainless-steel, 1.50-inch OD x 0.120-inch minimum wall thickness, polished and buffed to 320 grit finish and must be passivated, in compliance with ASTM A967-99, incorporating organic acid passivation techniques for maximum corrosion resistance. Bends must be smooth and free of wrinkles. Grab rails must be pretzel bend style with dimensions as indicated in the plans and as manufactured by Spectrum Products, SR Smith, Paragon or approved equal. Anchor sockets for grab rails must be of the wedge type, cast bronze or stainless-steel, 4 inches in depth and made to receive 1.50-inch OD tubing as manufactured by Paragon #28105, SR Smith #AS-200B, Spectrum #54052 or approved equal. The wedge must be cast bronze, incorporate a stainless-steel tightening bolt, and flat washer, and be designed as the sacrificial element to the anchor system. Metallic components must be passivated, in compliance with ASTM A967-99, incorporating organic acid passivation techniques for maximum corrosion resistance. Anchors must be provided with flush closure caps and escutcheons with set screws where indicated. Escutcheons must be of the keyhole or oblong shape, similar to the casted, electro-polished stainless-steel escutcheon with set screw by Paragon #28303SS, SR Smith #IEP-200, Spectrum #35222 or approved equal.
 2. Entry rails must be provided as shown on the drawings, fabricated from one continuous piece of polished and buffed ASTM-A-554 grade 304L stainless-steel, 1.50-inch OD x 0.120-inch wall thickness, polished and buffed to 320 grit finish and must be passivated for maximum corrosion resistance. Bends must be smooth and wrinkle free. Custom rails as manufactured by Spectrum Products, Paragon, SR Smith or approved equal. Custom rail submittal drawings must be complete with details of custom fabrication and installation information. Anchor sockets for railings must be of the wedge type, cast bronze or stainless-steel, 4 inches in depth and made to receive 1.50-inch OD tubing as manufactured by Paragon #28105, SR Smith #AS-200B, Spectrum #54052 or approved equal. The wedge must be cast bronze, incorporate a stainless-steel tightening bolt, and flat washer, and be designed as the sacrificial element to the anchor system. Metallic components must be passivated, in compliance with ASTM A967-99, incorporating organic acid passivation techniques for maximum corrosion resistance. Anchors must be provided with flush closure caps and escutcheons with set screws where indicated. Escutcheons must be of the keyhole or oblong shape, similar to the casted, electro-polished stainless-steel escutcheon with set screw by Paragon #28303SS, SR Smith #IEP-200, Spectrum #35222 or approved equal.
 3. Stanchion posts (backstroke and false start) must be provided as required and in the quantities shown on the drawings. The posts must be a straight length of type 304L stainless-steel tubing, 1.90-inch OD x 0.145-inch wall thickness x 8-foot (backstroke) or 4.5-foot (false start) overall length, polished and buffed to 320 grit finish. Stanchions must be capped at one end with a closure plug containing a U-shaped hook and fitted with a stainless-steel eyebolt attached to an adjustable nickel-plated bronze sliding collar. Stanchion with sliding collar and eyebolt as manufactured by Paragon #38106 with #38301, SR Smith #10167-MG with #35-102, Spectrum Products #23614 with #23625 or approved equal. For false start/recall use – Paragon #38105, Spectrum Products #23624, or SR Smith #10164-MG. Anchor sockets for stanchions must be of cast bronze or stainless-steel, sized to receive a full 6 inches penetration of 1.90-inch OD tubing as manufactured by Paragon #38201TC, Spectrum Products #23626, Kiefer #700103, SR Smith #AS-100D or approved equal. Each anchor socket must be provided with a flush threaded, vandal proof closure cap Paragon #38201TC, Spectrum Products #23628, or Kiefer #700103C and a grounding lug with screw. Provide Paragon #38303, Spectrum

- Products #23630, Kiefer #700103K or approved equal spanner wrenches for removing the closure cap. Anchors or sockets must be provided with flush closure caps and escutcheons with set screws where indicated.
4. Tagline stanchion posts must be provided as required and, in the quantities, shown on the drawings. The posts must be type 304L stainless-steel tubing, 1.90-inch OD x 0.145-inch wall thickness x 8-foot overall length, polished and buffed to 320 grit finish. Tagline stanchions must be capped at one end with a closure plug containing a U-shaped hook and fitted with a stainless-steel eyebolt attached to an adjustable nickel-plated bronze sliding collar. Tagline stanchion with sliding collar and eyebolt as manufactured by Paragon #38111 with #38301, Spectrum Products #2010607 with #23625 or approved equal. Anchor sockets and frames for tagline stanchions must be of cast bronze or stainless-steel, sized to receive a full 6 inches penetration of 1.90-inch OD tubing as manufactured by Paragon #38211, Spectrum Products #1810360 or approved equal. Each anchor socket must be provided with a flush threaded, vandal proof closure cap Paragon #23071, Spectrum Products #23628, or and a grounding lug with screw. Provide Paragon #23303, Spectrum Products #23630, or approved equal spanner wrenches for removing the closure cap. Anchors or sockets must be provided with flush closure caps and escutcheons with set screws where indicated.
 5. Starting Platforms
 - a. Dual post starting platforms for the fully recessed gutter (11 required, 10 plus 1 spare) must have number plates on both sides numbered 1 through 10. Spare block must not be numbered. Platform block height must be 29-1/2" inch above water level. The platform top (24" wide x 32" deep) and intermediate sidestep (8" x 12") must be constructed of UV inhibited high density polypropylene. Confirm step is on correct side (right or left) according to plans. The surface must have a non-skid dual cross-grooved sand textured finish. The top must be permanently positioned at a 10° tilt towards the pool. Frames must be 2.5 square inch x 0.125-inch wall thickness 304 stainless-steel tubing with a powder coated finish. Refer to the Owner/Architect for color selections. Verify height of platform above water before ordering. The backstroke bar must be 1" diameter and allow both horizontal and vertical grab positions. Blocks must have raised side grip handles and adjustable back plate. Platforms must be Competitor Track Start by KDI Paragon custom blocks as detailed on the plans. Refer to the Owner/Architect for color and logo selections. Each starting platform must have two labels affixed stating "Warning – For Use by Trained Competitive Swimmers Only – Execute Shallow Racing Dives Only - Impact with Pool Bottom Can Cause Permanent Injury."
 - b. Anchors sockets for dual post starting platforms located on the fully recessed gutter must be designed to prevent rocking. A stainless-steel cap must be provided to flush mount on the deck when platform is removed. The anchor sockets must be cast T304 stainless-steel with wedge assembly consisting of a bronze wedge and T304 stainless-steel hardware. Anchors for starting platforms must be by the starting block manufacturer KDI Paragon Competitor Starting Platform dual post anchor.
 6. Water Polo Goals
 - a. Goals must be constructed to meet official regulations of World Aquatics, NCAA, NFHS, and USWP. Where a conflict exists between these specifications and the official regulations of World Aquatics, World Aquatics must govern. Special finishes and backings must comply with the regulations.
 - b. Floating water polo goal (2 required) must consist of a front frame made of non-corrodible aluminum with rounded. The goal must be provided with mesh netting securely fastened to the cage. Goal must incorporate attachments for wave quelling cable floats, hooks, and take-up ratchet for securing to rope anchors. Floating goal as manufactured by Anti-Wave, Malmsten or approved equal.
 7. Lifeguard Chairs
 - a. Lifeguard chairs (2 required) must be movable and provided with a molded plastic seat 6 feet above the deck. The seat must be capable of a 360-degree swivel and

must be supported on a stainless-steel tube structure. Platform must be laminated wood coated with fiberglass and polyester resin and have a non-skid surface. Access to the platform must be by means of a sloping front ladder, 26" wide. Ladder steps must be injection molded ABS, UV stabilized, 26" long x 5" wide with a raised slip resistant tread. The framework of the chair must be rigidly bolted. Ladder and guard rails must be manufactured of polished and buffed ASTM-A-554 grade 304L stainless-steel, 1.50-inch OD x 0.083-inch wall thickness. Metallic components must be passivated, in compliance with ASTM A967-99, incorporating organic acid passivation techniques for maximum corrosion resistance. 6" diameter wheels must be attached to the bottom of the rear legs and means of attaching a rescue tube and umbrella must be provided. Lifeguard chairs must be the 6 Ft Discovery, by Spectrum Products #20160, Paragon #20302, SR Smith Vista #US48500, or approved equal.

- b. Lifeguard chairs (2 required) must be portable and provided with a molded plastic seat 44 inches above the deck. The seat must be capable of a 360-degree swivel and must be supported on a stainless-steel tube structure. Platform must be a 6'-8" x 3'-8" fiberglass platform with a slip resistant surface. The framework of the chair must be rigidly bolted type 304L stainless-steel and angle. Rear access must be by means of 26" x 5", injection molded, UV stabilized ABS steps. Rubber bumpers must be provided for each leg. The chair must have an assembly that includes two (2) 7" diameter wheels on an axle and must be welded to the front legs in a manner that prevents the wheels from engaging the deck when the chair is at rest. Lifeguard chairs must be the 2-Step Griff's Vision Guard Station by Paragon #20341 or approved equal
8. Surge/balance tank access hatch must be provided in quantities as shown on the drawings. The access hatch must be a single door 3'-2" x 2'-6" with 1" fillable pan to receive ceramic tile and grout or concrete fill to match the surrounding deck. The frame must be ¼ inch extruded aluminum with built in neoprene cushion and continuous anchor flange. Door must be ¼" aluminum plate reinforced with aluminum stiffeners as required. The door must be equipped with heavy continuous stainless-steel hinges and must have compression spring operators for easy operation. The door must open to 90 degrees and lock automatically in that position. The door must be built to withstand a live load of 150 lbs. per square foot and equipped with a continuous Type 316L stainless-steel hinge, tubular type, and an automatic hold open arm with release handle. Hardware must be type 316L, 18-8, stainless-steel. A flush lift handle and a snap lock with removable key wrench must be provided. Factory finish must be mill finish with bituminous coating applied to the exterior of the frame. The access door must be Type TER single leaf pan type door ordered as a custom size as manufactured by the Bilco Company
9. Sleeves for surge tank valve extensions must be Spectrum Products Valve Extension Body #1910387 with Lid and Key #36450, or Spectrum Products Bronze Anchor Kit 1.90-inch O.D. x 6-inch-deep Anchor (field modification required) with Lid and Key #23638-00.
10. Surge/balance tank ladder must be provided for the depth of the surge/balance tank as indicated on the drawings and include a pull-up handrail. The ladder and handrail must be constructed of polypropylene that conforms to ASTM-D4101. Ladders must meet all ASTM0C-497 load requirements and OSHA 1910.26 and 1910.27 specifications. The ladder must be fastened to the floor and wall with 1/2" x 3-3/4" 316 stainless-steel anchors and installed per manufacturer's instructions. Adjustable mounting bracket must be 8". Aluminum reinforced copolymer polypropylene rail must be 1-3/4" x 1-3/4" diameter. Steel reinforced copolymer polypropylene ladder rungs must be 1-5/8" x 1-1/4" diameter with molded finger grips, 12" O.C. The ladder must be manufactured by Lane International Corporation or approved equal.
11. Backwash catch basin ladder rungs must be ½ inch Grade 60 steel encased with copolymer polypropylene plastic as manufactured by M.A. Industries, Inc, or approved equal.

12. Pool Lift: The pool lift (1 required) must be a battery powered handicap lift with footrest assembly. Lift must comply with the Americans with Disabilities Act Access Guidelines (ADAAG), be capable of lifting 300 lbs, and must include a seat belt assembly. The following accessories must also be provided: caddy, arm rest assembly, lift cover, extra battery, wired controls, stability vest, and spineboard attachment. Stainless-steel components must be 304L. Lift must be SR Smith Splash Aquatic Lift Extended Reach #370-0000. Confirm pool lift fits on pool perimeter and operates correctly.
13. Provided a ship's ladder or Lapeyre Stair in the size and shape shown on the drawings. The ladder must be aluminum with aluminum stiffeners if required by OSHA. Refer to the Architect.

2.11 LOOSE EQUIPMENT

- A. The following items must be supplied unless otherwise noted. Proprietary names are to designate performance only. Equal products will be accepted.
1. Competition floating lane ropes must be as shown on the drawings and described in these specifications. Floating lane ropes must be a non-turbulent type with wave quelling floats and 3/16" stainless-steel coated cable. Floats must be injection-molded polyethylene. Colors to alternate the length of the pool with a contrasting solid color for the final 15 feet. Owner/Architect to select colors from standard color chart. Floating lane ropes must be provided as completely assembled and installed with take up reel, type 304 stainless-steel spring and cable lock, hooks, and wrench. 5/8" wrench must be made of a forged steel shaft with a polished chrome finish. The take up reel must be constructed of type 304 stainless-steel. The spool must be a bronze nickel-plated casting with a nylon sleeve. Floating lane ropes must be Competitor Gold Medal 6" Racing Lanes pre-assembled and sized to fit the length of the pool. Provide lane rope extension hooks as detailed on the drawings complete with protective sleeve. Floating lane ropes with disconnects for shorter distance is acceptable. Provide contrasting disks located 15 meters from each end to meet resurfacing requirement. This requirement must be met for each possible course length.

Quantities:

Competition Pool: Provide 20 at 25 yards
 Provide 9 extensions to covert 25 yard lane ropes to 50 meters
 Provide 2 additional extension hooks
 Provide one spare floating lane rope that can accommodate the 50m course (disconnects are acceptable)

2. Water polo floating ropes must be provided as shown on the drawings and described in these specifications. Floating ropes must be a non-turbulent type with wave quelling floats and 3/16" stainless-steel coated cable. Floats must be injection-molded polyethylene. Floating ropes must be provided as completely assembled and installed with take up reel, type 304 stainless-steel spring and cable lock, hooks, and wrench. Water polo floating ropes must be pre-assembled and sized to fit the length of the water polo course. Provide extension hooks as detailed on the drawings complete with protective sleeve. Floats must be colored per NFHS and USA WP guidelines for each water polo course as shown on the drawings. The tether ropes must include a 2 meters long x 1.08 meters wide area of solid red disks to identify the re-entry area per World Aquatics WP1.2 field of play diagram. Provide boundary ropes for cross course water polo field of play. Water polo floating ropes must be by Malmsten or approved equal.
3. Threaded eyebolt for floating lane ropes and water polo floating ropes must be incorporated into the perimeter overflow system. The threaded eye bolts must be PI-74B rope eye by Perma-Cast or approved equal.
4. Backstroke flags will be owner provided.
5. Recall rope must be 1/2-inch yellow polypropylene rope complete with weight rings and two quick snap connectors made of chrome-plated brass. The rope must consist of a neoprene

plate constructed of soft aluminum that is crimped and used to connect the two pieces of rope to form the required loops. Recall rope must be Recreonics, #92-968 (max length of 79') or equal with specific length ordered to match span between recall rope stanchion posts as indicated in plans.

6. Lane Rope Storage Reel
 - a. Lane rope storage reel must be fabricated from two powder-coated enclosed aluminum wheels joined together by a 1-1/4-inch aluminum axle. This unit must ride easily on four 6" stainless-steel casters with individual brakes. The reel must have a collapsible tow handle for safe movability. The storage reel should be able to hold 902' of 4" lane ropes or 492' of 6" lane ropes. The storage reel must come assembled. The correct number of storage reels must be provided to store the lane lines. Lane line storage reel must be Competitor Swim Products Elite Stor Lane Reel #200 850 with Competitor storage reel cover #200 861, SR Smith XL Capacity Lane Line Reel #38000 with SR Smith lane line reel cover #36100 or approved equal.
7. Pace Clocks
 - a. Refer to 131106.
8. The lifeline must be 3/4-inch blue and white polyethylene rope with floats that are 5-inch diameter by 9-inch-long. Floats must be spaced on five-foot centers. Metallic rope hooks must be stainless-steel. Provide lifeline at five-foot break between shallow and deep water as shown on the drawings. Lifeline must be equal to Recreonics #14-438.BW or Lincoln Aquatics #44-115 safety line rope, Recreonics #14-381, Lincoln Aquatics #44-190 or Competitor Swim #350EZBW locking 5" x 9" floats, and Recreonics #14-456 or Lincoln Aquatics #44-125 rope end hooks.
9. Water Polo Nets (2 required) must be provided to span the width of the pool to isolate courses during water polo training and competition. Nets and harness system must be mounted to stanchions anchored in the stanchion anchors. Nets must be Malmsten Water Polo Stop Net (AR 1514012), or approved equal.
10. T-wrench for operation of valve extensions must be fabricated of 3/4" diameter SCH 40 stainless-steel pipe. The T-wrench must be 4'-0" in length with a 24" long welded "T" handle. The wrench must be fitted with a 3/4" square stainless-steel male end, 1" in length, for operation of valve extensions at the surge tank. Two complete T-wrenches must be provided.

2.12 MAINTENANCE EQUIPMENT

- A. The following items must be supplied unless otherwise noted. Proprietary names are to designate performance only. Equal products will be accepted.
 1. Wall brush (1 required) - Brush backing must be a flexible polyethylene material with five (5) rows of nylon bristles. The pool brush holder must be permanent mold cast aluminum with hydrofoil flap. The holder must have stainless-steel screws to facilitate brush changes. Handle bracket must be quick detachable mount to fit standard 1 1/4" or 1 1/2" inch diameter handles. Brush must be Recreonics #10-135, Lincoln Aquatics #31-020, or approved equal.
 2. Skimming net (1 required) - Skimmer head must consist of one-piece molded plastic frame with a reinforced, integral handle bracket suitable for quick attachment to a standard 1 1/4" or 1 1/2" inch diameter handle using bolts and wing nut. The standard nylon net must be attached to the frame using the groove and spline method. Net depth must be 16 inches minimum in the center. Skimming net must be manufactured by Recreonics #10-124, Lincoln Aquatics #31-103 or approved equal.
 3. Telescopic Poles (1 required) - Cleaning tool handle must be of the telescopic design and fabricated from corrosion resistant, high-quality anodized aluminum. Poles must be fully adjustable, to desired length, with a simple twist of a cyclac threaded locking device. Poles must consist of a 1-inch tube fitted inside a 1 1/4" inch tube and be adjustable from a range of 8 ft. to 16 ft. Handle must be adjustable from 8 ft. to approximately 16 ft. having a threaded bushing type clamp to lock handle at desired position. Poles must be Recreonics

- #10-323, Lincoln Aquatics #30-050 or approved equal.
4. Test Kits
 - a. Provide two (2) test kits:
 - 1) The first test kit must feature liquid reagents, a color comparator, waterproof instructions and treatment charts, chemistry guide and water gram. Test kit to have the ability to test for free and total chlorine (0.5 – 5.0 ppm), bromine (1-10 ppm), pH (7.0 – 8.0), acid and base demand, total alkalinity, calcium hardness and cyanuric acid. The test kit must be Taylor Complete 2005 test kit or approved equal.
 - 2) The second test kit must be photometric and utilize either liquid and powder reagents or tablet reagents for stability that will allow accurate measurement of free and total chlorine (0-10 ppm), bromine, pH, alkalinity, calcium hardness, and cyanuric acid. The test kit must have solid-state digital electronics and built-in filters. The test kit must be direct reading with automatic blank settings, automatic power cut-off, and store a minimum of the last 10 results in nonvolatile memory. Provide LMP106C Pooltest 6 with Hard Carry Case Kit and LMC001 Check Standard by Lumiso, AquaPRO 6 Test Kit manufactured by Orbeco-Hellige Inc and Reference Standard Kit (LP275680) or M-2005 Commercial Calorimeter Kit, in hard carry case, by Taylor Technologies or approved equal.
 5. Vacuum Cleaner
 - a. Vacuum cleaner (filtered water return to pool) - (1 required) must be Eko3 Systems WS-009-00310 Pool Vacuum Cart. Kit must come complete with a 155 square foot cartridge filter mounted on a stainless steel cart powered by a WhisperFlo 1.5 HP booster pump (capable of filtering 6,900 to 7,800 gallons of water per hour) with 50' discharge hose, vacuum head, and vacuum head attachment pole.
 6. Robotic Pool Cleaner
 - a. Provide one (1) dual pump floor, wall, and waterline only automatic commercial robotic pool cleaner. The cleaner must provide up to 5,820 square feet per hour of cleaning coverage as well as filter up to 9,000 gallons per hour. Unit must have 4-, 6- and 8-hour cleaning cycles. The pool cleaner must be provided with 131 feet of cable, PVC brushes, two (2) bottom loaded filter bags and a remote control for "spot cleaning". Features must include zero-depth entry sensor and transportation caddy. Unit requires a dedicated 120-volt circuit receptacle with GFCI to transform which provides 27 volts the automatic pool cleaner. The automatic pool cleaner must be #9999359-W120 WAVE 120 as manufactured by Maytronics USA or approved equal.
 7. Stainless-steel Cleaner - Provide a stainless-steel cleaner. The cleaner must comprise of one (1) gallon of organic passivation solution. It must be complete with instructions for proper maintenance of stainless-steel surfaces and material safety data sheets for the passivation solution. The cleaner must be the Spectra-Clean System 2 as manufactured by Spectrum Products. Product must be applied with 3M scouring pad, or equivalent.

2.13 SAFETY EQUIPMENT

- A. The following items must be supplied unless otherwise noted. Proprietary names are to designate performance only. Equal products will be accepted.
 1. Ring buoy and extension rope (2 required) – Buoy must be 24-inch diameter vinyl clad PVC foam with a metal ring molded inside. Buoy must have a 3/8-inch polyethylene rope attached to it at four points and be a minimum 60 feet in length. Preserver must be U.S.C.G. approved. Buoy and rope must be mounted at each lifeguard chair on hooks. Ring buoy must be Recreonics #12-252, Lincoln #44-075 or approved equal. The throw rope must be Recreonics #12-261, Lincoln Aquatics #42-050, or approved equal.
 2. Life hook and pole (2 required) – Life hook must be an anodized aluminum 3/8-inch OD

- "shepherd's crook" with a 1-1/8-inch OD handle attachment suitable for a 1¼-inch 16 ft. aluminum extension pole. Hook must be of looped construction. Each pole must be provided with a set of spring type stainless-steel pole clamps for mounting on each lifeguard chair. Life hook must be Recreonics #12-239, Lincoln #42-060 or approved equal. Pole clamps must be Recreonics #10-353, Lincoln #30-135, or approved equal.
3. Spineboards (1 required) - Spineboard must be 78" long x 20" wide, constructed of wood. The design must provide stiffness and torsional rigidity while remaining lightweight. The spineboard must accommodate up to 500 lbs. The spineboard must be CJ Wooden Backboard System as manufactured by Water Safety Products or approved equal. Provide one (1) set of heavy-duty stainless-steel utility hooks per spineboard for storing the spineboard at a convenient and readily accessible location near the pool (Recreonics #10-362).
 4. First aid kit (1 required) - First aid kit must be a 24-unit kit per American Red Cross standards as manufactured by Swift First Aid, Recreonics #12-013, Lincoln #47-084 or approved equal.
 5. Bloodborne pathogen kit (1 required) – Bloodborne pathogen kit must include a protective gown, medical-grade latex gloves, face mask with eye shield, antimicrobial hand wipes, and body fluid clean-up supplies. The kit must include a wall-mountable hard storage case. Bloodborne pathogen kit must be Recreonics #12-041, Lincoln Aquatics #48-056 or approved equal.
 6. Rescue tube (5 required) - Provide one rescue tube for each lifeguard chair plus one spare. Rescue tube must be Water Safety Products 50in or approved equal.
 7. Safety eyewash station (1 required) - Safety eyewash station must be a self-contained system in which eyewash bottles are securely positioned in a portable holder. Eyewash bottles must be 32 ounces and easily removable from case, and must contain a sterile, saline solution with the ability to neutralize a varying quantity acids or caustics. Eyewash stations must be equipped with a double back screw and holes for easy mounting in location determined by the Architect. Stations must be Recreonics #12-033, Lincoln Aquatics #49-026, or approved equal.
 8. Safety eyeglasses - Provided a safety eyeglass dispenser station containing ten (10) pairs of safety glasses. Eyeglasses must be ANSI/OSHA accepted.
 9. Bag Valve Masks – Provide two (2) bag valve mask assistant resuscitation systems, one size Adult (1500ml tidal volume) and one size Infant/Child (450ml tidal volume). Product must be a latex free disposable bag mask unit with support strap, transparent patient valve, and textured surface to eliminate slipping. Integral swivel valve, available with a closed reservoir system. Standard pack includes resuscitator, oxygen reservoir and a transparent bag for storage. Bag Valve Masks must be Laerdal The BAG II Disposable or approved equal.
 10. AED – Provide one (1) Automated External Defibrillator and one (1) trainer AED corresponding to the chosen AED per facility level for the aquatic facility. Product location must be coordinated with the Owner and Architect. AED must be Zoll AED Plus or approved equal and must have an available training AED device. AED Cabinet must be provided.

2.14 THERMOMETERS

- A. The following items must be supplied unless otherwise noted. Proprietary names are to designate performance only. Equal products will be accepted.
 1. Portable thermometer (2 required) must be a molded ABS plastic tube body type with the ability to measure temperature in both degrees Fahrenheit and Celsius. A 3 ft. polyethylene cord must be attached to thermometer. Thermometer must be manufactured by Pac-Fab/Rainbow #R141036 or approved equal.
 2. The inline thermometer must be near the heating loop and must have a 9-inch adjustable angle with a minimum 6-inch stem. There must be a minimum of two (2) thermometers per loop and must have ability to read temperature in both degrees

Fahrenheit and Celsius. Thermometers must be Recreonics #32-702, Lincoln Aquatics #21-125, or approved equal.

3. Digital temperature indicator (2 required) must be a 115-volt, wall mounting case, sensor, and a stainless-steel immersion well. Weiss Instruments 20DT or approved equal. Digital thermometer not required if function is provided by the Water Chemistry Controller.

2.15 SWIMMING POOL FINISHES

- A. Swimming Pool Cementitious Finish - Reference specification section 131104, Swimming Pool Cementitious Finish.
- B. Swimming Pool Tile - Reference specification section 131103, Swimming Pool Tile.

2.16 WATERPROOFING

- A. Products
 1. Interior surfaces of gutter, surge/balance tank and backwash pit with NO additional finishes: Apply two (2) coats of Vandex BB White, Xypex Modified, Xypex Megamix I, Miracote BC Pro or Basecrete directly to surface of gutter, surge/balance tank and backwash pit.
- B. Surface Preparation
 1. Surface must be structurally sound and free of foreign substances and debris that could reduce or impair adhesion. Surfaces must be roughened by sand blasting or water blasting. Shot blasting, scarifying, or grinding can also be accepted methods of surface preparation. Surface defects or holes must be patched per manufacturer's recommendations.
 - a. National Plasterers Council Surface Preparation Definitions
 - 1) Pressure Washing: The washing or cleaning of a surface by a stream of water ejected from a nozzle at high velocity, typically in the range of 1,000 psi – 4,000 psi.
 - 2) Water Blasting: The cutting, abrading, or removal of a surface or substrate by a stream of water ejected from a nozzle at ultra-high velocity, typically in the range of 10,000 psi – 40,000 psi.
- C. Application
 1. Do not apply materials under conditions where the ambient air temperature is less than 40 degrees Fahrenheit, or to a frozen substrate.
 2. The mixing of products, quantities and application procedures must be done in accordance with the manufacturer's recommendations.

2.17 SEALANTS

- A. Provide sealed expansion joints as shown on the pool and pool structural drawings or noted on the construction/expansion joint layout, and as required. Expansion joints must be constructed and sealed as indicated and in accordance with the manufacturer's recommendation. Sealant must be manufactured by LATICRETE International, Inc., Mapei, or Deck-O-Seal.
 1. For submerged joints:
 - a. Latasil, one component, neutral cure, high performance, 100% silicone sealant in the color(s) as selected by the Owner/Architect. Must be used in conjunction with Latasil 9118 Primer per manufacturer's recommendations.
 - b. Mapesil T, 100% silicone sealant in the color(s) as selected by the Owner/Architect.
 2. For joints behind the coping, or other horizontal deck joints:
 - a. Deck-O-Seal, two component (gun-grade or pourable, self-leveling), high resilience,

non-sag, non-flowing, polysulfide-based sealing compound in the color(s) as selected by the Owner/Architect. Must be used in conjunction with Rezi-Weld LV per manufacture's recommendations.

- B. Material Storage
 - 1. Materials must be stored in the original unopened factory containers in a cool dry location at 60 to 80 degrees F. Protect from the elements and the hazards of construction.
- C. Joint Preparation
 - 1. Clean the joints of deleterious material, to sound, clean and dry substrate.
 - 2. In mixing the slurry it is recommended that the water be added first, then the cement, and finally the bentonite. The more bentonite the faster the set. Do not get the slurry on the joint itself.
 - 3. Joint must be formed or filled with an approved, resilient, non-asphaltic, closed cell, polyethylene joint filler material down to firm substrate. Allow space at the top of the joint for the installation of approved closed cell polyethylene backer rod and install same to the required depth below the surface of the slab to control the depth of the sealant bead to within manufacturer requirements.
- D. Surface Preparation
 - 1. Concrete surfaces to receive sealant must be fully cured, clean, dry, and free of dirt, dust, curing compounds and other foreign material that might compromise the adhesion and performance of the sealant. Curing aids, form release agents and joint former residue must be completely removed, if necessary, by sand blasting and/or grinding. Loose dust must be brushed off.
 - 2. Prime surfaces to receive Latasil sealant with Latasil 9118 Primer prior to sealant application, and surfaces to receive Deck-O-Seal sealant with P/G Primer prior to application.
- E. Application
 - 1. Apply sealant in accordance with the manufacturer's recommendations.
 - 2. Tool the joint immediately after application to ensure a firm, intimate contact with the joint interface.
 - 3. Remove excess sealant and smear from adjacent surfaces with Xylol or Toluol before sealant cures.
 - 4. After the sealant has fully cured (generally a minimum period of five days at 72 degrees and 50% humidity), paint the surface of the sealant with a chlorine resistant chlorinated rubber or equivalent pool paint, in a compatible color as selected by the Owner/Architect. NOTE: Latasil cannot be painted.

2.18 UNDERWATER LIGHTS

- A. Underwater lights must be equivalent to 500 watts of incandescent light. Underwater lights must be UL listed and, in the quantities, shown and as detailed in the construction drawings and as described in these specifications. Coordinate for proper installation. Refer to the drawings for quantities and locations.
- B. The pool underwater lights must be 120VAC, 87W watts LED-type, and equivalent to 500+ watts of incandescent light. Fixture housing must be stainless-steel construction with minimum wall thickness of 0.020 inch per UL 676 underwater pool lighting standard. The niche must be stainless-steel with cast brass mounting ring or PVC plastic with stainless-steel mounting ring. Brass construction pressure grounding lug on interior and exterior services. Lens must be 8-3/8 diameter clear tempered heat resistant glass. The gasket must be single piece "U" shaped santoprene or silicone. Fasteners must be silicon-bronze or stainless-steel. The light fixture must be supplied with a #16-3 STW (120V) submersible cord with ground wire positively

grounded inside the fixture. Cord entrance must be a watertight seal and epoxy encapsulated. Light fixture must be J&J Electronics PureWhite #LPL-F5W-120-XXX-P. Underwater lights must be provided with cord length as required to allow for deck relamping of fixtures. The Niche must be compatible with the light specified.

- C. Junction boxes must be provided in the quantities required and must be located at least 8" above the pool coping and 5' from the pool edge. Refer to the Electrical drawings. Cord length must be sufficient to run from fixture to the junction box with sufficient cable in the niche to re-lamp the fixture on the deck. Provide junction boxes that must be installed by Electrical.

2.19 POOL COVERS

- A. The swimming pool cover system must be the standard catalogued product of a company regularly engaged in the manufacture of such products. Alternate swimming pool cover systems are not considered unless equal to the specified product and must be submitted for approval not less than ten (10) days prior to bid date. Submittal data must include complete documentation relating to the specified features and include manufacturer's sales literature, specification sheets, energy conservation audit, installation/maintenance manuals and engineering drawings.
- B. The swimming pool cover system must be of the energy conservation type. The covers must be supplied in panel sections, allowing for ease of storage, and ease of installation and removal. The cover panel materials must withstand the commercial aquatic facility's environment. Panels must receive edging materials to strengthen the panel and to allow for deployment and retrieval without damaging the panel's main body materials. Materials must be ultraviolet stabilized to ensure long life. Warning labels must be affixed in four places to both sides of the panel and must instruct in the panels proper use and warn patrons of hazards associated with covered swimming pools. Cover panel systems must be supplied with a protector, for use when panels are not deployed.
- C. Basis of Design: The swimming pool cover system and its accessory items must be Energy Saver by SR Smith (formally T- Star Enterprises).
- D. Cover Material
 - 1. Material must be woven, twelve by twelve count per inch, high-density polyethylene, ultraviolet stabilized film fabric, flame laminated to both sides of a 1/8-inch thick, closed cell, medium density, white, polyethylene foam. The woven polyethylene film fabric must be coated on the exposed sides with an ultraviolet stabilized, chemically resistant polyethylene coating. The combination of film, foam and woven components must be non-toxic, non-absorbent, non-permeable and buoyant. The color must be blue on the upper surface and on the under surface. In addition to the above, cover must meet the following requirements:
 - 2. Cover Design Criteria
 - a. Cover panels must be divided into widths to match the existing facility cover width of 14'-11". Contractor to field verify the width of covers prior to order. Panels must totally cover the surface of the swimming pool without gaps or overlaps. Cover panels must be compatible for use with storage reel(s) and not exceed a width equal to one foot less than the length of the storage reel winding tube on which it must be stored.
 - 3. Edging
 - a. Protective-reinforcement edging must be installed along the ends and sides of each panel. A weighted non-metallic/non-corroding material must be sewn into the panel protective edging. The weighted edge must be flat and must conform to the shape of the cover. Cover end edges must be reinforced with a double layer of polyethylene-coated film fabric. The end edging must be designed in such a manner as to prevent

panels from diving when they are being pulled across the surface of the swimming pool. The encapsulated weighted edging must be wrapped around the cover corners. The entire corner construction must be reinforced with a 1/8-inch-thick load dispersion plate. Both ends of each cover panel must be equipped with no less than five (5) non-corrosive/metallic grommets and quick-release loops for easy connection to a storage reel or to the next cover panel.

4. Sewing
 - a. Sewing must be double locking chain stitch, using ultraviolet stabilized, chemically resistant, 100% polyester thread. Sewing must be accomplished with computer-controlled machines, synchronizing speed with stitch length to assure uniformity and strength.
 5. Warning Labels
 - a. Warning labels consistent with the recommendations of the Federal Consumer Protection Agency must be permanently affixed to each end of each cover panel and to the sides of perimeter panels on both sides of the panel.
- E. Portable Storage Reel
1. The portable storage reel assembly must be provided in the size and quantity to store all pool cover sections. Portage storage reel assembly must be the Bitterroot by Spectrum Aquatics, the Manual Storage Reel by SR Smith, the Deck Reel System by Alta Enterprises or approved equal. The winder must be provided with a cover to protect the pool covers while stored.

2.20 POOL HEATERS

- A. Provide the pool water heating system. Heating system to include piping, heaters, booster pumps, controls, gauges, thermostats, control valves and wiring required to draw water from the recirculation piping, heat the water and return it back to the recirculation piping. Interlock pool heating system with pool recirculation pumps.
1. Pool heater manufacturer representative must be on site to start and adjust pool heater(s). Copies of the startup report must be sent to the Architect/Engineer.
 2. The heater system must consist of a indirect gas fired boiler with an internal pumped bypass as shown on the drawings. Proposed substitutions must include a mechanical drawing incorporating required changes in layout, piping valves, gas, venting and electrical connections. The cost of such changes must be included in the price of the substitute. Confirm by 1/4-inch scale shop drawing that the alternate heater(s) must be provided will fit within the available space.
 3. The pool heater(s) must have an input rating as shown on the drawings and must be orificed for operation on Natural Gas.
- B. Indirect Gas Fired Boiler with Pumped Bypass
1. Basis of Design: Lochinvar Aquas, Raypak XTherm Indirect, or approved equal.
 - a. The indirect heater(s) package must be as follows: A high efficiency, condensing boiler piped to a dedicated heat exchanger. The boiler side piping must be stainless pipe with a circulating pump, and appropriate components and fittings for safe and efficient delivery of indirect heat transfer to the pool water.
 - b. The bypass pump must be constructed of cast iron and operate on a 120-volt, 60 Hz, 1 phase power supply (unless otherwise specified). The pump must be factory wired to run with intermittent pump operation.
 - c. The expansion tank must be of a bladder type design and must be sized adequately to allow for the expansion of the boiler water when heated.
 - d. The flow switch must be of a paddle type design and must be wired to the internal boiler control safety circuitry so to not to allow the boiler to operate when there is not sufficient flow.
 - e. The automatic fill valve with pressure reducer must be factory set for 15 psi and

must allow fresh water to be added to the boiler system only when the water pressure has fallen below the pressure setting.

- f. The pressure relief valve must be ASME Certified and have a setting of 50 psi.
- g. The temperature and pressure gauge must be capable of reading temperature in both degrees Fahrenheit and degrees Celsius. The Pressure units must be read in pounds per square inch (psi). The entire assembly must be mounted on a 3" channel iron skid to facilitate handling and installation.
- h. The heat exchanger must be as follows:
 - 1) The standard titanium heat exchanger must be of a plate and frame, or shell and tube design constructed of a carbon steel frame and utilizing a titanium plate pack with EPDM gaskets.
- i. The boiler must be as follows:
 - 1) The boiler must bear the ASME "H" stamp for 160 psi working pressure and must be National Board listed. There must be no banding material, bolts, gaskets, or "O" rings in the header configuration. The stainless-steel combustion chamber must be designed to drain condensation to the bottom of the heat exchanger assembly. A built-in trap must allow condensation to drain from the heat exchanger assembly.
 - 2) The boiler must be certified and listed by C.S.A. International under the latest edition of the harmonized ANSI Z21.13 test standard for the U.S. and Canada. The boiler must comply with the energy efficiency requirements of the latest edition of the ASHRAE 90.1 Standard and the minimum efficiency requirements of the latest edition of the BTS2000 Standard. Models must operate up to 96.2% thermal efficiency with pool water temperatures below 100°F. The boiler must be certified for indoor installation.
 - 3) The boiler must be constructed with a heavy gauge steel jacket assembly, primed and pre-painted on both sides. The combustion chamber must be sealed and completely enclosed, independent of the outer jacket assembly, so that integrity of the outer jacket does not affect a proper seal. A burner/flame observation port must be provided. The burner must be a premix design and constructed of high temperature stainless-steel with a woven metal fiber outer covering to provide modulating firing rates. The boiler must be supplied with a gas valve designed with negative pressure regulation and be equipped with a variable speed blower system, to precisely control the fuel/air mixture to provide modulating boiler firing rates for maximum efficiency.
 - 4) The boiler must have the following turndown ratios:
 - a) On packages with 750,000 Btu/hr input must be capable of full modulation firing with a turndown ratio of 15:1.
 - b) On packages with 1,000,000 through 1,250,000 Btu/hr input must be capable of full modulation firing with a turndown ratio of 20:1.
 - c) On packages, with 1,500,000 through 2,000,000 Btu/hr input must be capable of full modulation firing with a turndown ratio of 25:1.
 - 5) The boiler must operate in a safe condition at a de-rated output with gas supply pressures as low as 4 inches of water column.
 - 6) The boiler must utilize a 24 VAC control circuit and components. The control system must have an electronic display for boiler set-up, boiler status, and boiler diagnostics. Components must be easily accessed and serviceable.
 - 7) The boiler must feature a control panel with an LCD touch screen display. The boiler must have password security, pump delay with freeze protection, pump exercise, domestic hot water prioritization and PC port connection. The boiler must allow 0-10 VDC input connection for BMS control and have built-in "Cascade" to sequence and rotate while maintaining modulation of up to eight packages without utilization of an external controller. Supply voltage must be 120 volt/60 hertz/ single phase unless otherwise noted.
 - 8) The boiler must be equipped with two terminal strips for electrical connection. A

low voltage connection board for safety and operating controls. A high voltage terminal strip must be provided for supply voltage.

- j. The heater(s) must be supplied with venting in accordance with the National Fuel Gas Code, ANSI Z223.1/NFPA 54 latest edition. Refer to Mechanical.
- k. The boiler must have an independent laboratory rating for Oxides of Nitrogen (NOx) of 20 ppm or less corrected to 3% O₂. The manufacturer must verify proper operation of the burner, controls, and the heat exchanger by connection to water and venting for a factory fire test prior to shipping.

PART 3 - EXECUTION

3.01 EXISTING CONDITIONS, INSPECTION AND PREPARATION

- A. Carefully examine the contract documents for requirements that affect the work of this section. Prior to starting work, notify the Architect of defects requiring correction. Do not start work until conditions are satisfactory.
- B. Verify that work by others, related to this section, has been completed. This includes earthwork, concrete work, and mechanical, electrical, and plumbing connections.
- C. Protect materials and work completed by others from damage while completing the work in this section.

3.02 FIELD MEASUREMENTS

- A. Verify benchmark and pool location prior to layout.
- B. If field measurements differ from the construction drawing dimensions, notification must be given to the Architect prior to proceeding with work.

3.03 EXCAVATION, REINFORCING STEEL AND SWIMMING POOL SHOTCRETE OR CAST-IN-PLACE CONCRETE

- A. Reference Division 31 - Site Work/Earthwork
- B. Reference Division 3 - Concrete

3.04 TOLERANCES FOR CONSTRUCTION OF THE POOL SHELL

- A. The completed structures must be constructed level and to the dimensions, elevation, depths, and thickness as shown on the plans.
- B. The elevation tolerance of the pool shell and gutter lip must be plus or minus 1/8 inch.
- C. The vertical wall surface tolerance of the pool shell, for the first 36 inches from the water surface must be plus or minus 1/4 inch from plumb measured with a 6-foot straight edge.
- D. For competitive racecourses, the following pool shell tolerances must apply:

Course	Tolerance	Minimum	Maximum
25 Yard	+ 1 3/16" /- 0"	75' – 3/4"	75' – 1 15/16"
50 Meter	+ 0.010 M	50.02 M	50.03 M

- 1. The above dimensions include allowances for a touchpad at each end of the course. The maximum dimension includes the construction tolerance.

2. The above dimensions apply to a vertical plane extending 1'-0" above and 3'-0" below the surface of the water at points of both end walls.
- E. Provide the services of a registered engineer or land surveyor who must measure and certify the elevations of the gutter lip at 10-foot centers as well as the length of each lane for each possible racing course. Courses designed with touchpads for competition must be measured and certified with touchpads in place. Course length survey must be made with the pool filled with water between 78- and 82-degrees Fahrenheit. The Contractor to submit compliant survey measurements to the Architect for review and record.
- F. Ground wires or grade pins, if used, must be installed in such a manner that they accurately outline the section of the pool shell as indicated on the plans. They must be located at intervals sufficient to ensure proper thickness throughout and must be maintained tight. Grade pins or grounding wires must not be permanently embedded in the pool shell.

3.05 WATER TIGHTNESS TEST

- A. The water tightness test described within the following section is in accordance with the Hydrostatic Tightness Testing of an Open Concrete Containment Structure as required by American Concrete Institute (ACI) 350.1-10 Section 2. Test reports must be provided and must include test locations within the structure, dates of testing, water level measurements, amounts of evaporation or precipitation, measured volume corrections, retest results (if applicable), actions taken, and final results.
- B. This test applies to the pool, the surge and balance tanks, and the gutter system.
- C. The water tightness test must be completed prior to the application of the finishes or waterproofing.
- D. Water Tightness Test Procedure
 1. Preparation
 - a. For concrete pools and surge/balance tanks: Allow the concrete structure to set 28 days for curing purposes. Once the shell has gained sufficient strength to withstand the test load and after the outlets have been securely sealed, the pool or surge/balance tank must be filled with water.
 2. Fill: Fill and then isolate the pool, the surge and balance tanks, and the gutter system. The water tightness test must begin after the vessel has been filled for a minimum of three (3) days. During the filling, outlets must be monitored for water tightness and concrete joints, if applicable, must be monitored for visible leakage. If visible leakage from the vessel is observed, the condition must be corrected prior to the start of the test.
 - a. After the initial fill, ground water must be removed from the pool sight sump or the pool location de-watering system. This must be completed prior to the start of the water tightness test. De-watering of the pool sight sump must be maintained during the entire duration of the test.
 3. 24-hour Allowable Loss
 - a. Calculate the allowable water loss from the unlined vessel(s). This is .1% of the total vessel volume. For example, if the vessel has a volume of 200,000 gallons, the 24-hour allowable loss will be 200 gallons.

Vessel	Total Volume (Gallons)	24-hour Allowable loss (.1% or .001 of Total Volume)
EXAMPLE	200,000 gal	200 gal
Pool		

Pool Surge Tank		
Sprayground Balance Tank		
Pool Gutter		

4. Measurement
 - a. Measurements must be taken at the pool, the surge and balance tanks, and the gutter system. Multiple test points with averaging are recommended for vessels which will be exposed to wind. Document the separate findings on the chart below. Repeat the measurements and document every 12 hours for a total of three (3) days. The Contractor must check the pool, the surge and balance tanks, and the gutter system for water loss with the Owner or a representative designated by the Owner every 12 hours. Submit photo documentation (with time stamps) of each measurement with the completed water tightness report. Example measurements are shown in the table below.
5. Evaporation/Precipitation Measurement Procedure
 - a. Fill a floating, restrained, partially filled, calibrated, open pan with water and allow the container to float within the pool during the testing period. This will be used to measure evaporation and precipitation.

Vessel	12 hrs. passed	24 hrs. passed	Day 1 TOTAL	36 hrs. passed	48 hrs. passed	Day 2 TOTAL	60 hrs. passed	72 hrs. passed	Day 3 TOTAL
Example Pool	0.021 ft	0.010 ft	0.031 ft	0.016 ft	0.019 ft	0.035 ft	0.022 ft	0.017 ft	0.039 ft
Example Pan	0.008 ft	0.006 ft	0.014 ft	0.008 ft	0.007 ft	0.015 ft	0.009 ft	0.007 ft	0.016 ft
Pool									
Pool Surge Tank									
Sprayground Balance Tank									
Pool Gutter									
Evaporation/ Precipitation Pan									

6. Calculate Daily Loss
 - a. Calculate the total daily water loss for the vessel(s) and record in the table below. If a vessel has a daily water loss that is greater than the calculated 24-hour allowable loss, the vessel cannot be considered watertight.
 - 1) $\text{Daily Loss} = 7.481 \times \text{Structure Surface Area (SF)} \times [\text{Total Water Loss per Day (FT)} - \text{Evaporation per Day (FT)} + \text{Precipitation per Day (FT)}]$
 - b. For example, we have a body of water that is 200,000-gallon volume and 3,500 square feet of surface area. Measurements for this example body of water are recorded in the table above.
 - 1) $\text{Day 1 Loss} = (7.481 \text{ gallons per cubic foot}) \times (3,500 \text{ SF}) \times [(.031 \text{ ft water loss}) - (.014 \text{ ft evaporation}) + (0 \text{ ft precipitation})] = \underline{445 \text{ gallons Day 1 loss}}$
 - 2) $\text{Day 2 Loss} = (7.481 \text{ gallons per cubic foot}) \times (3,500 \text{ SF}) \times [(.035 \text{ ft water loss}) - (.015 \text{ ft evaporation}) + (0 \text{ ft precipitation})] = \underline{524 \text{ gallons Day 2 loss}}$
 - 3) $\text{Day 3 Loss} = (7.481 \text{ gallons per cubic foot}) \times (3,500 \text{ SF}) \times [(.039 \text{ ft water loss}) - (.016 \text{ ft evaporation}) + (0 \text{ ft precipitation})] = \underline{602 \text{ gallons Day 3 loss}}$

Vessel	Daily Water Loss Day 1 (Gal)	Daily Water Loss Day 2 (Gal)	Daily Water Loss Day 3 (Gal)	Allowable Loss	Are daily values higher than the
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				(calculated above, Gal)	Allowable Loss? (Y/N)
EXAMPLE	445 gal	524 gal	602 gal	200 gal	Y, not watertight
Pool					
Pool Surge Tank					
Sprayground Balance Tank					
Pool Gutter					

7. Absorption
 - a. Waiting 3 days after the initial water fill will allow the concrete to absorb water and must be sufficient to minimize the effect of absorption on the test results.
8. If leaks are detected, repair the vessel, and make watertight in accordance with these requirements.
9. With regard to this test, the curing requirements, the final fill, and the cost of the water for two (2) complete fillings must be borne by the Owner. Expenses for subsequent fillings or partial fillings (more than 25%) of the pool must be provided and will not be borne by the Owner.

3.06 PIPING INSTALLATION

A. General

1. Provide and erect, according to the best practices of the trade, piping shown on the drawings and required for the complete installation of these systems. The piping shown on the drawings must be considered as diagrammatic in indicating the general run and connections and may or may not in parts be shown in its true position. The piping may have to be offset, lowered, or raised as required or as directed at the site. This does not relieve responsibility for the proper erection of the systems or piping in every respect suitable for the work intended as described in the specifications and approved by the Architect. In the erection of piping, it must be properly supported, and proper provisions must be made for expansion, contraction and anchoring of piping. Piping must be cut accurately for fabrication to measurements established at the construction site. Pipe must be worked into place without springing and/or forcing, properly clearing windows, doors, and other openings and equipment. Cutting or other weakening of the building structure to facilitate installation will not be permitted. Pipes must have burrs and/or cutting slag removed by reaming or other cleaning methods in strict accordance with the manufacturer's instructions. Changes in direction must be made with fittings. Open ends of pipes and equipment must be properly capped or plugged to keep dirt and other foreign materials out of the systems. Plugs of rags, wool, cotton waste or similar materials will not be used in plugging. Piping must be arranged so as not to interfere with removal and maintenance of equipment, filters, or devices, and so as not to block access to manholes, access openings, etc. Flanges or unions applicable for the type of piping specified must be provided in the piping at connections to items of equipment. Piping must be installed to ensure noiseless circulation. Valves and specialties must be so placed to permit easy operation and access.

B. Pipe Hangers and Supports

1. Pipes must be adequately supported by pipe hangers and supports as specified.
2. Horizontal PVC Schedule 80 piping must be supported in accordance with the manufacturer's recommendations for fluid temperature not exceeding 120-degree F and as indicated on the drawings.
3. Horizontal CPVC Schedule 80 piping must be supported in accordance with the

manufacturer's recommendations for fluid temperature not exceeding 140-degree F and as indicated on the drawings.

4. Round rods supporting the pipe hangers must be as indicated on the drawings.
5. Hanger rods must be galvanized steel. Provide for controlling level and slope by turn buckles or other approved means of adjustment and incorporate lock nuts.
6. Provide means of preventing dissimilar metal contact such as plastic-coated hangers, copper colored epoxy paint, or non-adhesive isolation tape.
7. Provide hangers to provide a minimum of 1-inch space between finished covering and adjacent work.
8. Place a hanger within 12 inches of each horizontal elbow.
9. Support vertical piping independently of connected horizontal piping. Support vertical pipes at every floor. Wherever possible, locate riser clamps directly below pipe couplings or shear lugs.
10. Where several pipes can be installed in parallel and at the same elevation, provide trapeze hangers as specified. Trapeze hangers must be spaced according to the smallest pipe size or provide intermediate supports according to the support spacing schedules. Provide heavier members as required for the load supported for the entire span distance. Hanger rods must be as specified above and properly sized for the load supported, but not less than 5/8 inches diameter.
11. Piping must be rigidly supported from the building structure by means of hanger assemblies properly selected and sized for the application in accordance with the manufacturer's recommendations and specifications. Do not support piping from other pipes, ductwork or other equipment that is not building structure. Do not modify the building structure for hanger installation.
12. Attachment of piping hangers to the building structure must be provided in a manner approved by the Architect and Building Structural Engineer.
13. The use of pipe hooks, chains, or perforated iron for pipe hanger supports will not be permitted.
14. A design for piping in a service tunnel, if required, supported by a structure must be submitted for approval. The structure must be non-corrodible and must be of a size and configuration to rigidly support the piping as shown in the plans at a minimum spacing as shown below.

C. Piping Installation – Below Grade

1. Trench bottoms must be smooth and free of rocks and debris. If the trench is dug in ledge rock, hardpan or where large boulders are not removed, place 3 inches of sand or compacted fine-grained soil below the pipe. Pipe must be supported over its entire length with firm, stable material. Blocking will not be used to change pipe grade or provide intermittent support over low sections in the trench. Surround the pipe with backfill meeting the requirements of Section 312000 with a particle size of 1-1/2 inch or less and in accordance with the project geotechnical report. Compact in layers not to exceed 6 inches with vibratory method. Follow installation methods of ASTM D2774 "Underground Installation of Thermoplastic Pressure Piping".

D. Flushing, Draining and Cleaning Pipe Systems

1. Flush out water systems with water before placing them in operation. Other systems must be cleaned by using compressed air or nitrogen. After systems are in operation and during the test period, strainer screens must be removed and thoroughly cleaned.

E. Expansion and Contraction

1. Make necessary provisions for expansion and contraction of piping with offsets, loops, flexible connections, and anchors as required to prevent undue strain. Provide shop drawings for method and arrangement for control of expansion and contraction of piping.

F. Testing

1. Piping installation and pressure testing must be performed by the Contractor and reviewed by the Owner or a designated representative of the Owner before commencement of backfilling. A minimum notice of one (1) week is required prior to review. Results must be submitted to the Architect. Pictures with time stamps for each section of piping must be included with testing report(s) and be submitted within one (1) week of the pressure test(s).
2. Pool related piping must be capped and hydraulically pressure tested (with water, not air) to a pressure of not less than 50 PSI for a period of no less than two (2) hours. Pressure testing must be conducted in accordance with ASTM D2774. The temperature of the water used for the test must be between 40°F and 90 °F.
3. Maintain a sustained 20 PSI pressure on pool related piping throughout the course of construction.
4. Adhere to the applicable provisions of Division 22 - Plumbing, "General Provisions" and "Basic Materials and Methods" for installation of piping system.

3.07 EQUIPMENT AND SYSTEMS INSTALLATION

- A. Provide and assemble equipment, special parts and accessories as shown on pool drawings, specifications, and shop drawings of the equipment suppliers.
- B. Provide anchors and inserts imbedded in the deck including fittings, inserts and structure sleeves and required anchorage as shown on the plans and as indicated in this section of the specifications. Equipment must be set true and plumb, using factory jigs where available. Removable equipment items must be easily removable from anchors and must fit without noticeable wobble.
- C. Provide templates for equipment anchors. Provide anchor bolts of the size and spacing as required by the equipment manufacturer. Anchor bolts must be stainless-steel Type 316L and of a length capable of adequate anchorage into rough slab-on-grade allowing for finish deck tile and setting bed. Anchors must be set and cast into place during building concrete work. Inspect anchor settings for horizontal and vertical alignment prior to placing concrete.
- D. Provide equipment and systems in accordance with manufacturer's directions. Equipment must be assembled and in place for final observation.
- E. Items necessary to complete this section are shown on the plans or described in the specifications including items that may be purchased by the Owner. Items are detailed and specified as a guide for dimensional purposes. Make provisions accordingly and submit shop drawings and submittals based on that data.

3.08 START-UP AND INSTRUCTION

- A. Supply the services of an experienced swimming pool operator/instructor for a period of not less than two days (total 16 hours) after the pool(s) have been filled and initially placed in operation. During this period, the Owner's representatives who will be operating the pool(s) must be thoroughly instructed in phases of the pool's operation. Deliver six (6) complete sets of operating and maintenance instructions for the swimming pool, structures, finishes and component equipment. Prior to leaving the job, obtain written certification from the designated Owner's representative acknowledging that the instruction period has been completed and necessary operating information provided. Include the cost of two (2) additional days (total 16 hours) of instruction and operational check out by the qualified representative during the first season of operation.
- B. Written reports of each of these visits outlining the pool's operation, competence and performance of the pool's operation personnel, and other pertinent comments must be

submitted to the Owner and Architect/Engineer within one (1) week after each visit.

- C. Provide specific written procedures that must be followed for emptying and refilling the pool as mentioned previously in this section. The procedures must be included in the bound volume of operating instructions and references in the front index with a note headed by the words: "CAUTION -- VERY IMPORTANT".

END OF SECTION 131100

SECTION 131103 - SWIMMING POOL TILE

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. The drawings and General Provisions of the contract, including General and Supplementary Conditions apply to the work of this section.

1.02 SUMMARY

- A. The cementitious pool finish must have ceramic tile markings and trim at locations including the pool vertical tile band, stairs, nosings, recessed wall steps, toe ledge, depth markings, wall targets, floor lane markings and other tile installations as shown and detailed on the contract drawings and in strict accordance with these specifications.
- B. The Contractor must furnish and install the work of this section.

1.03 RELATED SECTIONS

- A. Division 1 – Mock Ups
- B. Division 7 - Joint Sealers
- C. Division 9 - Ceramic Tile
- D. Section 131100 - Swimming Pool
- E. Section 131104 - Swimming Pool Cementitious Finish

1.04 QUALITY ASSURANCE

- A. Reference Standards: Conform to the following standards unless otherwise required herein.
 - 1. American National Standards Institute (ANSI)
 - a. A108.01 – General Requirements: Subsurfaces and Preparations by Other Trades.
 - b. A108.02 – General Requirements: Materials, Environmental, and Workmanship.
 - c. A108.1, Glazed Wall Tile, Ceramic Mosaic Tile, Quarry Tile and Paver Tile installed with Portland Cement Mortar.
 - d. A108.1C – Contractor's Option: Installation of Ceramic Tile in the Wet-Set Method with Portland Cement Mortar or Installation of Ceramic Tile on a Cured Portland Cement Mortar or Installation of Ceramic Tile on a Cured Portland Cement Mortar Setting Bed with Dry Set or Latex-Portland Cement Mortar.
 - e. A108.5 – Installation of Ceramic Tile with Dry-Set Portland Cement Mortar or Latex-Portland Cement Mortar.
 - f. A108.10 – Installation of Grout in Tile Work.
 - g. A137.1 Standard Specifications for Ceramic Tile.
 - 2. American Society for Testing and Materials (ASTM)
 - a. C144-99, Aggregate for Masonry Mortar
 - b. C150-00, Portland Cement
 - c. C171-97a, Sheet Materials for Curing Concrete
 - d. C206-97, Finishing Hydrated Lime
 - e. C207-91 (R1997), Hydrated Lime for Masonry Purposes
 - f. F-1869, Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride

- g. F-2170, Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using in Situ Probes
 - 3. Tile Council of North America (TCNA); 2021 Edition, Handbook for Ceramic Tile Installation.
 - 4. American Concrete Institute
 - a. ACI 302 – Guide for Concrete and Floor Slab Construction
 - 5. International Concrete Repair Institute (ICRI)
 - a. Concrete Surface Profile (CSP)
- B. The Contractor must have two years' experience in similar pool projects for which the Owner may require written proof thereof and proper tools to install tile.

1.05 MANUFACTURERS

- A. Subject to compliance with requirements provide ceramic tile, mortar, and grout of the following manufacturers: American Olean Tile Co. (tile), Dal-Tile Co. (tile), Buchtal (tile), KlinkerSire (tile), MAPEI, Inc. (thin-set, waterproofing, grout, and admixtures), and LATICRETE International Inc. (thin-set, waterproofing, grout, and admixtures) or approved equal.

1.06 SUBMITTALS

- A. Submit shop drawings indicating tile layout, patterns, joint layout, color arrangement, perimeter conditions, junctions with dissimilar materials, thresholds and setting details.
- B. Submit product data indicating material specifications, characteristics, and instructions for using adhesives and grouts.
- C. Samples:
 - 1. Submit physical samples for all tile color selections by Owner/Architect.
 - 2. Submit physical samples for grout color selections by Owner/Architect.
- D. Mockups:
 - 1. Mount tile and apply grout on 24"x24" backerboard to indicate pattern, color variation and grout joint size variations of each pattern. Furnish mounted tile samples as requested by the Architect/Owner for approval.
- E. Submit manufacturer's installation instruction.
- F. Submit maintenance data.
 - 1. Include recommended cleaning and stain removal methods, cleaning materials.

1.07 PRODUCT DELIVERY AND STORAGE

- A. Deliver tile materials to site in unopened factory containers sealed with grade seals bearing printed name or manufacturer and the words "Standard Grade". Keep the grade seals intact and containers dry until tiles are used. Keep cementitious materials dry until used.

1.08 JOB CONDITIONS

- A. Inspect and verify job conditions. Report defects in base surfaces for correction before proceeding.
- B. Maintain environmental conditions, including temperature humidity and ventilation, within

limits recommended by the manufacturer. Do not install products under environmental conditions outside the manufacturer's absolute limits.

- C. Do not install mortar, set, or grout tile exterior when inclement weather conditions are expected within 48 hours after work is scheduled to be completed unless proper protection is provided.
- D. Maintain a temperature range of 50 degrees Fahrenheit to 90 degrees Fahrenheit during installation of tile and grout materials. Tile installation should cure for a minimum 14 days with average a temperature of 70 degrees, while maintaining the minimum 40 degrees and maximum 90 degrees Fahrenheit, prior to filling pool with water.
- E. Vent temporary heaters to outside to avoid carbon dioxide damage to the new tile work.

1.09 COLORS

- A. Colors must be selected by the Owner/Architect or Interior Designer. Note that swimming pool regulations may dictate color selections within the pool tank. See tile materials for price group breakdowns.

1.10 WARRANTIES

- A. The Contractor warrants to the Owner that materials and equipment provided under the contract will be of good quality and new unless otherwise required or permitted by the contract documents, that the work will be free from defects not inherent in the quality required or permitted and that the work will conform with the requirements of the contract documents. Work not conforming to these requirements, including substitutions not properly approved and authorized, may be considered defective. The Contractor's warranty excludes remedy for damage or defect caused by abuse, improper or insufficient maintenance, improper operation, modifications not executed by the Contractor or improper wear and tear under normal usage. If required by the Owner, provide satisfactory evidence as to the kind and quality of materials and equipment. Warranties must be for a period of five years, unless otherwise specified.
- B. Setting materials must be provided by the same manufacturer. Mixing materials and application procedures must be done in accordance with manufacturer's recommendations and requirements. Documentation must be provided to this effect by the Contractor with verification from the manufacturer. This documentation must be included in the operations and maintenance manual under warranties as documentation qualifying the project for a 15 Year Systems Warranty by LATICRETE International, Inc., MAPEI, Inc. or approved equal.
- C. The Contractor must contact the tile setting material manufacturer's technical representative to review installation details, job site conditions, selected materials, and their conformance to the manufacturer's warranty requirements prior to the commencement of work. Failure to follow these requirements will not relieve the Contractor of the requirement to provide specified warranties.
- D. The Contractor must agree to repair or replace work at no cost to the Owner upon written notification from the Owner within the warranty period. Pro-rated warranties are not acceptable.

PART 2 - PRODUCTS

2.01 TILE MATERIALS

- A. Standard grade conforming to ANSI A137.1. Provide trimmer units as indicated and specified, including special shapes as detailed or required. Tile patterns and colors must be as indicated and specified, colors of approved shades. Mesh mounted or perforated paper backed tile is not allowed where the mesh of paper remains as a permanent part of the installation. If dot mounting is used, a minimum of 67% of the depth of the tile must be free from dots to ensure proper grout curing.
- B. Tile must be "frost-proof" and suited for an outdoor pool installation in a freeze/thaw climate.
- C. Unglazed Ceramic Mosaic Tile
 - 1. Slip-resistant porcelain unglazed ceramic mosaic tile, cushion, or all-purpose edges, 2" square from price group 2 for floor, walls, and stair treads unless otherwise noted. The minimum dynamic coefficient of friction must be 0.42 for wet surfaces and 0.65 for ramped surfaces. Where special shapes are required, they must be selected from price group 3. Equivalents provided by Knoxtile, Dal-Tile or American Olean. For wet surfaces: Buchtal Chroma Mosaics with front mount film (seven color options) 2"x2" 7161HVF or American Olean Unglazed color-body porcelain mosaics 2"x2", price group 1-3. For ramps: Buchtal Chroma non-slip mosaics with glass fiber net (four color options) 2"x2" 7161H. Or for wet surfaces or ramps: Buchtal Chroma non-slip 5"x5" 32020H thirteen color options) or Dal-Tile or American Olean Unglazed color-body mosaics 2"x2" with 7.5% abrasive grain (7 color options). Colors must be selected by the Owner/Architect.
 - 2. Ceramic tile band below the pool gutter lip, crown detail at stairs, toe ledge and recessed steps with color selected by Owner/Architect from Dal-Tile, Keystone Unglazed Mosaic, 2"x2" price group 4, American Olean Unglazed color-body porcelain mosaics 2"x2" price group 1-3, or powder glazed 2"x2" Buchtal Chroma Mosaics provided by Knoxtile.
 - 3. Contrasting ceramic tile nosings at pool stairs, recessed steps, toe ledge must be Universal Trim 2"x2" with color selected by the Owner/Architect from Dal-Tile, Keystone Unglazed Mosaic, price group 3 and 4, American Olean Unglazed color-body porcelain mosaics 2"x2", price group 1-3.
 - 4. Recessed steps and toe ledge must be Universal Trim 2"x2" with color selected by the Owner/Architect from Dal-Tile, Keystone Unglazed Mosaic, price group 3 and 4, American Olean Unglazed color-body porcelain mosaics 2"x2", price group 1-3.
 - 5. 4" wide contrasting ceramic tile stripe and 12" lane markers on the pool floor with color selected by Owner/Architect from Dal-Tile, Keystone Unglazed Mosaic, 2"x2" price group 3, American Olean Unglazed color-body porcelain mosaics 2"x2" price group 3, or from Knoxtile, as 4"x4" Buchtal Chroma Colors 22010H-717, 5556 Grey Black and 5535 Blue or 2"x2" Mosaic 7160HVF 5535 Grey Black. The main racecourse wall targets and lane markers must be black. The cross-course wall targets and lane markers must be midnight blue.
- D. Handhold tiles at the pool perimeter must be glazed ceramic tile from price group 3 as manufactured by Dal-Tile or approved equal. Color selection by Owner/Architect. Size of tile is 2-1/2" x 6", #A-7250. Provide stainless steel caps as manufactured by EKO3 model number DP-108-00004 in lieu of tile at locations with lane line threaded eye bolt as specified in drawings.
- E. Provide tile trim units where indicated or necessary for a complete and finished installation. Provide rounded units for external and internal corners and angles. Provide trim units of material and finish identical to the adjoining tile. Provide SCR/L701 units where the C701 hand hold is interrupted to permit draining. Color selection by Owner/Architect. The

Contractor should request via non-standard production. The SCR/L701 units are available through DalTile at 314-997-6970 or 1-800-672-2086.

- F. Message Tile and Depth Markings
 - 1. Horizontal and vertical depth markings and warning signs must be 6"x6" with 4" high numbers and letters. Horizontal depth markers must be slip resistant. Single tile abbreviations must be used for 'FT' and 'IN.'

2.02 SWIMMING POOL TILE SETTING MATERIALS AND INSTALLATION

- A. Surface Preparation
 - 1. Surface preparation must be in accordance with ACI 302. The surface must be structurally sound and free of foreign substances and debris that could reduce or impair adhesion, free of dirt, oil, grease, curing compounds, or other foreign materials. Sound and remove loose concrete to firm substrate. Surfaces must be roughened to a CSP of 3 to 5 (reference ICRI CSP Standards for acceptable profile height). Thoroughly wash/rinse with clean potable water. Surface defects or holes in the substrate must be patched per manufacturer's recommendations.
- B. Slurry Bond Coat
 - 1. Horizontal surfaces to receive a thick bed mortar application must be installed over a slurry bond coat of either LATICRETE 254 Platinum one-step, polymer-fortified, thin-set mortar or MAPEI Planislope RS polymer-modified pre-blended, rapid-setting mortar mixed with water only in compliance with ANSI A108.1A (2.2 & 5.2). As manufactured by LATICRETE International, MAPEI, Inc., or approved equal. Note that slurry bond coats are not required under vertical applications of the render and scratch coat.
- C. Mortar & Leveling Beds
 - 1. Bonded Thick Bed Method (Floor / Horizontal Surfaces): Provide a dry pack, thick mortar bed on horizontal surfaces consisting of LATICRETE 3701 Fortified Mortar Bed or MAPEI Planislope RS polymer-modified pre-blended, rapid-setting mortar mixed with water only. Apply over a properly prepared slurry bond coat.
 - 2. Render- Scratch and Float Coats (Wall / Vertical Surfaces): Provide wall render (scratch and float coats) on vertical competition turning surfaces to a depth of 4'-0" below the water surface, consisting of either LATICRETE 3701 Fortified Mortar Bed or LATICRETE 3701 Lite Mortar or MAPEI Planislope RS polymer-modified pre-blended, rapid-setting mortar mixed with water only for lift thicknesses up to 1/2". Wall render is made to a plastic consistency when used vertically. Fill holes and bring surface up to line and plane as required. As manufactured by LATICRETE International, MAPEI, Inc. or approved equal. Note that slurry bond coats are not required under vertical applications of the render and scratch coat. (Refer to Course Length Tolerances for competitive pools.)
- D. Tile Thin-Set
 - 1. Use either LATICRETE 254 Platinum one-step, polymer fortified, thin-set mortar or MAPEI Keraflex Super one-step, polymer modified, thin-set mortar, used in accordance with the manufacturer's requirements. As manufactured by LATICRETE International, MAPEI, Inc., or approved equal.
- E. Tile Grout
 - 1. Use either LATICRETE PERMACOLOR Grout or MAPEI Ultracolor Plus FA Grout in accordance with the manufacturer's requirements. As manufactured by LATICRETE International, MAPEI, Inc., or approved equal. Color selection by Owner/Architect.
- F. Elastomeric Sealant
 - 1. Use LATICRETE LATASIL over LATASIL 9118 primer or MAPEI Mapesil "T" 100%

silicone sealant for inside/outside corners, expansion/movement joints, and to seal lighting/plumbing fixture penetrations. The primer and sealant installation must be in accordance with the manufacturer's requirements. As manufactured by LATICRETE International, Inc., MAPEI, Inc. or approved equal. Color selection by Owner/Architect.

- G. Mixing and application procedures must be in accordance with the manufacturer's recommendations and requirements. The manufacturer's representative must visit the site to verify field conditions, confirm materials and application requirements and ascertain that materials and systems are so installed. Documentation must be provided to this effect.

PART 3 - EXECUTION

3.01 PREPARATION

- A. Complete water tightness test prior to tile installation. The concrete tank must be watertight per ASTM D5957, the Tile Council of North America, and specification 131100.
- B. Clean substrates of dust, dirt, oil, grease, curing compounds and other foreign substances and mechanically roughen concrete and shotcrete for bond. Conform to applicable reference standards and to recommendations of manufacturers of materials used and meeting ICRI, CSP of 3-5.
- C. Substrates to Receive Mortar Setting Beds
 - 1. Dampen concrete substrate to receive tile work according to above referenced standards or tile manufacturer's instructions, as required.
- D. Substrates to receive thin set tile applications must meet normal construction tolerances of 1/4" in 10' where competition tolerances do not apply and must meet competition tolerances where required elsewhere in these specifications, and must be free of bumps, dips and surface irregularities that may affect the satisfactory installation of the tile.
- E. Tile Wetting
 - 1. Dampen tile according to above reference standards or tile manufacturer's instructions, as required.
- F. Screeds
 - 1. Accurately set temporary screeds to control the finish plane of mortar-bed set tile and remove as soon as setting bed is sufficiently hardened. Fill void spaces from screeds with same mortar.

3.02 TILE INSTALLATION

- A. Arrange tile according to patterns detailed. Set tile with flush well-fitted joints, finished in true planes, plumb, square, joints of uniform size. Provide approved trimmers as shown or required. Cut tile without marring. Carefully grind and joint tile edges and cuts.
- B. Follow Tile Council of North America installation methods P601 and B417 to achieve total tile system thickness for thin or thick set.
 - 1. Thick Set
 - a. Apply specified setting bed mortar, up to 2" in thickness, on cured and dried concrete pool shell. Tamp and screed to required planes. Spread no more mortar than can be covered with tile before initial set. Do not use re-tempered mortar. Trowel 3/32" to 1/8" thick bond coat over plastic setting bed mortar just before setting tile or apply bond coat to back of each tile placed. Set tile in position and beat firmly into the

setting bed mortar. Bring tile faces to a true and correct plane. Complete beating and leveling before mortar sets and in no case later than one hour after first placing. When ready, wet and remove paper and glue avoiding excess water. At this time adjust out-of-line or out-of-level tile.

2. Thin Set
 - a. Apply specified bond coat on cured and dried concrete pool shell. Trowel 3/32" to 1/8" thick bond coat over concrete pool shell just before setting tile or apply bond coat to back of each tile placed. Set tile in position and beat firmly into the setting bed mortar. Bring tile faces to a true and correct plane. Complete beating and leveling before mortar sets and in no case later than one hour after first placing. When ready, wet and remove paper and glue avoiding excess water. At this time adjust out-of-line or out-of-level tile.
- C. Finished tile surface must be level and in plane, with no sharp or protruding edges. Tiles out or plane more than 1/16" must be removed and replaced. Sharp edges must be stoned smooth.
- D. Grout Joint Sizes
 1. Unless otherwise approved, install tile with uniform 3/32" joint width. A maximum 1/8" joint width may be utilized to meet specific installation requirements, if required.
- E. Ceramic Tile Joint Grouting
 1. Mix grout to a thick creamy consistency and force into joints for entire thick depth, flush with surface. Clean off excess and fill skips and gaps before grout sets. Color selection by Owner/Architect or Interior Designer. Provide dampness for minimum 3-day curing and polish with clean dry cloths (not required when epoxy grouts are used).
- F. Expansion Joints
 1. Place expansion joint per applicable TCNA Method P601MB, P601TB, or P602 and conforming to Method EJ171. Provide shop drawings showing backer rod and joint dimensions. Expansion, control, construction, cold, and seismic joints in the pool structure should continue through the tile work, including such joints at vertical surfaces. Movement joints must be placed at changes in direction and elevation. Refer to the structural engineer for additional required movement joints. Joint size must be a minimum of 1/8". Joints through tile work directly over structural joints must not be narrower than the structural joint. The Contractor must use cement compatible coatings when using chalk lines for joint layout purposes.
- G. Fill and Empty Rates
 1. Use a fill and drain rate of 2'-0" per 24 hours to minimize thermal shock and structural movement. Maintain a temperature differential of 10 degrees Fahrenheit or less between the pool water and the substrate during fill and drain cycles.

3.03 TESTING AND INSPECTION

- A. Before filling of the pool, and its subsequent provisional acceptance at substantial completion, the tile installation must be visually inspected and sounded in the presence of the Architects and/or the Owner's representative to verify mortar coverage below the tile to its substrate as well as its overall compliance with the requirements of this Section.
- B. Tile work found loose, lacking proper mortar coverage, out of plane, misaligned or otherwise non-conforming must be removed and replaced at no additional cost to the Owner.

3.04 CLEANING

- A. Upon completion of placement and grouting, clean tile installation as recommended by TCNA and manufacturers of proprietary materials. Tile must be cleaned with pH neutral solutions, free of both sodium and potassium, in accordance with the tile and grout manufacturer's printed instruction.
- B. Leave finished installation clean and free of cracked, chipped, broken, un-bonded or otherwise defective tile work.
- C. Protect installed tile work with non-staining Kraft paper, polyethylene sheeting, or other approved heavy covering during the construction period to prevent damage.

3.05 REPLACEMENT TILE

- A. Provide the Owner with approximately 10% or 25 square feet (whichever is least) of each color and type tile used on the project for Owner's repair and replacement requirements.

END OF SECTION 131103

SECTION 131104 - SWIMMING POOL CEMENTITIOUS FINISH

PART 1 - GENERAL

1.01 SUMMARY

- A. Provide a conventional proprietary aggregate plaster finish to the pool structure. Provide installation of bond coat prior to application of pool finishes in strict accordance with manufacturer's instructions. Provide ceramic tile trim on the pool vertical tile band, floor, walls, stairs, nosings, recessed wall steps, toe ledge, depth markings, wall targets, floor lane markings and other tile installations as shown and detailed on the contract drawings and in strict accordance with these specifications.
- B. Provide water analysis and pre-fill requirements.

1.02 SUBMITTALS

- A. Color Samples
 - 1. Provide physical color samples for review and approval by the Owner/Architect.
- B. Mockup
 - 1. Prepare 12-inch square panel at the site showing color and texture for pool plaster for approval by the Owner/Architect. Finished cementitious finish work must match the approved sample panel.
- C. Test Report
 - 1. Submit results of domestic water analysis and calculation of amounts of chemicals required to balance pool water on initial fill of pool.

1.03 PRODUCT DELIVERY AND STORAGE

- A. Deliver manufactured materials to site in manufacturers' original unbroken packages or containers bearing manufacturers' name and brand labels. Keep cementitious materials dry until ready to be used and stored off the ground, under cover and away from damp surfaces.

1.04 JOB CONDITIONS

- A. Apply plaster in swimming pool only when ambient temperature is above 40 degrees F and below 90 degrees F and protect applied plaster from rapid drying by sun or wind until curing is completed or pool is filled with water. Confirm and comply with applicable manufacturer's installation requirements.

1.05 QUALITY ASSURANCE

- A. The Contractor must have two years' experience in similar pool projects, for which the Owner may require written proof thereof and proper tools to install plaster.

PART 2 - PRODUCTS

2.01 DIAMOND BRITE

- A. The Contractor must provide a slip-resistant proprietary plaster finish in the areas indicated on the drawings. Description: Diamond Brite finish must be a blend of selected quartz aggregates and fortified white Portland cement. Color and texture selected by the Owner/Architect. Confirm

installation requirements with the manufacturer.

- B. Surface Preparation
 - 1. Surface must be structurally sound and free of foreign substances and debris that could reduce or impair adhesion, free of dirt, oil, grease, curing compounds or other foreign materials. Sound and remove loose concrete to firm substrate. Surfaces must be roughened by sand blasting or water blasting. Shot blasting, scarifying, or grinding can also be accepted methods of surface preparation. Pressure-wash the entire surface. Wash with trisodium phosphate (TSP) using a stiff broom. Thoroughly wash/rinse with clean potable water. Surface defects or holes in the substrate must be patched per manufacturer's recommendations. Lightly moisten walls and floors prior to application of Diamond Brite.
- C. Bond Coat
 - 1. Bond Kote by SGM, Inc., or approved equal, in strict accordance with manufacturer's instructions. Apply and cure bond coat per manufacturer's recommendations. After proper curing of bond coat, lightly moisten with clean potable water prior to application of cementitious finish. Ensure bond coat is free of foreign matter prior to plastering.
 - 2. A bond coat must be installed over all interior pool surfaces prior to plaster application unless the surface profile is adequate to omit the bond coat in accordance with the manufacturer's recommendations. A manufacturer's representative must visit the site and provide written confirmation that the bond coat can be omitted, and all warranties will be maintained.
- D. Mixing
 - 1. Thoroughly mix Diamond Brite to a homogeneous lump-free consistency using 1-1/2 to 2 gallons of potable water per 80 lb. bag.
- E. Application
 - 1. Diamond Brite must be applied to a uniform thickness of 3/8" to 1/2" over the entire surface. The walls must be scratch coated followed by a finish coat. Material applied to the floor after the walls have been applied must be accelerated to assure uniform setting time throughout the pool surface.
- F. Coverage
 - 1. Each 80 lb. bag to cover approximately 25 square feet to a thickness of 3/8".
- G. The proprietary plaster finish must be applied by a licensed applicator as approved by the manufacturer.

PART 3 - EXECUTION

3.01 PREPARATION OF SURFACES AND BOND COAT

- A. Surface must be structurally sound and free of foreign substances and debris that could reduce or impair adhesion, free of dirt, oil, grease, curing compounds or other foreign materials. Sound and remove loose concrete to firm substrate. Surfaces must be roughened by sand blasting or water blasting. Shot blasting, scarifying, or grinding can also be accepted methods of surface preparation. Pressure-wash the entire surface. Wash with trisodium phosphate (TSP) using a stiff broom. Thoroughly wash/rinse with clean potable water. Surface defects or holes in the substrate must be patched per manufacturer's recommendations.
 - 1. National Plasterers Council Surface Preparation Definitions
 - a. Pressure Washing: The washing or cleaning of a surface by a stream of water ejected from a nozzle at high velocity, typically in the range of 1,000 psi – 4,000

- psi.
- b. Water Blasting: The cutting, abrading, or removal of a surface or substrate by a stream of water ejected from a nozzle at ultra-high velocity, typically in the range of 10,000 psi – 40,000 psi.
- 2. Apply and cure bond coat in strict accordance with manufacturer's instructions. After proper curing of bond coat, lightly moisten with clean potable water prior to application of cementitious finish. Ensure bond coat is free of foreign matter prior to plastering.
- B. Do not apply finish materials to base surfaces containing frost. Provide temporary coverings as required to protect adjoining surfaces from staining or damage by plastering operations.
- C. Protect or mask adjacent surfaces that are not scheduled to receive cementitious finish. If expansion or construction joints exist in the areas where cementitious finish will be applied cover plastic joints for protection (if plastic joints are used). Additionally, mark joints for saw-cutting if area will be saw-cut.
- D. Verify that concrete surfaces that are to receive a cementitious finish have cured for a minimum of 5 days. Consideration should be given for the application of a primer for concrete structures that is over 28 days old to improve bonding.

3.02 APPLICATION OF CEMENTITIOUS FINISH

- A. General
 - 1. Confirm application requirements with the manufacturer. Apply finish plaster to the properly prepared substrate at the minimum thickness required by the manufacturer, but no less than 3/8-inch thickness. Apply finish plaster by hand or machine. If plastering machine is used, control fluidity of plaster to have a slump not exceeding 2-1/2 inches when tested using a 2" by 4" by 6" high slump cone. Do not add additional water to the mix subsequent to determining water content to meet this slump. Perform slump test according to following procedure:
 - a. Place cone on level, dry non-absorptive base plate.
 - b. While holding cone firmly against base plate, fill cone with plaster taken directly from hose or nozzle of plastering machine, tamping with a metal rod during filling to release air bubbles.
 - c. Screed off plaster level with top of cone. Remove cone by lifting it straight up with a slow and smooth motion.
 - d. Place cone in a vertical position adjacent to freed plaster sample suing care not to jiggle base plate.
 - e. Lay straightedge across top of cone being careful not to vibrate cone, measure slump in inches from bottom edge of straightedge to the top of slumped plaster sample.
 - 2. Mixing of materials and application procedures must be done in accordance with the manufacturer's recommendations and requirements. The manufacturer's representative must visit the site to verify field conditions, confirm materials and application requirements and ascertain that materials and systems are so installed. Documentation must be provided to this effect.
- B. Workmanship
 - 1. Unless otherwise required by the manufacturer, apply finish plaster in two coats by "double-back" method with second coat applied as soon as first coat is tamped and initially floated. Apply plaster with sufficient pressure to provide a good bond on bases. Work plaster to screeds at intervals of from 5 feet to 8 feet on straight surfaces. Apply smooth trowel finish without waves, cracks, trowel marks, ridges, pits, crazing, discoloration, projections, or other imperfections. Form plaster carefully around curves and angles, well up to screeds. Take special care to prevent sagging and consequent

drooping of applications. Produce surfaces free of visible junction marks in finish coat where one day's work adjoins another. Finish proprietary plaster as required by the manufacturer.

2. Cementitious finishes must be applied by a licensed applicator as approved by the manufacturer.

C. Curing

1. Curing cementitious finishes with fine fog water spray applied to finish coat as frequently as required to prevent dry-out of surface, or as directed by the manufacturer of the cementitious finish. Keep plaster damp until the pool is filled. Prevent damage or staining of plaster by troweling or curing.

D. Patching, Pointing, and Cleaning Up

1. Upon completion, cut out and patch loose, cracked, damaged, or defective plaster; patches matching existing plaster in texture, color, and finish, flush with adjoining plaster. Perform pointing and patching of surfaces and plasterwork abutting or adjoining other finish work in a neat and workmanlike manner. If 10 percent or more of the pools plaster finish is found to be defective, the plaster must be removed and replaced complete from surfaces. Remove plaster droppings or spattering from surfaces. Leave plaster surfaces in clean, unblemished condition ready for pool filling. Remove protective coverings from adjoining surfaces. Remove rubbish and debris from the site.

3.03 PRE-FILL SPECIFICATION

- A. Contractor must employ a qualified water testing agency to analyze the domestic water with which the pool will be filled within 2 weeks of the plaster date and must employ a swimming pool experienced water chemistry consultant to determine types and quantities of chemicals required to ensure calcium-balanced water immediately upon the completion of water filling. Refer to section 131100 for water filling requirements.
 1. Have on hand quantities of the chemicals as determine above, plus 25% overage for follow-up treatment. These chemicals, typically including calcium chloride, bicarbonate of soda, and muriatic acid are in addition to standard bromine/chlorine products and alkalizer/pH control products required elsewhere.
- B. The pool(s) must not be plastered until directed by the Owner's representative and the filtration system and chlorination system are complete and ready for start-up. The Contractor must supply chemicals required for treatment of the pool water.
- C. The Contractor must submit domestic water analysis to the Owner and/or Architect at least 2 weeks prior to filling the pool(s).

END OF SECTION 131104

SECTION 131106 - SWIMMING POOL TIMING SYSTEM

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. The BIDDING REQUIREMENTS, CONTRACT FORMS, AND CONDITIONS OF THE CONTRACT and applicable parts of DIVISION 1 - GENERAL REQUIREMENTS, as listed in the Table of Contents, must be included in, and made a part of, this Section.

1.02 SUMMARY OF WORK

- A. Introduction
 - 1. Provide labor, materials, equipment, and services necessary to provide a complete electronic timing and scoreboard system with multi-sport capability for race swimming, water polo, and pace clock.
- B. Work included in this section.
 - 1. It is the intent of this section to place the entire responsibility for the complete electronic timing and scoreboard system (including appropriate connections) with multi-sport capability under one vested supplier. The supplier is responsible for providing full integration of this system. Multiple suppliers for a system will not be approved.
- C. Related work specified in Electrical sections. Reference Division 26 – Electrical.
 - 1. Ground and bond pool structures, fittings, and equipment in accordance with Article 680 of the N.E.C. Test and verify that the system electrical ground is true and solid. Provide certification to this effort.
 - 2. Obtain permits, inspections, and approvals of wiring including grounding and bonding of metal components associated with the pool in accordance with Local, State and National Electrical Codes.
 - 3. Provide power, conduits, electrical boxes, ethernet connections and wiring for the Contractor provided electronic timing and scoreboard system with multi-sport capability for race swimming, water polo, and pace clock.
 - 4. Supply junction boxes for equipment outlined in these specifications and depicted on the timing system drawings.
 - 5. If required by local code, Electrical to provide labor for installing low voltage wiring for electronic timing and scoreboard system.
- D. Basis of Design:
 - 1. The complete electronic timing and scoreboard system with multi-sport capability is based upon Colorado Timing Systems, Inc.

1.03 ACCEPTABLE MANUFACTURERS AND SUPPLIERS

- A. Colorado Time Systems, Inc. (Basis of Design: Timing System & Scoreboard)

1.04 SUBMITTALS

- A. Submittals must include the following:
 - 1. Product data
 - 2. Shop drawings detailing system layout.
 - 3. Operations and maintenance manuals for system. Manuals must include a complete parts list.
 - 4. Warranty for each piece of equipment within this section.

1.05 JOB CONDITIONS

- A. Manufacturers proposing to submit a quotation for the electronic timing and scoreboard system must confirm that embedded items are compatible with the installation of their respective systems.
- B. Manufacturers must review the construction documents and must notify the architect 10 days prior to the bid date of conflicts or additions to the work of other trades for the proper installation of their system.

1.06 WARRANTIES

- A. The Contractor must warranty the completed installation of systems in this section for one year.
- B. The manufacturer must warranty the computer consoles, touchpads, pace clocks and starting system for two years.
- C. The manufacturer must warranty the titanium timing system wall plates for five years.
- D. The manufacturer must warranty the scoreboard for five years.

PART 2 - PRODUCTS

2.01 SCOREBOARD SYSTEM

- A. Full Color Video Display
 - 1. Full Color Video Display system must display necessary information to time swimming and water polo in compliance with the appropriate sanctioning body - World Aquatics, USA SWIMMING, NCAA, and NFHS. Display must provide competitor's names, full matrix graphics and animation, live video, and have advertising capabilities.
 - a. Basis of Design: Multi-Sport LED Scoreboard System is based upon Colorado Timing Systems, Inc. or approved equal.
 - 2. Display must include the following: Full matrix LED scoreboard with computer controller and DisplayLink+ software, flat wall mounting hardware and data/fiber cable up to 500'.
 - 3. The display must be a full color LED matrix display. The display must be comprised of red, blue, and green LED to form pixels. Display must be capable of 281 trillion shades of color.
 - 4. The display should be capable of 16-bit video processing, one hundred (100) levels of dimming capability and allow for Gamma correction.
 - a. Display intensity must be adjustable between 1200-8500 nits.
 - 5. The display must have a built-in graphics and animation capability with Windows- based software. Graphics and animation must have the capacity of being displayed on the entire matrix. MS Windows fonts must be compatible with the display.
 - 6. Display must have the ability to show live video or DVD's.
 - 7. Display must allow for front service access.
 - 8. Display must include 3% spare critical parts.
 - 9. Operation temperature must be between -4°F - 122°F (-20°C - 50°C).
 - 10. Humidity tolerance must be between 0%-95% non-condensing.
 - 11. Each indoor pixel must be comprised of 3 LEDs, 1R1G1B SMD LED package.
 - 12. Display must include LED video controller with the following functions/features at a minimum:
 - a. Dual zone, picture in picture capable with on-the-fly user defined window sizes.
 - b. Hardware controlled scaling of all video input sources; PC (computer) based scalers are not an accepted alternative.

- c. Must have a simple to use menu architecture allowing user to switch between video inputs and layouts with minimal keystrokes.
 - d. The controller must have a minimum of five (5) user defined display layout templates capable of switching between sources as well as zone layouts accessible via the controller's main menu.
 - e. Display controller must accept the following video input signals:
 - 1) One (1) DVI
 - 2) One (1) HD-SDI
 - 3) Two (2) HDMI
 - f. Display controller must include following output signals:
 - 1) One (1) DVI Loop (Follows DVI Input signal)
 - 2) One (1) DVI Monitor (Courtesy monitor for review of signal to display)
 - 3) One (1) HD-SDI Loop (Follows HD-SDI Input Signal)
 - 4) Four (4) LED Outputs (Primary and (3) backup outputs to LED display)
13. Scoreboard details must be as follows. Exact cabinet dimensions, detailed drawings, and weight must be provided with the submittals.
- a. Minimum Viewing Distance: 50 ft to 150 ft.
 - b. Pixel Spacing: 8 MM
 - c. Active Area: 9.24'H X 24.36'W (2.82H X 7.42W Meters)
 - d. Pixel configuration must be: 352 PIXELS HIGH x 928 PIXELS WIDE
 - e. Weight: 3600 LBS

B. Scoreboard Hanging Requirements

- 1. Scoreboard manufacturer must provide drawings with hanging information.
 - a. Material: Scoreboard hangers must be appropriate for outdoor installation.
 - b. Coordinate scoreboard hanging requirements with structural engineer prior to the submittal process.
- 2. Anchors
 - a. Hollow Block Construction
 - 1) Sleeve type anchors feature a split expansion sleeve over a threaded stud bolt body and integral expander, nut, and washer. Anchors must be made of zinc plated Carbon Steel, or Type 18-8 Stainless Steel. Anchors should be installed with carbide tipped hammer drill bits made in accordance to ANSI B212.15-1994. Anchors must be tested to ASTM E488 criteria and must meet or exceed U.S. Government G.S.A. specification A-A-55614 Type 2 (Formerly GSA: FF-S-325 Group VIII, Type 2), California State Fire Marshal, Factory Mutual and Underwriters Laboratories.
 - b. Filled Block or Solid Concrete Construction:
 - 1) The anchor must be a torque-controlled expansion anchor, which provides consistent performance for a wide range of mechanical anchor applications. This anchor series is available in carbon steel with zinc electroplated coating, carbon steel with hot-dip galvanized coating, 304 stainless steel and 316 stainless steel versions. The threaded stud version of the anchor is available in a variety of diameters ranging from 1/4- to 1-in. depending on the steel and coating type. Applicable base materials include normal-weight concrete, structural lightweight concrete, lightweight concrete over metal deck, and grout-filled concrete masonry. Basis of design is AISI Type 316 stainless steel KWIK Bolt 3 (KB3) manufactured by Hilti, Inc.
 - 2) Three anchors must have an anchor body, nut and washer that conform to AISI Type 316. The expansion wedges conform to AISI Type 316 stainless steel.
 - 3) Anchor bodies smaller than 3/4-inch, excluding KWIK Bolt 3 Countersunk, are produced from AISI Type 304 or Type 316 stainless steel having the bolt fracture loads shown in table 1. Anchor bodies 3/4-inch and larger, and stainless-steel KWIK Bolt 3 Countersunk anchor bodies are produced from AISI Type 304 or Type 316 stainless steel having the mechanical properties shown in

table 1. Nuts meet the dimensional requirements of ASTM F594. Washers meet the dimensional requirements of ANSI B18.22.1, Type A, plain. Stainless steel expansion wedges for AISI Type 304 are made from either AISI Type 304 or Type 316. Stainless steel expansion wedges for AISI Type 316 anchors are made from type 316. Stainless-steel nuts and washers for AISI Type 304 or Type 316 anchors are manufactured from AISI Type 304 or 316, respectively.

3. Supports
 - a. Slotted Strut (LED Board)
 - 1) Material
 - a) Fittings, unless noted, are made from hot-rolled, pickled, and oiled steel plates, strip, or coil, and conform to ASTM specifications A575, A576, A635, or A36. The fitting steel also meets the physical requirements of ASTM A1011 SS GR 33. The pickling of the steel produces a smooth surface free from scale. Fittings are also available in stainless steel, aluminum, and fiberglass. Consult factory for ordering information.
 - 2) Finishes
 - a) Fittings are available in: Perma-Green III (GR), Electro-galvanized (EG), conforming to ASTM B633 Type III SC1; Hot-dipped galvanized (HG), conforming to ASTM A123 or A153.
4. Brackets
 - a. Per ANSI B1.1- Surface roughness per ANSI B46.1- Surface roughness on holes 250 MAX unless otherwise specified. Variations in form from unmachined features are permitted within established –I filets 0.005-0.020 (APPROX. RADIUS) – Screw threads per ANSI B1.1- Pipe threads commercial standards. Edges and corners 0.005-0.020 (approx. radius or chamfer).
 - b. Materials and components used in the assembly of this item must be RoHS complaint material: 12GA (.105) HRS. The finish must be ZINC CLEAR CHROMATE PLATED. Manufacturer must break sharp edges and corners.
 - c. Support hardware, brackets, fasteners, hangers, etc. used during installation of the scoreboard must be Zinc Clear Chromated Plated.
- C. Software to Control Matrix / Video Display must include the following:
 1. Operates full color LED matrix displays.
 2. Receives data from all sports timers and scoring consoles.
 3. Receives data from 3rd party meet management software.
 4. Displays standard graphics formats (JPG, GIF, BMP, PNG).
 5. Playback of standard digital video (AVI, MPG, WMV).
 6. Allows creation of custom data templates with sport-specific information.
 7. Creates and plays sequences of templates and graphics, with transition effects.
 8. Stores name and team information for up to 12 lanes for an infinite number of events and heats.
 9. Stores multiple diving event orders, with name and team information.
 10. Supports any Windows font as well as custom CTS bitmap (pixel-mapped) fonts.
 11. Graphics and templates can be used to provide in-venue advertising.
 12. Multiple options for displaying team scores and full event results (standalone or in conjunction with meet management software).
 13. Quick message feature allows user-driven dynamic messaging.
 14. Provides user ability to schedule automatic display of templates and graphics, with recurrences.
 15. Allows creation of multiple outputs regions for multizone displays or multiple displays of varying resolutions.
 16. Allows creation of transparent overlay templates, facilitating sports data overlaid on still and video graphics backgrounds.
 17. Runs on Windows 10 and greater.
 18. Provides customer initiated remote technician assistance and fault monitoring.

19. Must be able to display dynamic team logos based on supplied team data.

2.02 MULTI-SPORT COMPUTER/TIMING SYSTEM

- A. Gen 7 Legacy Timing System
 1. Multi-Sport Computer/Timing System interface (computer or tablet) must be supplied with all necessary software to time and score swimming in compliance with the appropriate sanctioning bodies: USA SWIMMING and NFHS.
 - a. Basis of Design: Multi-Sport Computer/Timing System is based upon the GEN7 LEGACY TIMING as manufacturer by Colorado Timing Systems, Inc., or approved equal.
 2. Multi-Sport Computer/Timing System must be a standalone unit with physical connections to timing inputs. Multi-Sport Computer/Timing System must be controlled by user interface device (computer or tablet) via USB or network. One (1) laptop must be provided.
 3. Multi-Sport Computer/Timing System must accept inputs for up to 12 lanes for a parallel wiring installation.
 4. Multi-Sport Computer/Timing System must time to a user-selectable resolution from 1 second to .001 second. It must take starts and finishes from the near end and/or far end of the pool. It must accept inputs from the start system, touchpads, up to three manual backup times per lane, and relay judging platforms.
 5. Multi-Sport Computer/Timing System must run off of a 12 Volt power supply connected to a standard 110 VAC outlet and will automatically switch to (and display on screen of connected interface device) internal battery source power, in case of line power failure without affecting the continuity and accuracy of the timing system.
 6. Multi-Sport Computer/Timing System must interface to single and multi-line scoreboards and must post immediate results to scoreboard in "Lane" or "Place" order (user selectable). The Multi-Sport Computer/Timing System must also have the capability to pull race results from memory and post those results to the scoreboard in "Lane" or "Place" order (user selectable).
 7. Multi-Sport Computer/Timing System must be capable of communicating wirelessly with wireless scoreboards (2.4GHz) using ZigBee wireless communication.
 8. Multi-Sport Computer/Timing System to include internal clock calendar with self-sustaining battery to time/date stamp all results.
 9. Multi-Sport Computer/Timing System must meet acceptable safety standards. Multi-Sport Computer/Timing System must be ETL approved, or equivalent.
 10. The user interface must display complete race status. The interface must be capable of functioning as a miniature scoreboard displaying information simultaneously for all active lanes including lane number, current length in race or final place, split or finish time, relay judging status indicator, and backup time and backup button status.
 11. All race data, including near and far end splits, must be stored to internal memory for later recall to facilitate meet management connectivity and printing. Printed reports must include cumulative and subtractive splits as well as relay judging times (when required).
 12. Backup timing must provide backup time via push button provided on a per lane basis should swimmer fail to trigger touchpad or touchpad fails to register. Multi-Sport Computer/Timing System must be capable of accepting up to three backup button times per lane.
 13. Meet memory must be capable of being transferred to external storage (via USB) or cloud data backup services (i.e., Dropbox, Google Drive, etc.).
 14. Relay judging must automatically compare the touchpad hit of an incoming swimmer with the starting swimmer's time of departure from the optional relay judging platform. Results must display both "plus" and "minus" takeoff times and must be able to be printed and stored in race memory.
 15. Multi-Sport Computer/Timing System must communicate with meet management

- peripheral software on a two-way "handshake" basis, enabling the meet manager's resident computer to query the timing system's memory via the USB port or via the network at any time for any race results.
16. The system's Automatic Event Sequencer must be capable of holding both standard and user defined event sequences. The event order must be able to be downloaded from the meet management software. The desired order is user selectable. EVENT SEQUENCES with appropriate race distance and race description for high school, college meets, and two "User Defined" meets to permit construction of custom meets, World Aquatics, USA SWIMMING, NCAA, and NFHS. When recalled from memory, race distance and descriptions are automatically selected for the operator.
 17. Multi-Sport Computer/Timing System must automatically flag timing discrepancies (in the user interface, on the results printouts, and in stored memory) greater than .30 seconds between touchpad and backup times.
 18. Multi-Sport Computer/Timing System must have touchpad delay feature with ability to program delays from 1 to 99 seconds.
 19. The user interface software must permit operation of essential functions including Lane Off/On, Finish Arm, Split Arm, and Print Results directly from the main screen to ensure speed and simplicity of operation during critical race times. The interface must permit the operator to insert a backup time when required (edit) or to disqualify (DQ), automatically posting it to the scoreboard, and provide automatic re-ranking of results. Any corrections generated by the operation (edit or DQ) must be clearly identified on the results printouts.
 20. The user interface must permit the operator to correct for an erroneous touch by adding/subtracting a touchpad hit to correct the lengths completed. The interface must not permit the operator to finish a race in any lane; timers including such a function are unacceptable because they permit the possibility of cheating.
 21. Multi-Sport Computer/Timing System must include electronic beeper and LED signaling to indicate touchpad, backup button, and relay judging inputs. Multi-Sport Computer/Timing Systems which do not allow the user to configure (enable/disable) this feature are unacceptable.
 22. Multi-Sport Computer/Timing System connectivity must include:
 - a. USB (Type A) port for external storage.
 - b. USB (Type B) port for meet management connectivity.
 - c. USB (Type B) port for user interface computer connectivity.
 - d. Ethernet port for network connectivity.
 - e. Wi-Fi (ZigBee) for wireless scoreboard connectivity.
 - f. Three (3) independent scoreboard output ports.
 - g. Redundant near and far end connections timing inputs (touchpads, backup button, relay judging platforms) for up to 12 lanes.
 - h. Start system connection directly to timing system.
 - i. External DC power port.
 23. Multi-Sport Computer/Timing System must be capable of updating internal software/firmware via Internet connection.
 24. Multi-Sport Computer/Timing System software must have the ability to adjust the intensity of LED scoreboard brightness.
 25. When recalled from memory, race distance and descriptions are automatically selected for the operator.

2.03 SWIMMING TIMING SYSTEM CONNECTORS

- A. General Description
 1. The Multi-Sport Computer/Timing System must employ the topology of a single communication bus to which timing and connectivity nodes are connected and communicate with each other.
 2. Connection points must be production items and not a one off or prototypes.

3. Exposed connectors must feature titanium contacts. They must be wet pluggable and electrically passive if not connected. No maintenance to prevent corrosion of deck plate connector contacts is needed.
 4. Self-test capabilities to detect compromised timing bus wire terminations and scoreboard bus wire terminations.
- B. Wall Plates
1. Wall plates must be provided as required in the quantities as shown on the drawings. Wall plates must be the termination point for connections between deck cables, timers, start system, and other wall plates.
 - a. Basis of design: Wall plates are based upon WLP WALL PLATE as manufactured by Colorado Timing Systems, Inc.
 2. Wall plate must permit 50-wire connections to be made through one connector. Military connectors must be used for start system integration to prevent accidental disconnection.
 3. Wall plate must permit connection of start system and scoreboard(s).
 4. Wall plate must be black acrylic material 15" x 15", with all connection points labeled.
 5. Wall plate must mount to 12"x 12" x 6" junction box, flush with finished wall, a minimum of 18" above finished floor.
 6. Junction Boxes (Provided by Electrical):
 - a. Wall plate components must fit into a 12" x 12" x 6" PVC junction box.
 - b. Acceptable Manufacturer: Cantex (P/N 5133713) or similar box that will fit wall plate assembly of the following dimensions: 12" x 12" x 6" ± 0.05 ", cover plate width must be 15" ± 0.02 " square.
 - c. Conduit interconnects between boxes (deck plates and wall plates) must be PVC. Refer to drawings for sizing.
 - d. Verify routing of conduit with Multi-Sport Computer/Timing System manufacturer prior to installation.

2.04 SWIMMING TIMING START SYSTEM

- A. Starting System
1. Swim Timing Start System (x required) must be provided to start the automatic Multi-Sport Computer/Timing System. The start system must be capable of driving up to twenty (20) (45 ohm) individual starting block speakers mounted under the starting blocks or two (2) underwater/aux speakers (up to 8 ohm each), the relay judging platform strobe lights and deck side start indicators with microphone.
 - a. Basis of Design: Swimming Timing Start System is based upon the CHAMPIONSHIP ELITE START SYSTEM (SSE) as manufactured by Colorado Time Systems, Inc.
 2. The start system shall use wired microphone and shall have a volume control, including base and treble.
 3. The start system shall have a sturdy, all metal, non-corrosive enclosure with feet. The start system should include a tripod mount (TR-3) or backstroke flagpole mount (START-FPM-2) for each start system.
 4. The start system shall have external connections for additional external visual indicator strobe light(s) (EVI's), speaker output, start output and speedlights.
 5. The system shall run off two (2) internal gel cell batteries. The internal batteries must automatically be recharged while the starter is plugged in to the external power supply. Under typical operation the batteries must last more than 15 hours and must typically recharge in approximately 2.5 hours.
 6. System shall have an LED showing the battery status (green, yellow, red) when the internal batteries are starting to get low on power. Battery status percentage shall be displayed on the LCD screen.
 7. The start system must be compatible with underwater speaker system (SP-UND).
 8. The start system must have standard CTS start tone and alternate start tone.

9. Loudness of start tones and under block speakers shall be configurable by the end user for optimal use both indoors and outdoors.
10. The intensity of the onboard strobe and EVIs shall be configurable by the end user for optimal use both indoors and outdoors.
11. The start system shall include a backlit and transfective LCD screen that provides easy navigation and onboard help menus.
12. The start system shall include a visual start signaling system (VSS) option to provide a clear visual start sequence for all athletes. Visual functionality includes the following: call to block (EVI blinks red), step up (EVI steady red), take your marks (EVI steady yellow), start (EVI flashes green or white). VSS must be controllable via user operated pushbutton device separate from starter microphone.
13. The start system shall include a training mode that provides both a pre-recorded and customizable "take your marks" message and start signaling with a variable interval between starts. Time interval between "take your marks" and start signal must include random delay. The training mode shall be configurable by the user to include VSS signaling.
14. The start system must be FCC compliant, and safety listed. UL or equivalent.
15. The start system shall be able to be updated by customer.
16. Provide cabling quantities required to connect the start system to the Multi-Sport Computer/Timing System including (R-015-715-8) 8M Start Cable(s) for connection to the Multi-Sport Computer/Timing System and Elite Start to wall plate cable(s)

2.05 WATER POLO

A. Water Polo Scoring

1. Provide water polo program with the Multi-Sport Computer/Timing System. Water polo basic system must include water polo software, user interface with toggle for start/stop, scoreboard horn, signage for scoreboard, and manual.
 - a. Basis of Design: The water polo program is based upon Colorado Timing Systems, Inc.
2. Accessory software program must turn Multi-Sport Computer/Timing System and Multi-Sport scoreboard into complete water polo scoring system.
3. Features must include presentable period times, timeout times, eject times for up to three players, game times, and shot time.
4. Selectable options must include display of game time in seconds, tenths, and/or hundredths, keeps player fouls "on the fly" and records in memory.
5. Water polo scoreboard display functions must include game time, shot time, penalty times, three (3) team scores, period number, player fouls and time of day.
6. Interface unit must permit hand-held switch control of shot clock reset function and toggle switch for the start/stop of game time.
7. Miscellaneous features must include: 12 or 24-hour time of day display, tenths of hundredths of a second remaining display, total game time display, individual player foul totals display.
8. Game time must display to 0.1 seconds when stopped.
9. Multi-Sport Computer/Timing System must be capable of operating two shot clocks in addition to water polo scoring.
10. Multi-Sport Scoring System must be compliant with World Aquatics Rule WP21.14- 20 second reset.

B. Water Polo Tabletop Controller

1. Provide water polo tabletop controller (1 required) for water polo scoring. Controller must have:
 - a. Buttons with tactile dome feedback
 - b. Large transfective LCD screen that is easily readable in environments from darkness to bright sunlight.

- c. Built-In real time clock to keep time of day.
 - d. Configurable defaults allow customizing to your league rules.
 - e. Slide-in keyboard insert.
 - f. Able to operate multiple scoreboards with one controller.
 - g. Supports the external Run/Stop/Reset switch to allow for additional clock operators.
 - h. Include (1 RSR) Stop/Start/Reset switch for each controller.
- C. Portable Deck Clock (Shot Clock/Pace Clock)
 - 1. Two (2) portable shot clock/pace clock must be provided for water polo course.
 - a. Basis of Design: The portable deck clock (shot clock) is based upon the DC-1500 as manufactured by Colorado Timing Systems, Inc.
 - 2. The clock must include a ruggedized polyethylene enclosure that is water and sun resistant and completely corrosion free. The enclosure must include a built-in handle to allow for easy carrying from point to point.
 - 3. The deck clock must be capable of being used as a game/shot clock for many sports or set to pace in time of day.
 - 4. The deck clock must include LED digits with variable intensity settings to allow for visibility in a variety of environments and times of day or night. Time of day or game time must be displayed at the top of the clock, with 5" digits displaying hours and minutes. 10" digits must show seconds for pacing or shot time.
 - 5. The deck clock must include an integrated 2.4GHz wireless adaptor to receive game/shot data from tabletop or handheld controllers. Data can also be received from a Multi-Sport Computer/Timing System with a wireless adapter.
 - 6. The deck clock must be capable of providing pace in time of day (hours, minutes, and seconds) without the controller. Multiple clocks must automatically synchronize in pace mode.
 - 7. The clock must include an integrated horn. The horn must produce both game and shot tones.

2.06 SWIMMING TIMING COMPONENTS

- A. Gutter Hung Touchpads
 - 1. Provide 17 touchpads (17 required, 16 plus 1 spare) to time swimming, in compliance with the appropriate sanctioning body.
 - a. Basis of Design: The gutter hung touchpad is based upon the AQUAGRIP GUTTER HUNG TOUCHPAD as manufactured by Colorado Timing Systems, Inc.
 - 2. Touchpad must be constructed of an all-plastic exterior with only electrical connector metal exposed. Touchpad must be the following dimensions:
 - a. Touch pad must be the TP-90G AQUAGRIP, 90" wide x 22" tall x 0.3" thick.
 - 3. Touchpad must have a uniform fine grit and non-abrasive surface that prevents swimmer slippage in any direction.
 - 4. Touchpad markings must have contrasting colors with a 2" black border and black end-wall cross pattern for portion covered by touchpads.
 - 5. Touchpad brackets must be custom made to fit the pool. The Contractor to provide sufficient number of brackets for support of each touchpad. The Contractor is to provide gutter/bulkhead dimensional drawings for confirmation of custom brackets.
 - a. The Contractor to provide an additional two (2) spare touchpad brackets.
 - 6. Touchpad must have a three-year warranty without a requirement to purchase a protective touchpad cart.
 - 7. Touchpad caddy for storing the number of touch pads supplied must be CAD-TP-XXX.
- B. Push Buttons
 - 1. Provide two (2) back-up buttons for each touchpad provided.
 - 2. Back-up buttons must be plunger style buttons with a 5' cable.

- C. Over the Deck Cable Harness
 - 1. Provide one (1) over-the-deck cable harness system for 10 lane facility. Cable harness to include a ten lane cable harness, one push button per lane plus one spare, vacuum pump, and touchpad meter. The cable harness must be Serial Timing System TP-GEN7-XX as manufactured by Colorado Timing Systems, Inc.
- D. Swimming Timing Systems Caddies
 - 1. Provide touchpad caddy for storing touch pads. The correct number of touchpad caddies must be supplied to store touchpads. Caddy must be sized to match timing system touch pad widths. Touchpad caddy must consist of an aluminum frame with four freewheeling casters. The Contractor is responsible for assembly. Touchpad caddy must be CAD-TP as manufactured by Colorado Timing Systems, Inc.

2.07 PACE CLOCKS

- A. Pace Clock Program
 - 1. Accessory software program must turn multi-sport computer and multi-sport scoreboard into an effective training system and coaching tool.
 - a. Basis of Design: GEN7 PACE CLOCK PROGRAM as manufactured by Colorado Timing Systems, Inc.
 - 2. Accessory software program must turn multi-sport computer and multi-sport scoreboard into an effective training system and coaching tool.
 - 3. Interface to HYTEK's "Workout Manager" software with direct download to computer timer.
 - 4. Programmable workouts are saved into memory for up to 80 workouts.
 - 5. Workouts display on multi-line scoreboard by lane.
 - 6. START/STOP lanes with one keystroke, or individually.
- B. Slim Pace Clocks
 - 1. Pace clocks must be provided as required in the quantities as shown on the drawings.
 - a. Basis of Design: SLIM PACE CLOCKS as manufactured by Colorado Timing Systems, Inc.
 - 2. The pace clock must include thirteen (13") high visibility LED digits, with variable intensity settings. The pace clock must include a rugged powder-coated aluminum enclosure, conformal coated to protect against corrosion, a real time of day clock, and must be suitable for indoor or outdoor use.
 - 3. Pace clock must include twelve (12) operating channels to eliminate interference.
 - 4. Pace clocks have an integrated real time of day chip (RTC). If multiple pace clocks are used in a facility, they will synchronize the time automatically.
 - 5. Pace clock must include a wireless frequency of 2.4 GHz and have autosensing power capabilities for 120/240 VAC.
 - 6. Pace clock must be FCC compliant, and UL listed or equivalent.
 - 7. The pace clock must have four (13") digits.
 - a. Overall Size (H x W x D): 19.25" x 42.25" x 2.8"
 - b. Weight: 15 lbs
- C. PC-PRO Wireless Pace Clocks
 - 1. Provide (1) wireless portable pace clock.
 - a. Basis of Design: PCW-PRO as manufactured by Colorado Timing Systems, Inc.
 - 2. Wireless portable pace clock must have the capability of being controlled by a hand-held console for pacing functions. Additionally, it must be capable of being controlled with the Multi-Sport Computer/Timing System.
 - 3. Wireless portable pace clock must have an external switch to change from a pacing function to a water polo function.
 - 4. Wireless portable pace clock must have the capability of using the Multi-Sport Computer

- to run the water polo functions.
5. Wireless portable pace clock must have a minimum battery life of 6 hours/internal rechargeable battery.
 6. Wireless portable pace clock must be capable of 15 training modes (Lap Counter, Simple Pace Clock, Pace Clock with Cumulative Splits, Pace Clock with Lap Splits, Relay Exchanges, etc.)
 7. The wireless portable pace clock must have a minimum of 2 channels of wireless communication in the 900MHz spectrum, with a minimum indoor line of sight communication range of 500ft.
 8. Wireless portable pace clock must have the capability to be set up as either Master or Slave. Wireless pace clock set as master must re-transmit pace clock data to slave pace clocks set to receive data on the same frequency.
 9. Wireless portable pace clock must be able to receive shot clock data from a wireless-enabled Multi-Sport Computer/Timing System.
 10. Wireless portable pace clock must have the capability to adjust the LED intensity using the control panel.
 11. Wireless portable pace clock must include a wireless frequency of 900MHz and have autosensing power capabilities for 110/220 VAC.
 12. Pace clock must be FCC compliant, and UL listed or equivalent.
 13. Wireless portable pace clock must be wireless and portable with four (4) 10" LED digits. Units with digits less than 10" will not be accepted due to inadequate viewing distance.
 - a. Overall Size (H x W x D): 13.5" x 36.25" x 4.75"
 - b. Weight: 29 lbs

PART 3 - EXECUTION

3.01 EXISTING CONDITIONS

- A. Verify that work by others, related to this section, is installed.
- B. Carefully examine the construction documents that affect the work of this section.
- C. Prior to starting work, notify the Architect of defects requiring correction.
- D. Protect other materials and installed work against damage while completing work in this section.

3.02 INSTALLATION

- A. Provide custom cables, connectors, scoreboard mounting brackets, and fasteners.
- B. Provide scaffolding and labor for mounting scoreboard and pulling cables.
- C. Provide equipment in accordance with the manufacturer's drawings and instructions.
- D. Provide scoreboard mounting, Multi-Sport Computer/Timing System cable terminations, system checkout, and local operator training at time of installation. Training must consist of one 4-hour session.
- E. Provide as-built drawings precisely locating items.
- F. Wiring and grounding must be installed in strict accordance with the latest edition of the National Electric Code – Article 680.

END OF SECTION 131106

SECTION 13 11 75 - 1**ON-DEMAND OBSTACLE COURSE SYSTEM****PART 1 - GENERAL****1.01 SECTION INCLUDES**

- A. NinjaCross™ On-Demand Obstacle Course System
1. Two-Lane Course – NCS Model #NCS-O-64

1.02 RELATED SECTIONS (by others)

- A. Section 03XXX: Concrete
- B. Section 16XXX: Electrical

PART 1 - GENERAL**1.1 DESCRIPTION:**

The four-tower structure is built from steel manufactured by NinjaCross Systems. The dimensions of the steel arch (outdoor system) measure approximately 105' 3.5" x 17' 2" from corner to corner of steel base plates, actual footprint will depend on foundation design, deck design, and required grouting between tower and deck. The Arch is built using 28" x 28" Steel Towers with 34" Square Base Plates. The Steel Towers are connected via a steel box truss; the combination of 2 columns and horizontal box truss creates a Leg Truss Assembly. A completed arch system uses 2 Leg Truss Assemblies connected via the T1 Arch Truss which is a steel arch assembly of 6x 16.5' steel arch sections connected to create a completed arch. The T1 Trusses are stabilized via the T3 Ladder Truss. A lower grid of 12" x 12" plated box truss supports the rigging components used to make the obstacle course grid.

- A. Scope of Work: work shall include the furnishing of all labor, materials, equipment, engineering expertise and other incidentals as indicated on the Drawings, specified herein, and as necessary for proper completion and construction of the following, including;
1. NinjaCross™ On-Demand Obstacle Course System
 - a. Obstacle Truss System Components and Rigging
 - b. Truss Support System and Related Supports, Rigging Cables, and Pulley Blocks
 - c. Winch and Pulley Retraction System, Spreader Bar, Stabilizing Cable
 - d. Safety Back-up System.
 - e. Entertainment Timing System
 - f. Labor to complete the installation of the obstacles, truss support and obstacle truss system.
 - g. Safety and Instructional Signage
 - h. Operations and Maintenance Manuals
 - i. On-Site Certification and Training.
- B. Work Provided Elsewhere in the Specifications and/or on the Drawings (to be provided by others)
1. All demolition and repairs to decks, fences, and landscaping.
 2. All electrical work, buildings, permits, and modifications if any to the pool and deck in the location where the On-Demand Obstacle Course System is to be erected.
 3. All necessary utilities required for installation and operation of the system and special effects areas (if applicable) as specified by manufacturer.
 4. Installation and supply of mechanical and electrical equipment, including but not limited to electrical connections and wiring to the designated areas as specified by the manufacturer.
 5. Winch system requires single phase, 15amp electrical service, 110volt.
 6. Conduit runs from main system control box to owner supplied electrical service, one timer display, and winch/pulley system, timer system.

Additive Alternate NO.1 as follows: Installation and fabrication of Ninja Cross System and associated footings, electrical, and rigging as shown in A#04-124187 William Woollett Jr. Aquatics Center Addition. Work is included in but not limited to the following associated sheets HI-LITED RED: C3.0, A1.1, A2.1, E1.2, T1.1, T2.1, NS0.1, NS0.2, NS1.0, NS1.1, NS2.1, NS2.2, NS2.3, NS2.4, NS2.5, NS3.1, NS3.2. Work is also included in specification section 13 11 75 On-demand Obstacle Course System.

This work should be provided as a separate price to the Base Bid for the client to select at the time of bid. ADA path of travel site concrete are required as part of the base bid. Time of construction is within the phasing plan and should not change any other phases of construction.

7. Lightning Protection installation, conduit runs, and labor.
8. Bonding materials, conduit, and installation
9. Installation Team will require access to the entire length and perimeter of the pool where the Obstacle Course System is to be erected and must be accessible for a 12-ton to 140-ton crane with a sufficient reach along with an 8,000 lb. all terrain lull, otherwise an additional charge may be applied.
10. The manufacturer will require a 16' x 20' access area directly adjacent to the Obstacle Course System area to operate equipment and erect the Obstacle Course System in its entirety.
11. Depending on the complexity of the obstacle course system and at NinjaCross Systems (manufacturer) sole discretion, we may also need to utilize a 50-ton crane or larger, depending on access and proximity to construction area. Site prep (rig mats, gravel etc.) may be required for cranes that require set-up on sites with existing decks, sidewalks etc.
12. Foundations and piers, for the outdoor truss support system including grounding wires and grouting.
13. The manufacturer will require a laydown area for equipment container, trusses, obstacles as well as the steel arch system.
14. The pool area will need to be closed during any erection times when the crane is being utilized or workers are located over the pool area.
15. All permits, licenses, and inspections of any kind if required.

1.2 CONCRETE FOUNDATIONS (by others)

- A. Concrete foundation design shall be completed by the obstacle course system manufacturer and constructed by the general contractor or pool builder. Anchor bolts for the truss support foundations shall be 304 or 316 Stainless Steel, and supplied by the obstacle course manufacturer, along with anchor bolt template. Typical preliminary foundation size and quantities have been provided in the bid document drawings.
 1. Foundation design is based on recommendations described in the geotechnical engineer's report by John R. Byerly Inc. dated September 17th, 2024. The geotechnical engineer's report is available upon request. All footings shall bear on level (within 1 in 12) undisturbed soil or approved engineered fill. Foundations have been designed for a maximum soil bearing pressure of 2500Psf below isolated column footings.
 2. Foundation elevations shown are for bidding purposes and may vary to suit sub-surface soil conditions. Elevation and bearing strata shall be approved by a geotechnical engineer prior to placing concrete. Provide engineered fill or low strength concrete (500 psi) under foundations at soft spots and for extending excavation to adequate bearing material. Install foundations at designed elevations.
 3. The contractor shall contact utility companies for locating underground services and is responsible for their protection and support.
 4. Fill and back fill:
 5. All fill materials shall be approved by a geotechnical consultant.
 6. Engineered fill beneath footings: minimum compaction 98% standard proctor density at the optimum moisture content.
 7. All areas within the footprint of the building, including utility trenches, must be free of any wet and/or soft areas prior to placement of fill material or slab.
- B. CONCRETE
 1. Concrete work and testing, as performed by "qualified field-testing technicians" and "qualified laboratory technicians", shall conform to all requirements of ACI 301-10, "specifications for structural concrete for buildings", except as modified by the supplemental requirements below. Reports from tests required by section 1.6 of ACI 301-10 shall be submitted to structural engineer, architect, owner, contractor, concrete supplier, and building official.
 2. Concrete work in cold weather shall conform to all requirements of ACI 306.1-90 "standard specification for cold weather concreting" and ACI 306R-10 "cold weather concreting".

3. Concrete work in hot weather shall conform to all requirements of ACI 305R-10 "hot weather concreting". The air temperature, relative humidity, concrete temperature, and wind velocity shall be entered into nomograph figure 2.1.5 to determine if precautions against plastic shrinkage are required.
 4. Concrete mix designs shall be submitted for each type of concrete to the structural engineer for approval in accordance with ACI 301-10 section 4.2.3.4 field test data or trial mixtures. Submittal data must include field test data from at least 10 tests, or a three-point curve generated using trial mixtures.
 5. Submit shop drawings of reinforcing steel.
 6. Materials: (f'c based on 28 days unless noted)
 7. Concrete for foundations with exterior exposure: f'c = 4000 psi, (4.5% to 7.5% entrained air), maximum water/cementitious ratio = 0.50.
 8. Reinforcing steel: ASTM A615 60 KSI yield deformed bars and ASTM A185 welded wire fabric, flat sheets only.
 9. Fly Ash: ASTM C618, type F or C. When used, fly ash-to- total cementitious ratio shall be 15% minimum.
 10. Ground granulated blast furnace slag: ASTM C989. Total ground granulated blast furnace slag -to- total cementitious ratio shall not exceed 50% maximum.
 11. Fly ash, natural pozzolans, silica fume, or ground granulated blast furnace slag: when exposed to deicing chemicals, limit the maximum weight to the percentages of the total weight of cementitious materials given in table 4.2.2.8 of ACI 301-10.
 12. Plasticizing admixture: ASTM C1017.
 13. Water reducing admixture: ASTM C494.
 14. Chloride content of concrete: limit total chloride ion content to amount indicated in table 4.2.2.6 of ACI 301-99. Admixtures containing chloride are not permitted in reinforced concrete or concrete containing metals.
 15. If concrete arrives at the point of delivery with a slump below that which will result in the specified slump at the point of placement and is unsuitable for placing at that slump, the slump may be adjusted once only to the required value by adding water up to the amount allowed in the accepted mixture proportions. The addition of water shall be in accordance with ASTM C94. Do not exceed the specified water-cementitious material ratio or slump in the approved mix design. Do not add water to concrete delivered in equipment not acceptable for mixing. After plasticizing or water reducing admixtures are added to the concrete at the site to achieve flowable concrete, do not add water to the concrete. Measure slump (and air content of air entrained concrete), after slump adjustment, to verify compliance with specified requirements.
 16. Slump shall be measured prior to the addition of admixtures and after the addition of admixtures.
 17. Minimum cast-in-place concrete cover over reinforcing steel, unless noted otherwise, shall be as follows:
 18. Concrete cast against earth: 3"
 19. Concrete expose to earth or weather:
 - #6 bar or larger: 2"
 - #5 bar or smaller: 1½"
 20. Specified concrete cover over reinforcing steel shall be maintained to all reinforcement at concrete reveals and insets. Shop drawings showing concrete reveals and other insets shall be submitted for review. Reinforcing bars shall be free of form release agents.
 21. Provide 3/4" chamfer at corners of exposed concrete.
- C. EPOXY ADHESIVE ANCHORS
1. Epoxy adhesive for concrete shall be HILTI-RE 500 V3. Install per manufacturer's recommendations. Substitutes may be considered; submit manufacturer's data prior to installation.
 2. Threaded rods shall be type 304 stainless, unless noted otherwise. Sizes and embedment are as indicated on the drawings

3. Drill holes with a coarse cutting rock chisel using pneumatic percussion equipment equipped with hollow stem drill rod and continuous air jet to remove cuttings. Blow out holes with compressed air or vacuum to remove all dust and chips.
4. Twenty percent of installed anchors shall be tested by a testing agency using a torque-calibrated wrench to a minimum torque of 60 foot-pounds. The testing agency shall also verify compliance of drill bit type, hole depth and cleanliness, product description and brand name, anchor diameter, length, and type, adhesive expiration date, and verification of anchor installation with the manufacturer's published instructions.
5. For connections to existing reinforced concrete, verify the locations of the reinforcing using a rebar detector, prior to drilling. Notify the engineer if anchor locations conflict with existing reinforcing. Do not drill through existing reinforcing bars.
6. Adhesive anchors must be installed in concrete aged a minimum of 21 days in accordance with ACI 318-14 17.1.2.
7. Adhesive anchors shall have been tested and qualified for use in accordance with ACI 355.4 and ICC-ES AC308 for cracked, uncracked, and seismic concrete recognition.

1.3 REGULATIONS AND CODES

- A. The Obstacle Course System shall be designed and installed to the 2022 California Building Code and conform to all requirements of:
 1. The Department of Public Health, and all other state and local health and building codes.
 2. 2015 International Building Code
 3. AISC Steel Manual, 15th Edition
 4. ASCE 7-10 Minimum Design Loads for Buildings and Other Structures
 1. ANSI E1.2-2012 Entertainment Technology, "Design, Manufacture and Use of Aluminum Trusses and Towers"
 2. Aluminum Design Manual, 2010 Edition
 3. AISC Steel Manual, 14th Edition
 4. American Institute of Steel Construction, Steel Construction Manual 14th Edition
 5. American Society of Civil Engineers 7-10 (ASCE 7-10) "Minimum Design Loads for Buildings and Other Structures"
 6. ANSI E 1.21-2013 "Temporary Ground-Supported Overhead Structures Used to Cover Stage Areas and Support Equipment in the Production of Outdoor Entertainment Events"
 7. ANSI E 1.2-2012 "Manufacture and Use of Aluminum Trusses and Towers"

1.4 SITE CONDITIONS

- A. General
 1. Topography - The drawings indicate the location and building information pertaining to the site for the Obstacle Course System.
 2. Soils Report - The drawings indicate the location and building information pertaining to the site for the Obstacle Course System.

1.5 USE OF SITE

- A. General
 1. The contractor will restrict his/her construction to the general area shown on the drawings.
 2. Access and egress shall be coordinated with the general contractor and controlled so as not to conflict with the normal operations of the project.
- B. Design
 1. The design, shown in the drawings show the intended use and desired locations of the elements in relation to the adjacent deck uses.
 2. The Obstacle Course System manufacturer shall indemnify and hold harmless the architect and the owner from all actions caused by or related to the design, fabrication, and installation of the work of this specification section.

1.6 PERMITS & FEES (to be provided by others)

- A. The manufacturer and/or the contractor shall provide sufficiently detailed information on all items furnished to secure all necessary permits, including but not limited to:
 - 1. Building permit
 - 2. State Department of Public Health construction and operating permits
- B. All applicable fees and permits for construction will be paid for by the contractor(s) and shall be included in the bid price. The Department of Public Health construction permit for the swimming pools will be paid for by the owner.

1.7 JOB CONDITIONS

- A. Protection:
 - 1. Use all means necessary to protect existing work and, in the event of damage, immediately make all repairs and replacements necessary, subject to approval of the architect/engineer and at no additional cost to the owner.
- B. Store Products:
 - 1. The contractor shall assume full responsibility for the protection and safekeeping of products under this contract stored on the site.
- C. Lines, Levels and Layout of Work:
 - 1. The contractor shall establish and guarantee all lines, levels, etc. called for on the drawings.
 - 2. The contractor shall be responsible for the lines, levels, etc. of all his subcontractors.

1.8 SUBMITTALS

- A. Submit in accordance with Division 13 11 75.
- B. Construction Schedule:
 - 1. The contractor will cooperate with scheduling determined for the complete job so as not to create any delays or slowdown of other contractors.
- C. Engineered Drawings:
 - 1. Promptly after award of the contract, the contractor shall submit complete shop drawings to include, but not be limited to:
 - a. Course layout with dimensions.
 - b. Obstacle Course System detail.
 - c. Obstacle Course System support details, including footings and foundations.
 - 2. All engineered drawings shall be certified and sealed by a structural engineer, registered, and licensed in California where the equipment is to be erected.

1.9 GUARANTEE/WARRANTY

- A. **Labor and Material Payments Bonds:** by GC per Owner/ Contractor Contract requirements.
- B. **Qualification of Workmen:** At least one (1) person who is thoroughly familiar with the materials, methods and equipment being utilized shall be always present during the construction to direct the work where required.
- C. **Approved Manufacturers** - The following manufacturers have submitted sufficient information to be pre-qualified as sources of the On-Demand Obstacle Course System;
 - 1. WJN, LLC. dba/NinjaCross Systems, (800) 778-9702, Overland Park, Kansas 66223.
WWW.NinjaCrossSystems.com info@NinjaCrossSystems.com

PART 2 PRODUCTS

2.10 REQUIRED COMPONENTS: The On-Demand Obstacle Course System shall be furnished with the following components:

- A. On-Demand Obstacle Course System - Push Button Deployment that allows for course to be in place and operational in approximately sixty seconds
- B. On-Demand Obstacle Course System - Push Button Retraction that allows for course to be in resting mode in less than sixty seconds (dependent on site-specific ceiling height).
- C. Three-Dimensional Obstacle Course Consisting of the following:
 - 1. Above the water surface obstacle elements
 - 2. On the water surface obstacle elements
 - 3. Below the water surface obstacle elements
- D. Patent Markings must be visible on the system and include the following:
 - 1. Patent No., US 9,889,387 B2

2.11 MATERIALS:

The structural steel/aluminum truss support, aluminum obstacle truss, winch and pulley retraction system, and obstacles, shall be constructed of materials that are able to be installed by the obstacle course manufacturer or by a manufacturer certified installation company.

2.12 ALUMINUM: aluminum shall conform to the following unless noted otherwise on the drawings:

- A. Member alloy: 6005-T5 or 6061-T6 or 6005A-T6
- B. Channels, plates, and sheets: 6061-T6
- C. Weld filler allow: 4043, 5356, or 5556.
- D. All detailing, fabrication and erection shall conform to the aluminum association aluminum design manual, current edition.
- E. Welding shall be in accordance with the American Welding Society latest edition.
- F. Field connections shall be bolted unless specified otherwise on the drawings.
- G. Aluminum truss to aluminum truss connection bolts: 5/8" diameter grade A325
- H. Aluminum truss shall be manufactured by one of the following companies or an approved equal:
 - 1. Total Structures
 - 2. Applied Electronics
 - 3. James Thomas Engineering
 - 4. Tomcat USA
 - 5. Tyler Truss
 - 6. Xtreme Structures and Fabrication
 - 7. Athletic and Performance Rigging
- I. Truss to truss connection hardware (unless noted otherwise):
 - 1. Plated ends: 5/8"Ø grade 8 bolts
- J. Unless noted otherwise, all loads shall be applied to trusses at panel points.
- K. Rated spans, capacities and loading conditions published by the truss manufacturer shall not be exceeded unless reviewed and Approved by a licensed California engineer for a specific use.

2.13 STRUCTURAL STEEL: structural steel shall conform to the following unless noted otherwise on the drawings

- A. All detailing, fabrication, and erection shall conform to AISC Specifications for "Design, Fabrication, and Erection of Structural Steel for Buildings", and the AISC "Code of Standard Practice for Steel Buildings and Bridges", current edition.
- B. The fabricator shall design connections and, when requested, submit calculations to aid the engineer in review. Unless specific end Moments and reactions are indicated on drawings, design and fabricate connections to resist shear based on the maximum uniform load capacity of the member for the span increased by 15%, but no more than the shear capacity of the member.
- C. Field connections shall be bolted except where welded connections are indicated on the structural drawings.
- D. Welding shall be in accordance with the American Welding Society (AWS D1.1:2004)

E. Materials

1. Rolled shapes other than w-shapes and plates unless noted: ASTM A36.
2. Pipe shapes (HSS round): ASTM A53, types E or S, grade B.
3. Bolts: Hot-Dip Galvanized SAE J429 grade 5 bolts ($f_y=92$ KSI) or type 316 stainless steel ASTM A193-71 grade B8M ($f_y=100$ KSI).*
4. Field welds: AWS E70XX, low hydrogen electrodes.
5. Tubular shapes (HSS square and rectangular): ASTM A500, grade B
6. Non-shrink non-metallic grout: CRD-C-621 and ASTM C1107 for interior and exterior applications.
7. Misc. plate, bar, angles, and channels: ASTM A36, $FY = 36$ KSI
8. HSS tubes: ASTM A500 GR B, $FY = 46$ KSI
9. HSS round: ASTM A500 GR B, $FY = 42$ KSI
10. Bolts or scaffold connection pins: SAE J429 grade 5 bolts ($FY=92$ KSI)
11. Truss to truss connection pins: A449
12. Welding shall be in accordance with the American Welding Society latest edition.
13. Hot dip galvanized per ASTM A123 after fabrication. Coating weight per paragraph 5.1 of ASTM A123 and A153. Fabricate assemblies per ASTM A143, A384, AND A385. Repair damaged areas and welds made after galvanizing after erection in accordance with ASTM A780 with organic zinc rich paint complying with DOD-P-21035 OR MIL-P-26915, multiple coats to dry film thickness of 4 MILS.
14. Contractor shall supply temporary bracing to take care of all loads on the structure during erection to ensure the safety of the structure, leave if is required, remove when safety is assured.

2.14 CORROSION PROTECTION COATING: Unless otherwise noted all steel structure shall first be hot dipped galvanized. All obstacles below the water surface shall either be HDPE or aluminum. Obstacles receive an undercoating of E-Coat followed by ALESTA AR300 produced by Axalta. Outdoor systems where our four tower Arch structure is used will be hot dip galvanized followed by an application of IFS COATINGS 400SD - SRSL 45891. Please note this is specifically for selection 2604 Ivory. *Specifications may differ for other color selections.* This is a thermo-setting Super Durable Polyester-TGIC powder coatings and designed specifically for architectural applications and exterior durability. It is formulated with Super durable polyester resin technology & high-performance pigments to conform to the performance requirements of AAMA2604-21.

ARCH – CORROSION PROTECTION

A. IFS COATINGS 400SD POWDER PROPERTIES

1. ASTM D5965-96, C - Specific Gravity 1.56 ± 0.05 , Theoretical Coverage 123 sq.ft/lb./mil
2. ASTM D3451-92, 13 - Shelf life (at below 80°F in dry condition) 12 months.

B. IFS COATINGS 400SD COATING PROPERTIES

1. ASTM D2604-21, Sec. 8.2 25-35 - Gloss 60°angle
2. AAMA 2604-21, Sec. 8.4.2 - Dry Adhesion 5B (100%)
3. AAMA 2604-21, Sec. 8.4.2.2 - Boiling Water Adhesion 5B (100%)
4. AAMA 2604-21, Sec. 8.4.2.3 - Wet Adhesion 5B (100%)
5. AAMA 2604-21, Sec. 8.5 - Direct Impact Resistance $3\text{mm}\pm0.3$ mm deform,
6. AAMA 2604-21; Sec. 8.6 - Abrasion Coefficient ≥ 40
7. AAMA 2604-21, Sec. 8.7.1 - Muriatic Acid Resistance No visual change and blistering
8. AAMA 2604-21, Sec. 8.7.2 - Mortar Resistance No visual change, 5B Adhesion
9. AAMA 2604-21, Sec. 8.7.3 - Nitric Acid Resistance , $\Delta E: \leq 5.0$ No visual 5B Adhesion
10. AAMA 2604-21, Sec. 8.7.4 - Detergent Resistance No color change, 5B Adhesion
11. AAMA 2604-21, Sec. 8.7.5 - Window Cleaner Resistance, No visual change
5B Adhesion
12. ASTM D2247, 3000 hours - Humidity Resistance Rating 7 (creepage) No blistering
13. ASTM G-85, Annex 5, 1500 hours - Cyclic Corrosion Rating 7 (creepage)
Rating 8 (blistering)

OBSTACLES – CORROSION PROTECTION

- C. ALESTA AR300 POWDER PROPERTIES
 - 1. ASTM D5965-96, C - Specific Gravity 1.53 ± 0.05 , Theoretical Coverage 126 ft ²/lb./mil.
 - 2. ASTM D3451-92, 13 - Mass Loss During Cure < 1%, Recommended Shelf Life:24/MO.
- D. ALESTA AR300 COATING PROPERTIES
 - 1. ASTM D523-89 - Gloss at 60° 70-80
 - 2. DPC TM 10.219 - PCI Powder Smoothness 7
 - 3. ASTM D2454-95 – Overbake Resistance, Time 100%
 - 4. ASTM D3363-92a – Pencil Hardness 2H
 - 5. ASTM D2794-93 - Dir / Rev Impact, Gardner 160 / 160 in/lbs.
 - 6. ASTM D3359-97 - Adhesion, Cross Hatch 5B Pass
 - 7. ASTM D522-93a - Flexibility, Mandrel 1/8 in. dia., no fracture
 - 8. ASTM B117-97 - Salt Spray 1,000 hrs.

OBSTACLE – TRUSS FRAME PROTECTION

The obstacle truss frame is anodized, prepped, and powder coated. PRSL 84396, is a Polyester-TGIC Powder coating designed for interior or exterior applications, particularly the natatorium environment. This product is formulated to resist high humidity, chlorine and water. ELSS 90056 is recommended for highly corrosive and chemical resistance applications as basecoat.

- A. IFS COATINGS PRSL 84396 POWDER PROPERTIES
 - 1. Specific Gravity (ASTM D5965-96, C) 1.59 ± 0.05
 - 2. Theoretical Coverage 121 sq.ft/lb./mil
 - 3. Shelf life (at below 80°F in dry condition) 12 months
- B. IFS COATINGS TYPICAL PHYSICAL PROPERTIES
 - 1. Specific Gravity (ASTM D5965-96, C) 1.59 ± 0.05
 - 2. Theoretical Coverage 121 sq.ft/lb./mil
 - 3. Film Thickness 2.5-4.0 mils
 - 4. Gloss 60°angle (ASTM D-523-89) 25-35
 - 5. Hardness (ASTM D-3363-92A) H-2H
 - 6. Flexibility (ASTM D-1737-89) 1/4 inch
 - 7. Adhesion (ASTM D-3359-95A) 5B (100%)
 - 8. Impact Direct/Indirect (ASTM D-2794-93) 100/100 in-lbs.
 - 9. Humidity Resistance (ASTM D2247, 2000 hrs) No blisters*
 - 10. Salt Spray (ASTM B117, 500 hrs., Bonderite 1000 panel) Rating 7 (Creepage)
 - 11. PRSL 84396, can be applied with a corona electrostatic powder spray gun at between 60kv – 100 kV or fluidized bed.
 - 12. PRSL 84396, can be cured in a direct or indirect gas convection oven, an electric oven, or an Infrared. A combination of any of these ovens is also suitable.
 - 13. Std. Cure: 10 minutes @ 400oF Peak Metal Temperature
 - 14. All tests were performed on B-1000 iron phosphate panels* with a nominal film thickness of 2.5-3.5 mils.

2.15 WIRE ROPE AND RIGGING ACCESSORIES:

- 1. Wire rope 3/8" or less in diameter: 7x19 GAC, 7x19 Coated GAC, 7x19SSAC or 7x19 IWRC, meeting federal spec. RR-W-410E.
- 2. Wire rope 7/16" or greater in diameter: 6X19 IWRC or 6x19 IWRC SS, meeting federal spec. RR-W-410D, type 1 Class 2
- 3. The wire rope and hardware are stainless. The fittings will be the same as wire rope.
- 4. Shackles: galvanized or stainless steel, bolt anchor type or screw pin type, ASTM A153
- 5. Swage Sleeve stainless steel, meeting Mil Spec MS51844
- 6. Wire rope thimbles: stainless steel, meeting federal spec. FF-T-276B type II.
- 7. Steel core Polyester Endless Sling

2.16 HARDWARE:

- a. Steel Hardware, ASTM A-7, or A-36 (hot dipped galvanized).
- b. Bolts, for Arch SAE J429 Grade 5 or Type 316 Stainless Steel ASTM A193-71 Grade B8M

2.17 INSPECTIONS:

1. All truss units, scaffold and/or other rigging equipment shall be visually inspected prior to erection. Damaged or corroded equipment shall not be used. Field modifications shall be approved by the engineer of record prior to installation.

2.18 COLOR - OBSTACLE & SUPPORT CORD(S):

1. Color shall be integral to the obstacle and/or support cord(s). Obstacle and obstacle support cord color shall be selected from nine standard colors supplied by the obstacle course manufacturer. Colors may be different for obstacles and cord if desired. Powder coated and anodizing colors are numerous and can be provided for color selections upon request for an additional cost to owner.

2.19 SYSTEM COMPONENTS: shall consist of elements that make up the Obstacle Course System;

1. **Obstacle Frame:** the point at which the Obstacles mount and the portion of the system that moves up and down to place the obstacles either in a usable position or in a stored position. The Obstacle Frame is constructed from 12" x 12" aluminum box truss. These will be connected by bolting them end to end to either another box truss or a corner block. The Obstacle Frame is rectangular in shape, being 12' wide with the length dependent on the final design.
2. **Obstacles:** the elements in which participants climb/swim on, over, and under that are located above, on and below the water level consisting of three types;
 - a. Underwater Obstacles - where most of the obstacle is under water and the participant's body will be in the water. Examples of these types of obstacles are Underwater Hoops, Underwater Sea of Discs, The Cube, etc.
 - b. Water Level Obstacles - where the obstacle is at water level, these obstacles either have the participant standing on top of the obstacles or require the participant to climb over the obstacle. Examples are Water Level Sea of Discs, Low Bars, etc.
 - c. Above Water Obstacles - where the obstacle is higher above the water and the participant's body is out of the water, typically requiring the participant to use upper body strength. Examples are Overhead Rings, Tilted Ladder, Trapeze Bar
 - d. Obstacles are constructed of steel core nylon rope, HDPE plastic, stainless steel tubing, aluminum tubing and stainless-steel hardware.
3. **Attachment Hardware** - obstacles attach to the Obstacle Frame via either an Obstacle Attachment Bar, Truss Clamp, Incord Netform or Webbing.
 - a. Obstacle Attachment Bar is a 2" bar that attaches to the Obstacle Frame and allows for obstacles to have a wider attachment than 12".
 - b. Truss Clamp is an attachment that clamps to the 12" truss with an eye loop. This allows quick attachment of items to the truss.
 - c. Incord NetForm is a three-strand fiber core, around which six strands of steel wire cord are wrapped. These cords are built with a multi-strand steel wire core which is polypropylene thermo-fixed and finished with a soft, yet durable polyester jacket.
 - d. Webbing is a simple nylon webbing that wraps around the truss and allows an obstacle to attach to the webbing.
4. **Rigging System** – includes three components; The retraction system, safety backup system, and static live load system. All points shall be dead hung points. All rigging shall be hung from panel points (locations on the truss chords braced both vertically and horizontally) unless specifically approved by the engineer of record. Bridles shall not be used unless specifically allowed by the engineer of record.

- a. The Retraction System consists of the wire rope, pulley blocks, DDPS Redirect, and winch. A stainless-steel Main Cable attached to the winch runs horizontally from the winch to the DDPS Redirect. The winch cable attaches to the Lift Cables via a Rigging Plate. The Lift Cables, which on each end there are the same number of cables as there are corner blocks on the Obstacle Frame. If an Obstacle Frame has six corner blocks, then there are six pull cables, three on each side. The Lift Cables run from DDPS Redirect to a Pulley Block, a Pulley Block is a series of Pulley Sheaves (a Sheave is the round wheel of a pulley) that allow the Lift cables to either run horizontal to the next Pulley Block and stay in alignment or to redirect downward to the Obstacle Frame. The Lift Cable attaches to the Obstacle Frame by way of an Eye Bolt mounted to the corner Block via a Rigging Plate or via a Truss Pick attached to the Truss Frame
- b. The Backup System is a system designed to catch the Obstacle Frame in case a rigging cable breaks and prevents the Obstacle Frame from falling into the water. The current system used is a product called Load Halt. How it works is a cable runs from the Obstacle Frame to the Load Halt that connects internally to internal wheel, if that wheel starts to spin fast, a break is triggered that halts the spin of the wheel and prevents the load from descending further.
- c. The Static Live Load System is a series of cables that run to the Obstacle Frame to the building ceiling/arch frame that holds the Live Load of the Obstacle Frame.

2.20 ELECTRICAL SYSTEM:

Single Phase, 15amp service shall be required for winch. The timing and entertainment system will require 15amp service. These services can be split so that the winch system is a 115V 15amp service and timer system is 115V 15amp service. Switches and controls to be housed in a NEMA-4 control enclosure.

2.21 TIMER SYSTEM:

The Timing System works with a Start Button to activate the timer as well as an activation countdown via the timer entertainment system. Each lane has its own clock with a timer stop button at the end of each lane. When the participant hits the stop button, tat lanes timer will stop.

2.22 GRAPHIC PANELS:

Graphic Panels shall be used as a preventive measure to keep guests from climbing on the leg truss structure. These graphic panels will also be used aesthetically for branding and instructional signage for the NinjaCross System.

- A. These panels are weather resistant and designed for corrosive environments.
- B. One-eighth aluminum ACM with vinyl wrap
- C. Sixteen (16) - 2'-4" wide x 8'-0" tall - This will cover all four legs on all four sides.
- D. Two (2) 16'-0" wide x 3'-3" tall - These will be attached at the top of the arch centered on both sides. These are made up of four panels.

2.23 OBSTACLE COURSE SYSTEM CONFIGURATIONS:

1. The proposed NinjaCross System is designed for an outdoor 25-meter competition/lap pool.
2. All Obstacle Course System attraction layout(s) have been developed utilizing designs provided by WJN, LLC dba/NinjaCross Systems and shall include the following;

A. SUPPORT TRUSS SPAN:

The system will use our Steel Arch Span, and the Overall Footprint will be 105'-3.5" x 17'-2". The arch reaches 26'-1.75" above pool deck (overall height will reach an additional 1.5" with the necessary grout below the mounting plates). This truss frame will support a secondary element frame that will be raised and lowered to the pool for NinjaCross use.

B. ELEMENT TRUSS:

The element truss is the structure that will raise and lower above the pool surface. The Element Truss size can vary from a minimum of 12' x 12' to a maximum of 12' x 64' for typical 25yd/25m pools. Our typical standard sizes will be 12' x 43', 12' x 54', 12' x 64'. This will create a two-lane course with a centerline separation of 11'. The element truss structure will be lowered to a position that allows the elements to hang in a natural position with some elements being underwater, some elements at water

level, and other elements above the water level. When the element frame is in the retracted position, the elements will hang from the frame with the lowest hanging element approximately 8 feet above the water.

C. LANE OBSTACLES:

The two-lane design will include a set of obstacles designed in such a way to challenge each participant with swimming ability, balance, agility, and strength. The Two-Lane design will have the capability of changing the element spacing, adding new obstacles, or substituting obstacles for different programs and skillsets. The system is designed for all adjustments to be made by the pool operations staff.

D. USER CAPACITY AND MAXIMUM WEIGHT RESTRICTIONS:

This system is designed to allow one participant every ten feet with a maximum of 5 people on each lane at the same time (10 people total). User weight is limited to 270lbs per person.

INDOOR AND OUTDOOR SYSTEM APPLICATIONS:

Whether installed indoors or outdoors, the NinjaCross™ Obstacle Frame, Obstacles elements, and Rigging System will remain the same. However, the attachments of the Rigging System may vary, but the workings of the system are unchanged.

A. Indoor Systems:

Indoor systems use the building ceiling structure as the mounting point. The ceiling can be a concrete roof, steel trusses, wood trusses etc. The Pulley Blocks will mount to the ceiling, the Load Halts will mount to the ceiling, and the Stabilizing Cables will mount to the ceiling. The winch can mount either to the ceiling or wall.

B. Outdoor Systems:

Since an outdoor pool lacks an overhead structure to mount to, an overhead structure will be erected to mount the rigging system too. This structure will be a hot dipped galvanized Steel Arch structure, which includes a powder coating finish (color to be selected by the owner or architect). The rigging points will attach directly to the steel arch. This structure has a 100' span, so with a minimum set back of 7.5' allows the arch to span an 85' pool (25m).

PART 3 - EXECUTION

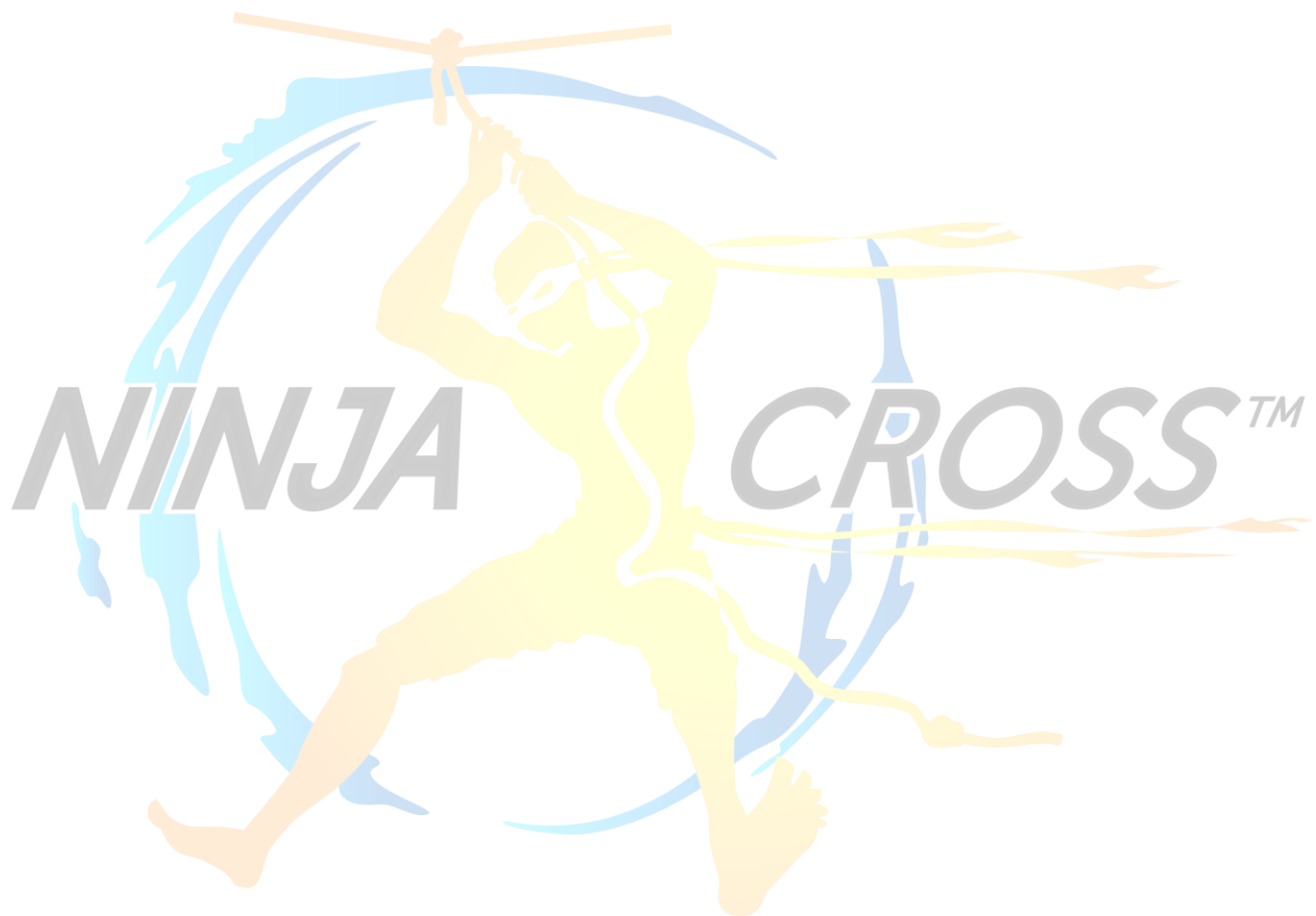
3.1 GENERAL

- A. The installation of this work shall comply with the following governing and regulatory authorities.
1. Department of Labor (OSHA).
 2. State Department of Public Health.
 3. All State and Local Building Codes.
 4. Any other agency that has legal authority.

3.2 OWNER INSTRUCTION:

- A. In addition to Section 13 11 75 requirements for operation/maintenance instructions, the Obstacle Course System manufacturer shall deliver four complete sets of operating and maintenance instructions bound together in a complete manual for the Obstacle Course System(s) to the Architect/Engineer. Including, but not limited to the following:
1. Narrative on the Obstacle Course System operation including recommended loading procedures and operation through all sequences.
 2. Recommended user requirements including recommended signage with height and weight restrictions.
 3. Written Obstacle Course System warranty and contact information.
 4. Maintenance information and recommended maintenance program.

END OF SECTION





SECTION 131233 - SPRAYGROUND

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. The BIDDING REQUIREMENTS, CONTRACT FORMS, AND CONDITIONS OF THE CONTRACT and applicable parts of DIVISION 1 - GENERAL REQUIREMENTS, as listed in the Table of Contents, must be included in, and made a part of, this Section.

1.02 SUMMARY OF WORK *(for general guidance-not inclusive)*

- A. Introduction
 - 1. Furnish labor, material, equipment, and services for installation of the sprayground elements including the spray features, manifold, rain divertor valve, controllers, and programming software.
- B. The outdoor sprayground must include the various spray features as indicated in these specifications as well as swimming pool drawings.
- C. Provide the sprayground elements as indicated on the swimming pool drawings, specified herein, and as necessary for proper completion including, but is not necessarily limited to:
 - 1. All spray features.
 - 2. All activation devices.
 - 3. All controllers.
 - 4. Operations and maintenance manuals.
 - 5. On site startup training.
 - 6. Proper signage as required.
- D. Related work specified in other sections:
 - 1. Reference Division 131100 – Swimming Pools
 - a. Provide sprayground and balance tank structure.
 - b. Provide the final finishes to the sprayground and balance tank surface.
 - c. Provide mechanical equipment (including all recirculation components) and sprayground piping as necessary for sprayground operation.

1.03 QUALITY ASSURANCE

- A. The supplier must demonstrate their specific experience and competency in the manufacturing and installation of the sprayground elements and systems.
- B. The supplier must have completed at least five installations comparable to the system specified herein within the last 5 years. Submit a list of such projects with name, address and current telephone number of the Owner's Operator and Architect of Record to the Architect with bid on the bid date.
- C. The Owner reserves the right to reject a bid if the evidence submitted by, or investigation of, such bidder fails to satisfy the Owner that such bidder is properly qualified to carry out the obligation of the contract and to complete work described or if bidder does not have the qualifications stated herein.
- D. Products must be specifically designed for the use by children and adults and follow the ASTM F2461-09 norm.

1.04 REGULATORY AGENCY REQUIREMENTS AND ENGINEERING SERVICES

- A. The system must comply with necessary approvals obtained by the Architect from local regulatory agencies governing the design and construction of public swimming pools.
- B. Must give necessary notices, obtain permits, and pay government fees, and other costs in connection with his work; file necessary drawings, prepare documents and obtain necessary approvals of governmental departments having jurisdiction; obtain required certificates of inspection for his work and deliver same to the Architect before request for acceptance and final payment for the work.
- C. Must include in the work, without extra cost to the Owner, labor, materials, services, apparatus, or drawings in order to comply with applicable laws, ordinances, rules, and regulations, whether or not shown on drawings and/or specified.
- D. Where provisions of pertinent codes and standards conflict with this specification, the more stringent must govern.

1.05 COORDINATION AND CLARIFICATION

- A. Coordinate with other trades affecting and affected by work in this section.
- B. The Contractor must establish with other trades having related work in this Section, that work necessary to complete the sprayground as shown on the drawings and in the specifications is included in the base bid and alternates to the Owner.
- C. If in doubt regarding the responsibility for work covered in this section and/or discovery of errors or omissions in the bidding documents, must notify the Architect through channels established by the specifications and request a clarification ten (10) days prior to the bid date.

1.06 CONTRACTORS ALTERNATIVE PROPOSAL

- A. Suppliers to submit their bid based on materials, equipment and methods as specified in this section. Substitutions of material, equipment or method must be submitted in accordance with the specified procedure described in Division 1. Required changes to the construction documents must be described in writing and costs or changes must be included in the price quoted to complete the installation.

1.07 SUBMITTALS

- A. Refer to requirements in Division 1.
- B. Shop Drawings
 - 1. Provide a complete set of shop drawings required to fabricate and assemble the sprayground elements.
- C. Include complete product data indexed, tabbed, and referenced to specifications.
- D. Submit details indicating the spray features, activation devices, controllers, as well as necessary flow regulation devices necessary to operate the sprayground system as indicated by the manufacturer.
- E. Installation of the sprayground and associated spray feature footings must not commence until detailed plans and specifications are approved by the department of Building and

Safety. The responsibility for costs associated with obtaining such approval must be part of the General Construction contract.

- F. Specify water supply requirements and required pump characteristics to Architect, for approval, prior to preparation of fabrication drawings.
- G. Guarantee / Warranty
 - 1. Warranties must be for a period of one year from the date of substantial completion or the owner begins using the sprayground unless otherwise specified. Submit warranties covering, but not limited to the following:
 - a. Manufacturers minimum twenty-five (25) year warranty on the stainless-steel products and stainless-steel anchoring systems.
 - b. Manufacturer's minimum five (5) year warranty on the brass elements including spray nozzles, spray caps and spray heads, the high-density polyethylene (HDPE) elements, polyurethane elements, ultra-high molecular weight polyethylene elements, and the acetyl nozzles.
 - c. Manufacturer's minimum five (5) year warranty on the water distribution manifold.
 - d. Manufacturer's minimum two (2) year warranty on the color coatings including powder coating and any airbrushed graphics.
 - e. Manufacturer's minimum two (2) year warranty on the stainless-steel hardware & moving parts.
 - f. Manufacturer's minimum two (2) year warranty on the fiberglass, acrylic and polycarbonate elements.
 - g. Manufacturer's minimum two (2) year warranty on the sprayground controller, actuator switches, actuated valves, and the rain divertor system.
 - 2. All warranties must be managed by the sprayground elements supplier.

1.08 MAINTENANCE MANUALS AND CLOSE-OUT SUBMITTALS

- A. Submit six (6) bound volumes of complete Operating and Maintenance instructions covering installed equipment. Include wiring diagrams, lubrication, and user maintenance instructions.
- B. Include manufacturer's recommended maintenance schedule, parts lists, piping diagram and troubleshooting information.
- C. Include one set of approved submittals as a part of each O & M manual.
- D. All submittals must also meet the requirements set forth in other accompanying swimming pool specifications such as 131100 – Swimming Pools.

1.09 COLORS

- A. Colors must be selected by the Owner/Architect. Physical color samples must be provided as requested.

1.10 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Deliver material in manufacturer's original, unopened containers and crates with labels intact and legible.
- B. Deliver materials in sufficient time and quantity to allow continuity of work and compliance with approved construction schedule.
- C. Handle materials in a manner to prevent damage.

- D. Store materials on clean raised platforms with weather protective covering when stored outdoors. Provide continuous protection of materials against damage or deterioration.

PART 2 - PRODUCTS

2.01 GENERAL

- A. The specified sprayground elements must be provided in the locations as provided in the swimming pool drawings and specified hereinafter. The sprayground elements must be provided by Waterplay Solutions Corp. Equivalent sprayground elements must be submitted for review and approval a minimum of two (2) weeks prior to the final bid date for Owner's and Engineer review and approval. The Contractor must verify hydraulic capacity equivalency and coordinate any necessary changes to pipe size(s) and/or pumping requirements (including electrical) for substituted sprayground elements at no additional cost to the Owner. The supplier must provide sprayground spray features complete with anchoring and fastening devices, required gaskets, controllers, programmers, and program software.

2.02 SPRAYGROUND ELEMENTS

- A. The following sprayground elements must be included.
 - 1. ACTIVATOR (1 required)
 - a. Product Code: 0010-1854
 - b. Mount: Playphase Base Small.
 - 2. SPRAYGROUND CONTROLLER (1 required)
 - a. Product Code: 0010-2248
 - b. It is the responsibility of the installer to make the field installation NEMA 4 compliant. The installation must comply with local electrical code requirements and be approved by local electrical inspection authorities. The control panel is not to be installed in direct sunlight.
 - c. The splashpad controller shall operate on a real time clock and will control operation of the park's valves based on time of day and day of the week.
 - d. The splashpad controller shall be capable of remote access to the PLC program, system variables, and the Human Machine Interface (HMI) touchscreen. The controller must be configured to interface with a supervisory control system, such as smartACCESS, or approved alternative.
 - e. The splashpad controller shall have a color Human Machine Interface (HMI) touchscreen through which operators can modify splashpad sequencing, component run times, operating days, hours of daily operation, and test mode to manually activate all valves.
 - f. The splashpad controller shall operate the 24VAC solenoid valves located in the splashpad valve boxes.
 - g. The splashpad controller includes power distribution to all necessary components, including the splashpad solenoid valves and activators.
 - h. The splashpad controller shall have a minimum of one input channel available to connect to each splashpad activator.
 - i. The splashpad controller will actuate splashpad solenoid valves as per an operator programmable, manufacturer preset, and drought control sequence upon input signal from an activator.
 - j. The splashpad controller shall be prewired and have all inputs and outputs channels tested prior to shipping.
 - k. The splashpad controller shall be housed in a NEMA 4 enclosure.
 - l. The overall height, width and depth of the controller shall be no less than 26 inches (654mm), 17 inches (421mm) and 10 inches (246mm).

3. DRAIN (2 required)
 - a. Product Code: 0010-4133
 - b. Flow rate capacity of 200 GPM.
 - c. 306 Stainless Steel construction
 - d. Design that protects against finger and toe entrapment and eliminate pinch points.
 - e. Flush-to-grade installation.
 - f. Inclusion of strainer box.
4. AQUALUME SOAKER 5 (1 required)
 - a. Product Code: 0010-4258
 - b. Mount: Playphase Base Medium.
 - c. The hydraulic requirements shall be 25 gpm @ 6 psi (95 lpm @ 41 kpa).
 - d. Bucket Count: Five (5)
5. FISH (1 required)
 - a. Mount: Playphase Base Small.
 - b. The hydraulic requirements shall be 14 gpm @ 2 psi (53 lpm @ 14 kpa).
6. SPLASH BLASTER (4 required)
 - a. Product Code: 0010-0403
 - b. Mount: Playphase Base Small.
 - c. The hydraulic requirements shall be 3 gpm @ 7 psi (11 lpm @ 48 kpa).
7. TEAM BLASTER (1 required)
 - a. Product Code: 0010-0414
 - b. Mount: Playphase Base Small.
 - c. The hydraulic requirements shall be 8 gpm @ 20 psi (30 lpm @ 138 kpa).
 - d. Blaster Count: Two (2)
8. WATERFALL 3 (1 required)
 - a. Product Code: 0010-4592
 - b. Mount: Playphase Base Small.
 - c. The hydraulic requirements shall be 15 gpm @ 8 psi (57 lpm @ 55 kpa).
9. WATER-O (1 required)
 - a. Product Code: 0010-0369
 - b. Mount: Playphase Base Small (2 required).
 - c. The hydraulic requirements shall be 10 gpm @ 6 psi (38 lpm @ 41 kpa).
10. DOUGHNUT (1 required)
 - a. Product Code: 0010-7494
 - b. The eight (8) spray canisters shall be connected to a 45 x 40 inch (1143 x1016mm) square stainless tubing weldment acting as a manifold. Each canister shall be no less than 6 inches (152mm) tall with a diameter of Ø2.88 inches (73mm). The Acetal spray nozzles and winter caps shall be seated into the canister with an o-ring and secured using tamper resistant security bolts. Tamper resistant winter caps are included. All nozzles sit flush with final grade. There shall be two 1 inch (25mm) National Pipe Thread water inlets.
 - c. Flush to grade mount.
 - d. The hydraulic requirements shall be 24 gpm @ 3 psi (91 lpm @ 21 kpa).
 - e. Nozzle Count: Eight (8)
 - f. Water Display: Water will flow through eight (8) 1.5" acetal nozzles. If restriction is placed on any nozzle, the flow and height on the remaining nozzles will increase.
11. SPRAY TUNNEL 4 (1 required)
 - a. Product Code: 0010-7496
 - b. Flush to grade mount.
 - c. The hydraulic requirements shall be 12 gpm @ 3 psi (45 lpm @ 21 kpa).
 - d. Nozzle Count: Four (4)
12. TULIP (3 required)
 - a. Product Code: 0010-7489
 - b. Shall be constructed of schedule 40 stainless steel structural tubing with an outside diameter of 2.875 inches (73mm) with a wall thickness of 0.203 (5mm). The

canister shall be a total height of 11.38 inches (289.05mm) tall with a .25-inch (6.35mm) thick X 5.5-inch diameter (139.7mm) base plate. The Acetal spray nozzle and winter cap shall be seated into the canister with an O-ring and secured using a tamper resistant security bolt. The spray nozzle shall provide a mushroom sheet spray effect. The hydraulic requirements shall be 10 gpm @ 15 psi (38 lpm @ 103.4 kpa). Tamper resistant winter caps are included. The water inlet shall be 1 inch (25mm) National Pipe Thread located 1.41 inches (35.8mm) below the base plate. The canister shall be secured into place by securing three (3) 3/8-inch x 11 inches (9.52 mm x 279mm) L bolts (SS) through three (3) anchor holes on the side of the canister.

- c. Flush to grade mount.
- d. The hydraulic requirements shall be 6 gpm @ 0.75 psi (23 lpm @ 5 kpa).
- 13. MANIFOLD – 12 VALVE (1 required)
 - a. Product Code: 0010-2614
 - b. Compact design for easy installation into small spaces.
 - c. Construction from stainless steel header and schedule 80 PVC piping.
 - d. Provided with slow-closing solenoid valves from the manufacturer.
 - e. Pre-assembled with mounting brackets for easy installation.
 - f. Allows for easy maintenance access.
 - g. Electrical components UL certified.
 - h. Meets local codes & assembled with NSF 50 listed parts.
- 14. PLAYPHASE BASE (as required)
 - a. Product Code:
 - 1) Small: 0011-2156
 - 2) Medium: 0011-1953
 - b. Provide spray features with footing system provided by the manufacturer. Footing system must install flush-to-grade and allow for easy removal of features.
- 15. RAIN DIVERTER (1 required)
 - a. Product Code: 0010-4666
 - 1) Provide with custom dimensions as shown on the drawing to ensure piping elevations to do not create a leak path for the balance tank.
 - b. Rain diverter must interface with the sprayground controller.
 - c. Rain diverter must come from the manufacturer with actuator valve, straining basket, and mounting.
 - d. Provide Rain Diverter with hatch rated form pedestrian traffic.

PART 3 - EXECUTION

3.01 SYSTEMS INSTALLATION

- A. The sprayground installer must assemble and install equipment, special parts, and accessories in accordance with these specifications and detailed layouts and shop drawings of equipment supplier.
- B. Installer must provide anchors and inserts that must be imbedded including fittings, inserts, structure sleeves and required anchorages.
- C. Provide equipment and systems in accordance with manufacturer's directions.
- D. The sprayground must be as described in the specifications. Items are detailed and specified as a guide reference and for dimensional purposes. Must make provisions accordingly and submit shop drawings and submittals based on that data.
- E. Installer must coordinate, supervise, and approve work by other trades responsible for work related to this section. All work in this section must be performed by the sprayground installer

except as noted.

3.02 SITE CONDITIONS

- A. Inspection
 - 1. Prior to installation of the work of this section, carefully inspect the installed work of other trades and verify that such work is complete to the point where this installation may properly commence.
 - 2. Verify that sprayground elements are fabricated and erected in strict accordance with the original design, the approved shop drawings, and the referenced standards.
- B. Discrepancies
 - 1. In the event of discrepancy, immediately notify the Architect.
 - 2. Do not proceed with fabrication or installation in areas of discrepancies until such discrepancies are fully resolved.

3.03 FABRICATION

- A. Fabricate the sprayground and its related systems in strict accordance with the approved shop drawings and referenced standards.

3.04 CLEAN-UP

- A. Upon completion of the work of this section, immediately remove fiberglass, debris and rubbish occasioned by this work to the approval of the Architect and at no additional cost to the Owner.

3.05 START-UP AND INSTRUCTION

- A. The supplier must provide the services of an experienced operator/instructor to assist in the initial start-up and training of the sprayground and its related systems has been completed and initially placed in operation. During this period, the Owner's representatives who will be operating the sprayground must be thoroughly instructed in phases of the sprayground operation. Prior to leaving the job, obtain written certification from the designated Owner's representative acknowledging that the instruction period has been completed and necessary operating information provided. A minimum of one (1) 2-hour session is required. The manufacturer of sprayground elements must have an on-site representative for the commissioning of the sprayground.

3.06 INSTALLATION

- A. Drawings and instructions must be supplied by the manufacturer for ease of installation. Manufacturer must supply a service technician on site at the time of system startup to ensure spray patterns are correct, lines are free and clear, water pressures are correct, the sprayground controller is programmed correctly, play events are correct and facility staff is properly trained on the operations of the sprayground controller.

3.07 CONCLUSION

- A. It is the intention of these specifications to provide a complete installation of the sprayground as described. All accessory construction and apparatus necessary or advantageous in the operation or testing or high performance of the work must be included. The omission of specific reference to part of the work necessary for such complete installation must not be interpreted as relieving the sprayground supplier or installer from providing and installing such parts. Any such omission or clarification must be brought to the attention of the Architect prior to bidding.

END OF SECTION 131233

SECTION 22 00 00 - GENERAL PLUMBING PROVISIONS

PART 1 GENERAL

1.1 GENERAL CONDITIONS

- A. The foregoing General and Special Conditions shall form a part of this Division with the same force and effect as though repeated herein. The provisions of this Section shall apply to all the Sections of Division 22.

1.2 CODES AND REGULATIONS

- A. All work and materials shall be in full accordance with current rules and regulations of applicable codes and all California Amendments. Nothing in these drawings or specifications is to be construed to permit work not conforming to these codes. Should the drawings or specifications call for material or methods of construction of a higher quality or standard than required by these codes, the specifications shall govern. Applicable codes and regulations are:
 - 1. California Code of Regulations – CCR:
 - a. Title 8, Industrial Relations.
 - b. Title 24, Building Standards.
 - 2. California Building Code – CBC.
 - 3. California Mechanical Code – CMC.
 - 4. California Plumbing Code – CPC.
 - 5. California Fire Code – CFC.
 - 6. California Green Building Code.
 - 7. American Gas Association – AGA.
 - 8. American National Standards Institute – ANSI.
 - 9. American Society of Heating, Refrigerating and Air Conditioning Engineers – ASHRAE.
 - 10. American Society of Mechanical Engineers – ASME.
 - 11. American Society for Testing and Materials – ASTM.
 - 12. American Water Works Association – AWWA.
 - 13. Cast Iron Soil Pipe Institute – CISPI.
 - 14. California Electrical Code – CEC.
 - 15. National Electrical Manufacturers Association – NEMA.
 - 16. National Fire Protection Association – NFPA.
 - 17. National Sanitation Foundation – NSF.
 - 18. Plumbing and Drainage Institute – PDI.
 - 19. Sheet Metal and Air Conditioning Contractors National Association – SMACNA.
 - 20. Underwriters' Laboratory – UL.
 - 21. Occupational Safety and Health Act - OSHA.
 - 22. California Assembly Bill 1953 (AB1953).
 - 23. ASCE 7-16, Chapter 13.

1.3 PERMITS AND FEES

- A. The Contractor shall take out all permits and arrange for all tests in connection with his work as required by local ordinances. All charges are to be included in the work. Permits for equipment connected to a particular system are to be considered as a part of the work included under each system; for example, permits for electric motor connection are part of electrical work, permits for domestic water or gas connections are part of plumbing work. All charges for service connections, meters, etc. by utility companies or districts shall be included in the work.

1.4 COORDINATION OF WORK

- A. Layout of materials, equipment and systems is generally diagrammatic unless specifically dimensioned. The actual locations of all materials, piping, fixtures, equipment, supports, etc. shall be carefully planned, prior to installation of any work, to avoid all interferences with each other, or with structural, electrical or architectural elements. Verify the proper voltage and phase of all equipment with the electrical plans. All conflicts shall be called to the attention of the Engineer prior to the installation of any work or the ordering of any equipment.

1.5 GUARANTEE

- A. Guarantee shall be in accordance with the General Conditions. These specifications may extend the period of the guarantee for certain items. Where such extensions are called for, or where items are normally provided with guarantee periods in excess of that called for in the General Conditions, the Certificate of Guarantee shall be furnished to the Owner through the Engineer.

1.6 EXAMINATION OF SITE

- A. The Contractor shall examine the site, compare it with plans and specifications, and shall have satisfied himself as to the conditions under which the work is to be performed. No allowance shall subsequently be made in his behalf for any extra expense to which he may be put due to failure or neglect on his part to make such an examination.

1.7 SUBMITTALS

- A. Submit shop drawings in accordance with Division 01.
- B. Shop Drawings: Within 30 days of contract award, the Contractor shall submit six copies of shop drawings for all materials, equipment, etc. proposed for use on this project. Material and equipment shall not be ordered or installed until written review is processed by the Engineer. Any item omitted from the submittal shall be provided as specified without substitution. All shop drawings must comply with the following:
 - 1. Shop drawings are required for all material and equipment items and shall include manufacturer's name and catalog numbers, dimensions, capacities, performance curves, and all other characteristics and accessories as listed in the specifications or on the drawings. Descriptive literature shall be current factory brochures and submittal sheets. Capacities shall be certified by the factory.
 - 2. All shop drawings shall be submitted at one time in a neat and orderly fashion in a suitable binder with title sheet including Project, Engineer and Contractor; Table of Contents; and indexed tabs dividing each group of materials or item of equipment. All items shall be marked with the specification paragraph number for which they are proposed. All equipment shall also be identified by the mark number as indicated on the drawings.
 - 3. All capacities, characteristics, and accessories called for in the specifications or on the drawings shall be highlighted, circled, or underlined on the shop drawings. Calculations and other detailed data indicating how the item was selected shall be included for items that are not scheduled. Data must be complete enough to permit detailed comparison of every significant characteristic which is specified, scheduled, or detailed.
- C. Substitutions: Manufacturers and model numbers listed in the specifications or on the drawings represent the standard of quality and the features desired. Unless otherwise noted, alternate manufacturers may be submitted for review by the Engineer. Calculations

and other detailed data indicating how the item was selected shall be included. The Contractor shall assume full responsibility that substituted items or procedures will meet the specifications and job requirements and shall be responsible for the cost of redesign and modifications to the work caused by these items.

- D. Review: Submittals will be reviewed for general conformance with the design concept, but this review does not guarantee quantity shown, nor does it supersede the responsibility of the Contractor to provide all materials, equipment, and installation in accordance with the drawings and specifications. The Contractor shall agree that shop drawing submittals processed by the Engineer are not Change Orders; that the purpose of shop drawing submittals by the Contractor is to demonstrate to the Engineer that the Contractor understands the design concept; that he demonstrates his understanding by indicating which equipment and material he intends to furnish and install and by detailing the fabrication and installation methods he intends to use. The Contractor shall agree that if deviations, discrepancies or conflicts between shop drawings and design drawings and specifications are discovered either prior to or after shop drawing submittals are processed by the Engineer, the design drawings and specifications shall control and shall be followed.

1.8 OPERATION AND MAINTENANCE INSTRUCTIONS

- A. Submit one electronic pdf copy for review and after approved submit three hard copies of the Operation and Maintenance Instructions and Wiring Diagrams for all equipment and parts lists for all equipment, etc. shall be submitted to the Engineer. All instructions shall be clearly identified by marking them with the same designation as the equipment item to which they apply (e.g. WH-1). All wiring diagrams shall agree with revised shop drawings and indicate the exact field installation. All instructions shall be submitted at the same time and shall be bound in a suitable binder with tabs dividing each type of equipment (e.g. Water Heaters, Pumps, Motors, etc.). Each binder shall be labeled indicating "Operating and Maintenance Instructions, Project Title, Contractor, Date" and shall have a Table of Contents listing all items included. **(These submittals shall be submitted with regular submittals at start of job so Commissioning Contractor can start on the commissioning check list for Title 24 Requirements)**
- B. Verbal: The Contractor shall verbally instruct the Owner's maintenance staff in the operation and maintenance of all equipment and systems. The controls contractor shall present that portion of the instruction that applies to the control system. The Engineer's office shall be notified 96 hours prior to this meeting.
- C. Acknowledgment: The Contractor shall prepare a letter indicating that all operation and maintenance instructions (printed, verbal and posted) have been given to the Owner, to the Owner's satisfaction. This letter shall be acknowledged (signed) by the Owner and submitted to the Engineer.

1.9 RECORD DRAWINGS

- A. The Contractor shall maintain a set of prints for the project as a record of all construction changes made. As the Work progresses, the Contractor shall maintain a record of all deviations in the Work from that indicated on the drawings. Final location of all underground work shall be recorded by depth from finished grade and by offset distance from permanent surface structures, i.e. buildings, curbs and walks. In addition, the water, gas, sewer, etc. within the building shall be recorded by offset distances from building walls. The original drawings will be made available to the Contractor from which he shall have a set of reproducible drawings made. The Contractor shall then transfer the changes, notations, etc. from the marked-up prints to the reproducible drawings. The record drawings (marked-up prints and reproducibles) shall be submitted to the Engineer for review (as an alternative, the marked-up prints may be photocopied full size on reproducible stock).

PART 2 PRODUCTS

2.1 PROTECTIVE COATING FOR UNDERGROUND PIPING

- A. All ferrous pipe below grade (except cast iron) shall have a factory applied protective coating of extruded high density polyethylene, 35 to 70 mils total thickness, X-Tru Coat, Scotchkote. All fittings and areas of damaged coating shall be covered with two layer double wrap of 10 mil polyvinyl tape to total thickness of 40 mils. Manville Corporation. Protective coating shall be extended 6" above surrounding grade.

2.2 CONCRETE ANCHORS

- A. Concrete Anchors shall comply with CBC 1901A.3. Steel stud with expansion anchor requiring a drilled hole; powder driven anchors are not acceptable. Minimum concrete embedment shall be 4-1/2 diameters. Minimum spacing shall be 10 diameters center-to-center and 5 diameters from center to edge of concrete. Maximum allowable stresses for tension and shear shall be 80% of the test report values "with special inspection". Anchors shall be Hilti, Philips - or Approved equal.

2.3 SEISMIC RESTRAINTS

- A. All plumbing systems (all equipment, piping, etc.) shall be provided with seismic restraints in accordance with "Seismic Restraint Systems Guidelines" OPM-0052-13 by Eaton/ Tolco.

2.4 SYSTEM IDENTIFICATION

- A. Above Grade Piping: Provide markers on piping which is either exposed or concealed in accessible spaces. For piping systems, other than drain and vent lines, indicate the fluid conveyed or its abbreviation, either by preprinted markers or stenciled marking, and include arrows to show the direction of flow. Comply with ANSI A13.1 for colors. Locate markers at ends of lines, near major branches and other interruptions including equipment in the line, where lines pass through floor, walls or ceilings or otherwise pass into inaccessible spaces, and at 50' maximum intervals along exposed portion of lines. Marking of short branches and repetitive branches for equipment connections is not required.
- B. Equipment: All equipment shall be identified with a plastic laminated, engraved nameplate which bears the unit mark number as indicated on the drawings (e.g. WH-1). Provide 1/2" high lettering, white on black background. Nameplates shall be permanently secured to the unit.
- C. Valves: Provide valve tags on all valves of each piping system, excluding check valves, valves within equipment, faucets, stops and shut-off valves at fixtures and other repetitive terminal units. Provide brass tags or plastic laminate tags. Prepare and submit a tagged valve schedule, listing each valve by tag number, location, and piping service. Mount in glazed frame where directed.

2.5 EQUIPMENT SUPPORT FRAMES

- A. Unless specifically noted otherwise, it shall be the responsibility of Plumbing Contractor to furnish and install all support frames for its equipment.

PART 3 EXECUTION

3.1 SCHEDULING OF WORK

- A. All work shall be scheduled subject to the approval of the Engineer and Owner. No work shall interfere with the operation of the existing facilities on or adjacent to the site.

3.2 CONDUCT OF WORK

- A. The Contractor shall have at all times, as conditions permit, a sufficient force of workmen and quantity of materials to install the work contracted for as rapidly as possible consistent with good work and shall cause no delay to other Divisions engaged upon this project or to the Owner.
- B. Plumbing Contractor shall arrange for all cutting necessary for the proper installation of its work, providing all sleeves and chases necessary. Cutting shall not be done in such a manner to impair the strength of the structure. Any damage resulting from work shall be repaired by the Contractor at his expense to the satisfaction of the Engineer.
- C. Progressively, daily at the completion of each day's work, and at completion of the job, the Contractor shall thoroughly clean all of his work, removing all debris, stain and marks resulting from his work.
- D. **IAQ Management plan will be in effect for Cal Green requirements. Adhesives and mastic must comply with low VOC requirements and documentation (MSDS, etc.) shall be provided with submittals.**

3.3 EXCAVATION AND BACKFILL

- A. Excavation: Trenches are to be excavated to grade and depth established by drawings. Unless otherwise noted, minimum earth cover above top of pipe shall be 24", not including base and paving in paved areas. Width of trenches at top of pipe shall be a minimum of 16" plus the outside diameter of the pipe. Provide all shoring required by site conditions. Barrel of pipe shall have uniform support on trench bottom, hand excavate additional depth at bells, hubs, and fittings. Where over-excavation occurs, provide compacted selected backfill to pipe bottom. Where ground water is encountered, remove to keep excavation dry, using well points and pumps as required.
- B. Backfill:
 - 1. Around Pipe and to One Foot Above Pipe: Material shall be river run sand or native granular free flowing material, free of clay lumps, silt or vegetable matter and shall have 100% passing through the No. 4 sieve and a maximum of 3% passing through the No. 200 sieve. Place carefully around and on top of pipe, taking care not to disturb piping. Consolidate with vibrator.
 - 2. One Foot Above Pipe to Grade: Material to be sandy or silty loam, free of lumps, laid in 6" layers, uniformly mixed, to proper moisture and compacted to required density. If backfill is determined to be suitable and required compaction is demonstrated by laboratory test, water compaction in 6" layers may be used, subject to approval by the Engineer.
 - 3. Remove all water sensitive settlement from trench backfill regardless of location and compaction requirements.
- C. Compaction: Compact to a density of 95% within building and 90% outside building. Demonstrate proper compaction by testing at one-half of the trench depth. Perform three tests per 100' of trench.

3.4 OPENINGS, CUTTING AND PATCHING

- A. The locations and dimensions for openings through walls, floors, ceilings, foundations,

footings, etc. required to accomplish the work under this Specification Division shall be provided under this Division. The actual openings and the required cutting and patching shall be provided. Coring through existing concrete or masonry walls, floors, ceilings, foundations, footings, etc., and saw cutting of concrete floors or asphaltic concrete required to accomplish the work under this Specification Division shall be provided under this Division. Patching of these surfaces shall also be provided. Cutting and coring shall not impair the strength of the structure. Any damage resulting from this work shall be repaired at the Contractor's expense to the satisfaction of the Engineer.

3.5 MANUFACTURER'S RECOMMENDATIONS

- A. All material, equipment, devices, etc., shall be installed in accordance with the recommendations of the manufacturer of a particular item. The Contractor shall be responsible for all installations contrary to the manufacturer's recommendations. The Contractor shall make all necessary changes and revisions to achieve such compliance. Manufacturer's installation instructions shall be delivered to and maintained at the job site through the construction of the project.

3.6 QUIETNESS

- A. Piping and equipment shall be arranged and supported so that vibration is a minimum and is not carried to the building structure or spaces.

3.7 DAMAGES BY LEAKS

- A. The Contractor shall be responsible for damages to other work caused by leaks in the temporary or permanent piping systems prior to completion of work and during the period of the guarantee, and for damages to other work caused by disconnected pipes or fittings, and the overflow of equipment prior to completion of the work.

3.8 CLEANING

- A. Progressively and at completion of the job, the Contractor shall thoroughly clean all of his work, removing all debris, stain and marks resulting from his work.

END OF SECTION 22 00 00

SECTION 22 00 01 - PLUMBING

PART 1 GENERAL

1.1 GENERAL CONDITIONS

- A. The foregoing Section 22 00 00, General Plumbing Provisions shall form a part of this specification.

1.2 SCOPE

- A. Included: Perform all work necessary and required to complete construction as indicated. Such work includes the furnishings of all labor, materials, and services necessary for a complete, lawful, and operating plumbing system with all equipment as shown or noted on the drawings or as specified herein. The work includes, but is not necessarily limited to, the following:
 - 1. Sanitary sewer system.
 - 2. Domestic water system.
 - 3. Plumbing fixtures.
 - 4. Plumbing equipment.
 - 5. Condensate drains.
 - 6. Storm drain system.
 - 7. Gas piping.
- B. Work Specified Elsewhere:
 - 1. Line voltage power wiring (60 volts or greater), motor starters in motor control centers, and disconnect switches are included in the Electrical Division, unless otherwise noted.
 - 2. Access doors.
 - 3. Concrete and reinforcing steel.
 - 4. 23 00 01, Heating, Ventilating and Air Conditioning.

1.3 CODES AND STANDARDS

- A. All pipe, pipe or plumbing fittings or fixture, solder, or flux shall be lead free that provides water for human consumption per California Assembly Bill 1953 (AB1953).
- B. See Section 22 00 00 for additional requirements.

1.4 SUBMITTALS

- A. Provide product data for all materials per Division 01.

PART 2 MATERIALS

2.1 PIPING MATERIALS

- A. Sanitary Sewer:
 - 1. Soil, Waste and Vent Piping:
 - a. Inside Building and Within Five Feet of Building Walls: Standard weight coated cast iron pipe and fittings. Plain end with neoprene gasket and stainless steel retaining sleeve, CISPI 301, ASTM A888 hubless cast-iron, or hub end with rubber gasket, ASTM A74, ASTM C564. Size 2" and smaller above grade may be standard weight galvanized steel, ASTM A53, with coated cast iron recessed drainage

fittings, ANSI B16.12. All cast iron pipe and couplings shall be American made and tested, no imported pipe or coupling is acceptable. Use heavy-duty (4-Band) couplings for all soil and waste piping. Use standard (2-Band) couplings for all vent piping. Tyler Pipe, AB & I Foundry or Charlotte Pipe. Couplings shall be Tyler, Anaco or Husky.

OR

- b. Inside Building and Within Five Feet of Building Walls: PVC-DWV sewer pipe with solvent weld, ASTM D2665. Schedule 40 wall thickness. Traps, sink outlets, cleanouts, etc., shall be same material. Traps shall have union connections.
 - 1) Piping over food prep centers, food serving facilities, food storage areas and other critical areas shall be kept to a minimum and shall not be exposed.
 - c. Outside Building:
 - 1) For domestic waste only: Polyvinyl chloride gravity sewer pipe with bell and rubber Z-gasket, ASTM D3034, SDR 35. Carlon, J.M.
 - 2) PVC-DWV sewer pipe with solvent weld, ASTM D2665. Schedule 40 wall thickness. Traps, sink outlets, cleanouts, etc., shall be same material. Traps shall have union connections.
 - 3) Where cover is less than 15", pipe shall be cast iron, same as for inside of building.
 - 2. Cleanouts: Floor cleanouts: Smith 4020 with nickel bronze top in finished areas; Smith 4220 in utility areas. Wall cleanouts: Smith 4530 with stainless steel cover and screw. Comparable models of Josam, Wade, Zurn or equal.
 - 3. Cleanout Box: Precast reinforced concrete. Cast iron lid marked for service. Christy or equal; F22 in foot traffic area; G5 in roadways.
- B. Storm Drain:
- 1. Piping:
 - a. Inside Building and Within Five Feet of Building walls: Same as Soil, Waste, and Vent Piping.
 - b. Outside Building:
 - 1) 10" and Smaller: Standard strength non-reinforced concrete bell and spigot, ASTM C14, or Polyvinyl chloride gravity sewer pipe with bell and rubber Z-gasket, ASTM D3034, SDR 35. Carlon, J.M. Where cover is less than 15", same as for inside building.
 - 2) 12" and Larger: Reinforced concrete, Class III, 2000 D-load, ASTM C76.
 - 3) Fittings: Fittings and couplings shall be specifically designed for the type of pipe used. Fittings and couplings designed for perforated or under drain piping will not be allowed.
- C. Water and Gas:
- 1. Hot and Cold Water Piping:
 - a. Inside Building: Type L hard temper seamless copper, ASTM B88. Wrought copper fittings ANSI B16.22. Vacuum pipe shall have long sweeping elbow fittings. 95/5 tin-silver soldered joints. Brazesafe, Silcan or equal brazing material.
 - b. Outside Building Below Grade: Same as Inside Building with protective coating on ferrous pipe or Schedule 40 PVC pipe thru 2", Class 315 2" thru 4".
 - 2. Gas Piping:
 - a. Above Grade: Schedule 40 black steel pipe, ASTM A53. 150 psi black malleable iron screwed fittings, ANSI B16.3, ANSI B31.8. Galvanized pipe and fittings will not be allowed. Flexible connections shall be convoluted brass with dielectric couplings, AGA approved. Outside building flexible connections shall be convoluted stainless steel with dielectric couplings, AGA approved. Prime and paint all piping.
 - b. Outside Building – Below Grade: Same as Inside Building – Above Grade, with protective coating of ferrous pipe or medium density polyethylene (MDPE) PE2708 or PE2406 pipe manufactured in accordance with ASTM D2513 and IAPMO

Standards.

- D. Condensate Drain Piping: Same as cold water piping.
- E. Valves and Specialties:
1. Valves:
 - a. General: Manufacturer's model numbers are listed to complete description. Milwaukee, Kitz, Apollo, Nibco, Stockham or equal. All valves shall be full size of upstream piping. **Ball valves shall be substituted for gate valves 2" and smaller. Butterfly valves shall be substituted for gate valves 2-1/2" and larger. C_v factors for ball valves shall not be less than equal size gate valves.**
 - b. Check Valve: 2" and smaller: All bronze swing check, regrinding. 200 psi WOG. Milwaukee No. 509, 1509 or equal. 2-1/2" and larger: Non-slam type, 125 psi iron body wafer type with renewable seats and stainless steel spring. Milwaukee 1400 series or equal.
 - c. Plug Valve: Eccentric bronze plug. Nickel chromium alloy iron body. Bronze bushings. Buna-N O-rings. UL approved for gas distribution. 175 psi WOG. DeZurick Series 400 or equal.
 - d. Ball Valves: Two or three piece construction, forged bronze body, chrome plated brass ball, threaded ends, teflon seats, PTFE or reinforced teflon stem seals, lever handle. Underground valves shall have "T" handle. Provide one operating "T" extension handle for all underground valves. Milwaukee BA100/150, BA300/350, Nibco or equal.
 - e. Gas Valves: 2" and smaller, Milwaukee BB2-100; 2-1/2" and larger, Rockwell #142 or equal.
 - f. Valve Box: Precast reinforced concrete. Cast iron lid marked for service. Christy or equal; F22 in foot traffic areas; G5 in roadways.
 - g. Butterfly Valve: Iron Body, Aluminum bronze disk (connection to shaft shall not be by pins, screws, or bolts). Ductile body PPS coated with EPPM coated ductile disc. O-ring seals. Resilient removable seat. 416 stainless steel two piece shaft. 6" and smaller valves shall have multi-position lever handle. Underground valves shall have square operating nut. Provide one operating "T" handle for underground valves. Provide 2" extension neck at insulated pipes. Milwaukee "C" series, Kitz or equal.
 2. Miscellaneous Specialties:
 - a. Temperature and Pressure Relief Valve: ASME rated fully automatic, reseating combination temperature and pressure relief valve sized in accordance with energy input. Sensing element immersed within upper 6" of tank. Watts.
 - b. Union: 2" and Smaller: AAR malleable iron, bronze to iron ground seat. 300 psi.
 - c. Dielectric Coupling: Insulating coupling rated for 250 psig. EPCO or equal.
 - d. Shock Absorbers: Sioux Chief "Hydra-Rester", Zurn "Shoktrol", PPP "SC Series" or equal.
- F. Miscellaneous Piping Items:
1. Pipe Support:
 - a. Pipe Hanger: Adjustable split ring, swivel hanger and rod. Black malleable iron. Size and maximum load per manufacturer's recommendation. Felt lined, B-Line B3690F, Unistrut or equal.
 - b. Construction Channel: 12 gage 1-5/8" x 1-5/8" steel channel. Single or multiple section. Self-locking nuts and fittings. B-Line, Unistrut, Superstrut or equal.
 2. Pipe Sleeves: 24 gage galvanized steel. Adjus-to-Crete #10 with #99 thimble for floors. #100 for walls.
 3. Flashing: Vent flashing and flashing for piping through roof shall be prefabricated 24 gauge galvanized steel roof jacks with 8" square flange around pipe sealed with weatherproofing mastic.

2.2 PIPING INSULATION MATERIALS

- A. General: All piping insulation materials shall have fire and smoke hazard ratings as tested under ASTM E-84 and UL 723 not exceeding a flame spread of 25 and smoke developed of 50.
- B. Pipe Insulation: Elastomeric type, ASTM C534, with a thermal conductivity of 0.27 at 75°F when measured in accordance with ASTM C177 or ASTM C518.
 - 1. Wall thickness: 3/4 in.
 - 2. Adhesive: Conform to Manufacturer's recommendations.
- C. Pre-molded Fiberglass: Heavy density sectional pre-molded fiberglass with vapor barrier laminated all-service jacket and pressure sealing vapor barrier lap. Thermal conductivity shall not exceed 0.25 Btu-in/hr-sq. ft-degrees F, at a mean temperature of 50 degrees F. Perm rating 0.02, ASTM E96. Puncture rating 50 Beach units, ASTM D781. Provide 3" (min.) wide tape of same material as lap for butt joints. For hot water piping, thickness shall be 1" for pipe sizes less than 2", 1-1/2" thickness for pipe sizes 2" and larger. CSG Insulation Corp., Manville, Owens-Corning or equal.
- D. Fiberglass Blanket: Unfaced. Thermal conductivity shall not exceed 0.25 Btu-in/hr sq. ft-degrees F, at a mean temperature of 50 degrees F. 1-1/2" thickness. Manville, Owens-Corning or equal.
- E. PVC Jacket (for exposed pipes and fittings): Pre-molded polyvinyl chloride (PVC) jackets. Size to match application. Provide PVC vapor barrier, pressure-sealing tape by same manufacturer. Zeston or equal.

2.3 FIXTURES

- A. General: This Division shall rough-in for and install all plumbing fixtures shown on drawings. All trim not concealed shall be brass with polished chromium plate finish unless otherwise noted. All enameled fixtures shall be acid resisting. Standard color is white unless otherwise noted.
- B. Schedule: Refer to Plumbing Fixture Schedule on the drawings for list of fixtures. Manufacturer's model numbers are listed to complete description. Water consumption quantities listed on schedule are maximum. Equivalent models of American Standard, Crane, Haws, Kohler, Eljer, Zurn or equal. For drainage fixtures, equivalent models of Josam, Smith, Wade, Zurn or equal.
- C. Stops and P-traps: All fixtures shall be provided with stops and p-traps as applicable.
 - 1. Stops: All hot and cold water supplies shall be 1/2" angle stops with IPS inlets and compression outlets, stuffing box, screwdriver lock shield, and 1/2" flexible brass tubing riser. Speedway. Wall mounted trim shall have concealed loose key wall stop. Chicago 1771 or equal.
 - 2. P-traps: Brass, ground joint. 17 gage. American Standard, California Tubuler or equal.
 - a. Trap primers shall be provided with ball valve and cylinder key-lock access panel for all floor drains and floor sinks. PPP, Inc. or equal.

2.4 EQUIPMENT

- A. General Requirements:
 - 1. General: These equipment specifications are to supplement the drawings. Refer to schedules on drawings for the specific equipment to be provided. Capacities shall be

- in accordance with the schedules shown on the drawings. Capacities are to be considered minimum.
2. Dimensions: Equipment must conform to space requirements and limitations as indicated on the drawings and as required for operation and maintenance. Equipment will not be accepted that does not readily conform to space conditions.
 3. Ratings: Electrical equipment shall be in accordance with NEMA Standards and UL listed where applicable standards have been established.
 4. Basis of Design: Manufacturers and model numbers listed in schedules as the basis of design are intended to represent the standard of quality and the features desired.
 5. Piping: Each item or assembly of items shall be furnished completely piped for connection to services. Control valves and devices shall be provided. Equipment requiring domestic water for non-potable use shall be provided with backflow preventer acceptable for intended use by local governing authorities.
 6. Electrical:
 - b. General: Each item or assembly of items shall be furnished completely wired to individual terminal blocks for connection to single branch electrical circuit. All electrical accessories and controls required by equipment shall be furnished. Provide terminal blocks for controls not included in equipment package. Manual and magnetic starters shall have ambient compensating running over-current protection in all ungrounded conductors. Magnetic starters shall be manual reset. Controllers and other devices shall be in NEMA 3 or 12 enclosures as applicable.
 - c. Wiring: Conductors, conduit, and wiring shall be in accordance with Electrical Specifications. Individual items within assembly shall be separately protected with dead front, fused disconnect, fuse block, or circuit breaker for each ungrounded conductor, all accessible on operating side of equipment. Switches, contacts, and other devices shall be in ungrounded conductors.
 - d. Motors: Shall be rated, constructed, and applied in accordance with NEMA and ANSI Standards without using service factor. Single-phase motor shall be of type to suit application. Three-phase motors shall be open drip-proof, NEMA B design on pumps and fans, NEMA C on reciprocating equipment, sealed ball bearing, three-phase induction. Design shall limit starting inrush current and running current to values shown on drawings.
 - e. Starters: Motor starters shall be provided for all equipment except where starter is in a motor control center as designated on the electrical drawings.
 - f. Control Voltage: Equipment connected to greater than 240 volts shall be provided with 120 volt transformer if separate source is not indicated on plans. 240 volt control is acceptable if confined within control panel.
 - g. Submittals: Included in shop drawings shall be internal wiring diagrams and manufacturer's recommended external wiring.
- B. Electric Drinking Fountain: Wall hung, Dual height with Bottle Filler. Provide steel mounting brackets. Stainless steel basin. Removable grid drain. Chrome plated brass bubbler with automatic flow regulator and self-closing valve. Nonferrous evaporator. Hermetic compressor with automatic reset overload protection. Air cooled condenser. Adjustable thermostat. UL listed. ARI certified. Oasis, Sunroc.
- C. Water Heater, Electric: Glass lined tank. 150 psi working pressure. Fully insulated. Automatic temperature control. High limit control. Provide ASME rated temperature and pressure relief valve sized in accordance with energy input, dielectric couplings and drain cock. UL listed and CEC approved. Extended warranty for a period of 3 years minimum. State, A.O. Smith, National, Rheem or equal.
- D. Sewage Pumps:
 1. General: Furnish all labor, materials, equipment, and incidentals required to provide duplex pumping system as specified herein. The system shall be by the same manufacturer as supplying the pump and motor control panel. Hydro-pneumatic

- Pumps or equal.
 2. System shall consist of sewage grinder pumps with explosion proof motors, level control switches, discharge plumbing with hydraulically sealed discharge flange, pump mounting plates with bottom rail supports, upper rail supports, lifting chain, pedestal mount and cord sealing plate for panel or NEMA 4 junction box; to be installed in factory fabricated fiberglass basin with cover. A NEMA 4X weatherproof control box shall be supplied for mounting at the sump site or remote from the basin as required. Structure and dimensions to be as shown on drawings.
 3. Sump Level Controls: Float switches shall be supplied to control sump level and alarm signal. The switches shall be sealed in a solid polypropylene float for corrosion and shock resistance. The support wire shall have a heavy Neoprene jacket. A weight shall be attached to cord above the float to hold switch in place in sump and efficiently prevent sharp bends in the cord when the float operates. A quantity of 4 floats shall be provided to control level. An additional switch shall be provided with alarm.
 4. Check Valve and Piping: The discharge piping shall include a ball check valve with hydraulically sealed discharge flange and gate valve for each pump. Discharge from station shall be fitted with NPT couplings.
 5. Basin Cover: Cover shall be of gas tight steel construction with an O.D. equal to the O.D. of the top flange on the basin. Cover shall be secured by the stainless steel bolts and coated with a 3-4 mil thick rust-inhibiting paint.
- E. Circulation Pump: Bronze pump with stainless steel or non-metallic impeller. Shaft shall be stainless steel or ceramic with carbon bearings with EPDM O-ring and gaskets. Replaceable cartridge type circulators shall have stainless steel cartridge. Connections shall be sweat, threaded, or flanged. Taco, Bell & Gossett, Grundfos, Armstrong or equal.

PART 3 EXECUTION

3.1 PIPING INSTALLATION

- A. General:
1. Piping Layout: Piping shall be concealed in walls, above ceilings, or below grade unless otherwise noted. Exposed piping shall run parallel to room surfaces; location to be approved by Owner's Representative. No structural member shall be cut, notched, bored, or otherwise altered unless specifically allowed by structural drawings and/or specifications. Where such cutting is required, reinforcement shall be provided as specified or detailed. All piping shall be installed in a manner to ensure unrestricted flow, eliminate air pockets, prevent any unusual noise, and permit complete drainage of the system. All piping shall be installed to permit expansion and contraction without strain on piping or equipment. Expansion joints shall be installed as required. Vertical lines shall be installed to allow for building settlement without damage to piping. All exposed piping to be primed and painted, see painting section.
 2. Joints:
 - a. Threaded: Pipe shall be cut square and reamed to full size. Threads shall be in accordance with ANSI B2.1. Joint compound or tape suitable for conveyed fluid shall be applied to male thread only. Joints shall be made with three threads exposed.
 - b. Welded or Brazed: Filler rod shall be of the same suitable alloy as pipe. Welding or brazing shall be performed in accordance with requirements of recognized published standards of practice and by licensed or otherwise certified contractors. Welder or Brazer shall be a person who specialized in welding or brazing of pipes and holds a recognized certificate of competency from a recognized testing laboratory, based on the requirements of the ASME Boiler and Pressure Vessels Code, Section 9.
 - c. Other: Joints other than threaded or welded shall be installed in accordance with

- manufacturer's recommendations.
- d. Open Ends: Open ends of piping shall be capped during progress of work to preclude foreign matter.
 - e. Electrical Equipment: Joints shall be avoided, where possible, over electrical equipment.
 - f. Copper pipe 1-1/2" or less may be soldered. Above 1-1/2" and all below grade shall be brazed.
3. Fittings:
- a. Standard Fittings: All joints and changes in direction shall be made with standard fittings. Close nipples shall not be used.
 - b. Reducers: Pipe size reduction shall be made with bell reducer fittings. Bushings shall not be used.
 - c. Unions: A union shall be installed on the leaving side of each valve, at equipment connections, and elsewhere as necessary for assembly or disassembly of piping.
 - d. Valves: All valves shall be full line size. At equipment connections, valves shall be full size of upstream piping.
4. Pipe Support:
- a. General: Hangers shall be placed to support piping without strain on joints or fittings. Maximum spacing between supports shall be as specified below. Actual spacing requirements will depend on structural system. Refer to drawings for additional requirements and attachment to structure. Vertical piping shall be supported at floor and ceiling. Support pipe within 12" of all changes in direction. Support individual pipes with pipe hanger. All pressure piping, drainage piping above grade and metallic piping of dissimilar metal from hangers shall have isolating shield, or felted hangers.
 - 1) Screwed Pipe:

Pipe Size Between Supports*	Max. Spacing
(in)	(ft)
1/2	6
3/4	8
1	8
1-1/4 & larger	10
 - b. Trapeze: Trapeze hangers of construction channel and pipe clamps may be used. Submit design to Engineer for approval.
5. Excavation and Backfill: Minimum cover on all piping shall be as follows unless otherwise noted:
- a. Up to 2-1/2" pipe - 24" cover.
 - b. 3" and larger pipe - 30".
6. Miscellaneous:
- a. Escutcheons: Provide chromium plated escutcheons where piping penetrates walls, ceilings, or floors in finished areas.
 - b. Pipe Sleeves: All piping passing through concrete shall be provided with pipe sleeves. Allow 1" clearance between sleeve and pipe or pipe insulation.
 - c. Dielectric Couplings: Dielectric couplings shall be installed wherever piping of dissimilar metals are joined.
 - d. Shock Absorbers: Install per manufacturers recommendations.

- B. Sanitary Sewer Piping:
1. General: Where inverts are not indicated, sanitary sewer piping shall be installed at 1/4" per foot pitch. Piping 4" and larger may be installed at 1/8" per foot pitch where structural or other limitations prevent installation at a greater pitch.
 2. Cleanouts: Install cleanouts at ends of lines, at changes of direction greater than 45 degrees, and at not greater than 100 foot intervals. Locate interior cleanouts in accessible locations and bring flush to finished surface. Cleanouts at urinals shall be installed above urinal.
 3. Vents: Vents shall terminate not less than 6" above the roof nor less than 12" from any vertical surface nor within 10 feet of any outside air intake. Install horizontal vent lines at 1/4" per foot pitch. Offset vents 2 feet minimum from gutters, parapets, ridges, and roof flashing.
- C. Water Piping: Connections to branches shall be made from the top side of the main. Supply header in fixture battery shall be full size to last fixture, reducing in size only on individual connections to each fixture in battery. Provide ball valve shutoff for each building and at each connection to equipment and trap primers. Shock absorbers shall be installed in a vertical position at end of branch runs as specified in this section whether specifically shown or not on drawings. Connections to equipment shall be made with flexible connectors. Non-metallic pipe shall have 18 AWG copper tracer wire laid on top of pipe and taped in place at 15-foot spacing, terminate 4" above grade at ends of pipe runs.
- D. Gas Piping: Shall be pitched to drain to drip legs at each piece of equipment. No unions shall be installed except at connections to equipment. Provide shutoff at each equipment connection. Connections to equipment shall be made with flexible connectors. Under floor piping shall be sleeved, sealed, and vented. Polyethylene or polyvinyl chloride pipe and fittings shall be joined in accordance with manufacturer's recommendation. Metal-to-plastic transition fittings shall be installed at all transitions. Non-metallic pipe shall have 18 AWG copper tracer wire laid on top of pipe and taped in place at 15-foot spacing, terminate 4" above grade at ends of pipe runs. All gas below grade shall have continuous caution tape installed 12" above gas line. All exposed gas piping shall be primed and painted, see painting section.
- E. Condensate Drain Piping: Install with constant pitch to receptacle, 1/4" per foot where possible, otherwise 1/8" per foot minimum. Provide trap at each air handling unit to prevent air leakage. Connections to equipment shall be made with flexible connection unless connection is internally isolated.
- F. Storm Drain Piping: Install at 1/4" per foot pitch.

3.2 PIPING INSULATION INSTALLATION

- A. Domestic Tempered Water Supply:
1. General: All domestic tempered water supply piping, except for exposed connections to fixtures, shall be insulated. Do not insulate unions or valves less than 2", unless exposed to weather.
 2. Install elastomeric pipe insulation by slipping over end of pipe. Where not feasible, slit insulation longitudinally, snap over piping and seal with adhesive. Insulate fittings with larger diameter sleeves or insulation, lapping pipe insulation a minimum of 2 in.
 3. Butt sections of insulation tightly together and seal with adhesive to provide a continuous vapor and thermal barrier.
 4. Pipe: Apply pre-molded fiberglass sections to pipe using integral pressure sealing lap adhesive in accordance with manufacturer's recommendations. Stagger longitudinal joints. Seal butt joints with factory supplied sealing tape.
 5. Fittings and Valves:
 - a. Wrap fitting with pre-cut fiberglass blanket to thickness matching adjoining

insulation. Cover blanket with PVC jacket in accordance with manufacturer's recommendations. Seal all joints with factory supplied pressure sealing vapor barrier tape with 2" (min.) overlap on both sides of joint. Insulate valves to stem.

- b. For miscellaneous fittings for which PVC jackets are not available or where proximity of fittings precludes a neat-appearing installation, the contractor may cover the fiberglass blanket with stretchable glass fabric and at least two coats of vapor barrier coating. All exposed ends of insulation shall be adequately sealed.

B. ADA Compliant Fixtures:

- 1. At sinks/ lavatories which are to be ADA Compliant, the p-trap and angle stop assemblies shall be insulated with Trap Wrap Protective Kit 500R by Brocar, Truebro Handi Lav-Guard #102W or #105W or equal. Abrasion resistant exterior cover shall be smooth and have 1/8" wall minimum over cushioned foam insert. Fasteners shall remain substantially out of sight.

3.3 FIXTURE INSTALLATION

- A. Fixture Height: Shall be standard height except those specified as ADA Compliant. Such fixtures shall be mounted in accordance with CBC, Section 11B, Division 6 and drawing details.
- B. Wall Hung Fixtures: Shall be provided with proper backing and hanger plates secured to wall. Fixtures mounted on carriers shall bear against stop nuts, clear of wall surface. Caulk fixtures against walls with white G.E. "Sanitary SCS1700" silicone sealant. Caulking shall be smooth and flush with fixture surface (not concave).
- C. Floor Drains or Floor Sinks: Shall be placed parallel to room surfaces, set level, flush with floor, and adjusted at proper height to drain and easily accessible for inspection and cleaning. Cover openings during construction to keep all foreign matter out of drain line.
- D. Other Connections: Rough-in and connection for trim or fixtures supplied by others shall be included in this specification section.
- E. Floor Mounted Fixtures: Shall be provided with proper support plates. Caulk fixtures against floors with white G.E. "Sanitary SCS1700" silicone sealant. Caulking shall be smooth and flush with fixture surface (not concave).

3.4 EQUIPMENT INSTALLATION

- A. General: It shall be the responsibility of the equipment installer to ensure that no work done under other specification sections shall in any way block, or otherwise hinder the equipment.
- B. Connections to Equipment: Where size reductions are required for connections to equipment, they shall be made immediately adjacent to the equipment and, if possible, inside the equipment cabinet.

3.5 TESTS AND ADJUSTMENTS

- A. General: Unless otherwise directed, tests shall be witnessed by the Owner's Representative. Work to be concealed shall not be enclosed until prescribed tests are made. Should any work be enclosed before such tests, the Contractor shall, at his expense, uncover, test, and repair his work, and that of other contractors, to original conditions. Leaks and defects shown by tests shall be repaired and entire work retested. Tests may be made in sections. However, all connections between sections previously tested and new section shall be included in the new test. New sections shall be isolated from existing

sections for testing purposes. There shall be no drop in pressure during test except that due to ambient temperature changes. All components of system not rated for test pressure shall be isolated from system before test is made. Test the new sections or branches of piping only.

- B. Gravity System:
 - 1. Sanitary Sewer: All ends of the new sections of sewer system shall be capped and lines filled with water to the top of the highest vent, 10 feet above grade minimum. This test shall be made before any fixtures are installed. Test shall be maintained until all joints have been inspected, but no less than 2 hours.
 - 2. Condensate Piping: Maintain 15 psig water pressure for a duration of 4 hours.
- C. Pressure Systems:
 - 1. General: There shall be no drop in pressure during test except that due to ambient temperature changes. All components of system not rated for test pressure shall be isolated from system before test is made. Test the new sections or branches of piping only.
 - 2. Domestic Tempered & Cold Water Piping: Maintain 60 psig water pressure for a minimum duration of 2 hours.
 - 3. Gas Piping: Maintain 60 psig air pressure for a minimum duration of 2 hours.
- D. Accessible Lavatories:
 - 1. Faucet controls and operating mechanisms shall be installed and tested to comply per CBC Section 11B-606.4.

3.6 DISINFECTION

- A. Disinfect all domestic hot and cold water piping systems in accordance with California Plumbing Code Sections 609.9.1 through 609.9.4. The method to be followed shall be that prescribed by the Health Authority or, in case no method is prescribed by it, the following:
 - 1. The pipe system shall be flushed with clean, potable water until potable water appears at the points of outlet.
 - 2. The system or parts thereof shall be filled with a water-chlorine solution containing not less than 50 parts per million of chlorine, and the system or part thereof shall be valved-off and allowed to stand for 24 hours; or the system or part thereof shall be filled with a water-chlorine solution containing not less than 200 parts per million of chlorine and allowed to stand for 3 hours.
 - 3. Following the allowed standing time, the system shall be flushed with clean, potable water until the chlorine residual in the water coming from the system does not exceed the chlorine residual in the flushing water.
 - 4. The procedure shall be repeated where it is shown by bacteriological examination made by an approved agency that contamination persists in the system.
- B. Disinfection process shall be performed by certified testing agency or in cooperation with health department having jurisdiction and witnessed by a representative of the Architect. During procedure, signs shall be posted at each water outlet stating, "Chlorination - Do Not Drink". After disinfection, water samples shall be collected by certified testing agency or by health department for bacteriological analysis. Certificate of Bacteriological Purity shall be obtained and delivered to the Owner through the Owner's Representative.

END OF SECTION 22 00 01

SECTION 23 00 00 - GENERAL MECHANICAL PROVISIONS

PART 1 GENERAL

1.1 GENERAL CONDITIONS

- A. The foregoing General and Special Conditions shall form a part of this Division with the same force and effect as though repeated herein. The provisions of this Section shall apply to all the Sections of Division 23.

1.2 CODES AND REGULATIONS

- A. All work and materials shall be in full accordance with current rules and regulations of applicable codes and all California Amendments. Nothing in these drawings or specifications is to be construed to permit work not conforming to these codes. Should the drawings or specifications call for material or methods of construction of a higher quality or standard than required by these codes, the specifications shall govern. Applicable codes and regulations are:
 - 1. California Code of Regulations – CCR:
 - a. Title 8, Industrial Relations.
 - b. Title 24, Building Standards.
 - 2. California Building Code – CBC.
 - 3. California Mechanical Code – CMC.
 - 4. California Plumbing Code – CPC.
 - 5. California Fire Code – CFC.
 - 6. California Green Building Code.
 - 7. Air Diffusion Council – ADC.
 - 8. American Gas Association – AGA.
 - 9. Air Moving and Conditioning Association – AMCA.
 - 10. American National Standards Institute – ANSI.
 - 11. Air Conditioning and Refrigeration Institute – ARI.
 - 12. American Society of Heating, Refrigerating and Air Conditioning Engineers – ASHRAE.
 - 13. American Society of Mechanical Engineers – ASME.
 - 14. American Society for Testing and Materials – ASTM.
 - 15. American Water Works Association – AWWA.
 - 16. California Electrical Code – CEC.
 - 17. National Electrical Manufacturers Association – NEMA.
 - 18. National Fire Protection Association – NFPA.
 - 19. Sheet Metal and Air Conditioning Contractors National Association – SMACNA.
 - 20. Underwriters' Laboratory – UL.
 - 21. Occupational Safety and Health Act - OSHA.
 - 22. ASCE 7-16, Chapter 13.

1.3 PERMITS AND FEES

- A. The Contractor shall take out all permits and arrange for all tests in connection with his work as required by local ordinances. All charges are to be included in the work. Permits for equipment connected to a particular system are to be considered as a part of the work included under each system; for example, permits for electric motor connection are part of electrical work, permits for domestic water or gas connections are part of plumbing work. All charges for service connections, meters, etc. by utility companies shall be included in the work.

1.4 COORDINATION OF WORK

- A. Layout of materials, equipment and systems is generally diagrammatic unless specifically dimensioned. The actual locations of all materials, piping, ductwork, equipment, supports, etc. shall be carefully planned, prior to installation of any work, to avoid all interferences with each other, or with structural, electrical, or architectural elements. Verify the proper voltage and phase of all equipment with the electrical plans. All conflicts shall be called to the attention of the Engineer prior to the installation of any work or the ordering of any equipment.

1.5 GUARANTEE

- A. Guarantee shall be in accordance with the General Conditions. These specifications may extend the period of the guarantee for certain items. Where such extensions are called for, or where items are normally provided with guarantee periods in excess of that called for in the General Conditions, the Certificate of Guarantee shall be furnished to the Owner through the Engineer.

1.6 EXAMINATION OF SITE

- A. The Contractor shall examine the site, compare it with plans and specifications, and shall have satisfied himself as to the conditions under which the work is to be performed. No allowance shall subsequently be made in his behalf for any extra expense to which he may be put due to failure or neglect on his part to make such an examination.

1.7 SUBMITTALS

- A. Submit shop drawings in accordance with Division 01.
- B. Shop Drawings: Within 30 days of contract award, the Contractor shall submit six copies of shop drawings for all materials, equipment, etc. proposed for use on this project. Material and equipment shall not be ordered or installed until written review is processed by the Engineer. Any item omitted from the submittal shall be provided as specified without substitution. All shop drawings must comply with the following:
 - 1. Shop drawings are required for all material and equipment items and shall include manufacturer's name and catalog numbers, dimensions, capacities, performance curves, and all other characteristics and accessories as listed in the specifications or on the drawings. Descriptive literature shall be current factory brochures and submittal sheets. Capacities shall be certified by the factory.
 - 2. All shop drawings shall be submitted at one time in a neat and orderly fashion in a suitable binder with title sheet including Project, Engineer, and Contractor; Table of Contents; and indexed tabs dividing each group of materials or item of equipment. All items shall be marked with the specification paragraph number for which they are proposed. All equipment shall also be identified by the mark number as indicated on the drawings.
 - 3. All capacities, characteristics, and accessories called for in the specifications or on the drawings shall be highlighted, circled, or underlined on the shop drawings. Calculations and other detailed data indicating how the item was selected shall be included for items that are not scheduled. Data must be complete enough to permit detailed comparison of every significant characteristic which is specified, scheduled, or detailed.
- C. Substitutions: Manufacturers and model numbers listed in the specifications or on the drawings represent the standard of quality and the features desired. Unless otherwise noted, alternate manufacturers may be submitted for review by the Engineer. Calculations and other detailed data indicating how the item was selected shall be included. The Contractor shall assume full responsibility that substituted items or procedures will meet the specifications and job requirements and shall be responsible for the cost of redesign and

modifications to the work caused by these items.

- D. Review: Submittals will be reviewed for general conformance with the design concept, but this review does not guarantee quantity shown, nor does it supersede the responsibility of the Contractor to provide all materials, equipment, and installation in accordance with the drawings and specifications. The Contractor shall agree that shop drawing submittals processed by the Engineer are not Change Orders; that the purpose of shop drawing submittals by the Contractor is to demonstrate to the Engineer that the Contractor understands the design concept; that he demonstrates his understanding by indicating which equipment and material he intends to furnish and install and by detailing the fabrication and installation methods he intends to use. The Contractor shall agree that if deviations, discrepancies or conflicts between shop drawings and design drawings and specifications are discovered either prior to or after shop drawing submittals are processed by the Engineer, the design drawings and specifications shall control and shall be followed.

1.8 OPERATION AND MAINTENANCE INSTRUCTIONS

- A. Submit one electronic pdf copy for review and after approved submit three hard copies of the Operation and Maintenance Instructions and Wiring Diagrams for all equipment and parts lists for all equipment, etc. shall be submitted to the Engineer. All instructions shall be clearly identified by marking them with the same designation as the equipment item to which they apply (e.g. AC-1). All wiring diagrams shall agree with revised shop drawings and indicate the exact field installation. All instructions shall be submitted at the same time and shall be bound in a suitable binder with tabs dividing each type of equipment (e.g. Fans, Motors, etc.). Each binder shall be labeled indicating "Operating and Maintenance Instructions, Project Title, Contractor, Date" and shall have a Table of Contents listing all items included. **(These submittals shall be submitted with regular submittals at start of job so Commissioning Contractor can start on the commissioning check list for Title 24 Requirements)**
- B. Verbal: The Contractor shall verbally instruct the Owner's maintenance staff in the operation and maintenance of all equipment and systems. The controls contractor shall present that portion of the instruction that applies to the control system. The Engineer's office shall be notified 96 hours prior to this meeting.
- C. Posted: The Contractor shall prepare operation instructions for all systems which shall be typewritten, reviewed by the Engineer, and mounted under glass adjacent to the appropriate temperature control panel. These instructions shall include applicable temperature control diagrams.
- D. Acknowledgment: The Contractor shall prepare a letter indicating that all operation and maintenance instructions (printed, verbal and posted) have been given to the Owner, to the Owner's satisfaction. This letter shall be acknowledged (signed) by the Owner and submitted to the Engineer.

1.9 RECORD DRAWINGS

- A. The Contractor shall maintain a set of prints for the project as a record of all construction changes made. As the Work progresses, the Contractor shall maintain a record of all deviations in the Work from that indicated on the drawings. Final location of all underground work shall be recorded by depth from finished grade and by offset distance from permanent surface structures, i.e. buildings, curbs and walks. In addition, the water, gas, under-floor ducts, etc. within the building shall be recorded by offset distances from building walls. The original drawings will be made available to the Contractor from which he shall have a set of reproducible drawings made. The Contractor shall then transfer the changes, notations, etc. from the marked-up prints to the reproducible drawings. The record drawings (marked-up

prints and reproducibles) shall be submitted to the Engineer for review (as an alternative, the marked-up prints may be photocopied full size on reproducible stock).

PART 2 PRODUCTS

2.1 CONCRETE ANCHORS

- A. Concrete Anchors shall comply with CBC 1901A.3. Steel stud with expansion anchor requiring a drilled hole; powder driven anchors are not acceptable. Minimum concrete embedment shall be 4-1/2 diameters. Minimum spacing shall be 10 diameters center-to-center and 5 diameters from center to edge of concrete. Maximum allowable stresses for tension and shear shall be 80% of the test report values "with special inspection". Anchors shall be Hilti, Philips - or Approved equal.

2.2 SEISMIC RESTRAINTS

- A. All mechanical systems (all equipment, piping, etc.) shall be provided with seismic restraints in accordance with details on the drawings.

2.3 SYSTEM IDENTIFICATION

- A. Above Grade Piping: Provide markers on piping which is either exposed or concealed in accessible spaces. For piping systems, other than drain and vent lines, indicate the fluid conveyed or its abbreviation, either by preprinted markers or stenciled marking, and include arrows to show the direction of flow. Comply with ANSI A13.1 for colors. Locate markers at ends of lines, near major branches and other interruptions including equipment in the line, where lines pass through floor, walls or ceilings or otherwise pass into inaccessible spaces, and at 50' maximum intervals along exposed portion of lines. Marking of short branches and repetitive branches for equipment connections is not required.
- B. Equipment: All equipment shall be identified with a plastic laminated, engraved nameplate which bears the unit mark number as indicated on the drawings (e.g. AC-1). Provide 1/2" high lettering, white on black background. Nameplates shall be permanently secured to the unit.
- C. Controls: Label all panels, thermostats and by-pass timers with plastic laminated, engraved nameplate which bears the unit mark number as indicated on the drawings (e.g. AC-1). Provide 1/4" high lettering, white on black background. Nameplates shall be permanently secured to the unit.

2.4 EQUIPMENT SUPPORT FRAMES

- A. Unless specifically noted otherwise, it shall be the responsibility of Mechanical Contractor to furnish and install all support frames for its equipment.

PART 3 EXECUTION

3.1 SCHEDULING OF WORK

- A. All work shall be scheduled subject to the approval of the Engineer and Owner. No work shall interfere with the operation of the existing facilities on or adjacent to the site.

3.2 CONDUCT OF WORK

- A. The Contractor shall have at all times, as conditions permit, a sufficient force of workmen and quantity of materials to install the work contracted for as rapidly as possible consistent with good work and shall cause no delay to other Divisions engaged upon this project or to the Owner.
- B. Mechanical Contractor shall arrange for all cutting necessary for the proper installation of its work, providing all sleeves and chases necessary. Cutting shall not be done in such a manner to impair the strength of the structure. Any damage resulting from work shall be repaired by the Contractor at his expense to the satisfaction of the Engineer.
- C. Progressively, daily at the completion of each day's work, and at completion of the job, the Contractor shall thoroughly clean all of his work, removing all debris, stain and marks resulting from his work.
- D. **IAQ Management plan will be in effect for Cal Green Certification, including the sealing of duct ends before and during rough-in, specific requirements for the use of HVAC equipment during construction (if used at all), building flush-out, etc. Adhesives and mastic must comply with low VOC requirements and documentation (MSDS, etc.) shall be provided with submittals.**

3.3 OPENINGS, CUTTING AND PATCHING

- A. The locations and dimensions for openings through walls, floors, ceilings, foundations, footings, etc. required to accomplish the work under this Specification Division shall be provided under this Division. The actual openings and the required cutting and patching shall be provided. Coring through existing concrete or masonry walls, floors, ceilings, foundations, footings, etc., and saw cutting of concrete floors or asphaltic concrete required to accomplish the work under this Specification Division shall be provided under this Division. Patching of these surfaces shall also be provided. Cutting and coring shall not impair the strength of the structure. Any damage resulting from this work shall be repaired at the Contractor's expense to the satisfaction of the Engineer.

3.4 MANUFACTURER'S RECOMMENDATIONS

- A. All material, equipment, devices, etc., shall be installed in accordance with the recommendations of the manufacturer of a particular item. The Contractor shall be responsible for all installations contrary to the manufacturer's recommendations. The Contractor shall make all necessary changes and revisions to achieve such compliance. Manufacturer's installation instructions shall be delivered to and maintained at the job site through the construction of the project.

3.5 QUIETNESS

- A. Piping, ductwork, and equipment shall be arranged and supported so that vibration is a minimum and is not carried to the building structure or spaces.

3.6 DAMAGES BY LEAKS

- A. The Contractor shall be responsible for damages to other work caused by leaks in the temporary or permanent piping systems prior to completion of work and during the period of the guarantee, and for damages to other work caused by disconnected pipes or fittings, and the overflow of equipment prior to completion of the work.

3.7 CLEANING

- A. Progressively and at completion of the job, the Contractor shall thoroughly clean all of his work, removing all debris, stain and marks resulting from his work.

END OF SECTION 23 00 00

SECTION 23 00 01 - HEATING, VENTILATING AND AIR CONDITIONING

PART 1 GENERAL

1.1 GENERAL CONDITIONS

- A. The foregoing Section 23 00 00, General Mechanical Provisions shall form a part of this specification.

1.2 SCOPE

- A. Included: Perform all work necessary and required to complete construction as indicated. Such work includes the furnishings of all labor, materials, and services necessary for a complete, lawful, and operating air conditioning, heating, ventilating system with all equipment as shown or noted on the drawings or as specified herein. The work includes, but is not necessarily limited to, the following:
 - 1. Heating, ventilating and air conditioning equipment.
 - 2. Air distribution system (Ductwork, Air Terminals, etc.).
 - 3. System insulation.
 - 4. Controls and control wiring and conduit for control wiring.
- B. Work Specified Elsewhere:
 - 1. Line voltage power wiring (60 volts or greater), motor starters in motor control centers, and disconnect switches are included in the electrical section.
 - 2. Connection of gas and condensate drains to equipment.
 - 3. Access doors.

PART 2 MATERIALS

2.1 DUCTWORK MATERIALS

- A. General: All ductwork materials shall have fire and smoke hazard ratings as tested under ASTM E-84 and UL-181 not exceeding a flame spread of 25 and smoke developed of 50. All ductwork shall be per Chapter 6 of the CMC.
- B. Low Velocity Metal Ductwork: Metal ductwork shall be galvanized sheet steel, ASTM A653.
- C. Low Velocity Flexible Ductwork: Insulated flexible ductwork. Continuous internal liner bonded to galvanized steel wire helix. One pound per cubic foot glass fiber insulation, R-8. Thermal conductivity shall not exceed 0.13 Btu/hr. sq. ft.- degrees F at a mean temperature of 75°F. Seamless vapor barrier jacket. Each length shall have a factory installed metal sleeve at each end. Duct shall be capable of continuous operation at 1.5" of water static pressure and 4000 ft./ min. air velocity. Maximum length 5 ft., single piece at runouts to air terminals. Genflex, Lamborn or equal.
- D. Spiral Duct: Ductwork shall be galvanized steel with uni-seal spiral seamlock and uni-seal fittings, ASTM A653. United McGill Corp or equal. All exposed spiral duct shall be painted, color selected by Owner.
- E. Bonding Adhesive: Durodyne WBG, Scotchgrip Adhesive 4230 or equal.
- F. Duct Mastic: Minnesota Mining and Manufacturing Duct Sealer 800, Tuff-Bond No. 12, Glencoat Seal-Flex or equal.

- G. Duct Joints:
 - 1. As an option to joints and seams designated by SMACNA or shown on Drawings, the following systems may be used:
 - a. Ducts with sides 24 inches to 48 inches, transverse duct joint system by Ductmate Jr., Nexus or equal (SMACNA "E" Type connection).
 - b. Ducts 48 inches and larger, Ductmate Regular, Nexus (SMACNA "J" Type connection) or equal.
- H. Fiber Tape: Mineral impregnated fiber tape and plastic activator-adhesive. Hardcast, Inc., United McGill Uni-Cast or equal.

2.2 AIR TERMINALS AND DUCT FITTINGS

- A. Grilles: (Grilles, Registers and Diffusers)
 - 1. Information on Drawings: Refer to the Air Distribution Schedule on the drawings for the list of grilles. Manufacturer's model numbers are listed to complete the description. Equivalent models of J & J, Krueger, Barber-Colman, Anemostat, Price, Titus or equal. Refer to the floor plans for neck size, CFM, air diffusion pattern, and fire damper, if required.
 - 2. Performance: If, according to the certified data of the manufacturer of the proposed units, the sizes indicated on the drawings will not perform satisfactorily, the units shall be re-selected by the Contractor for the proper diffusion, spread, drop, and throw.
 - 3. Frame and Accessories: All supply, return, and exhaust grilles shall be provided with cushion heads and attachments to structure, unless otherwise noted. All surface mounted grilles shall have a perimeter gasket and flanged edge. All grilles shall have frames suitable for mounting in the surfaces designated by the architectural drawing, coordinate prior to ordering.
 - 4. Finish: All ceilings and wall grilles shall have a paintable white finish unless otherwise noted. Interior components shall be flat black.
- B. Turning Vanes: Double wall, hollow metal, air-foil shape. Spacing in accordance with manufacturer's recommendations. Aero Dyne, HEP or equal.
- C. Flexible Connection: UL listed neoprene coated 30-ounce fiberglass cloth. 3" metal, 6" fabric, 3" metal. Ventglas or equal.
- D. Branch Duct Volume Damper: Volume control damper (VCD) in rectangular ducts shall be as follows: Opposed blade, 6" maximum blade width, 16-gage blade, 48" maximum length, nylon or oil impregnated bronze bearings, 1/2" diameter pin shaft, 16-gage channel frame, actuating rod and linkage out of air stream. VCD in round duct shall be as follows: Damper blade full height of branch and 1" less than branch width. All branch dampers shall have regulator with stamped steel handle, spring loaded shaft nut, cast body, and serrated self-locking die cast core. Regulator for horizontal ducts overhead shall be mounted on sides or bottom of ducts. Secure a 12" length of brightly colored plastic ribbon to handle for ease of location. Where rectangular or round ductwork is insulated, slit insulation to allow handle to protrude. Ventlok 641 (with 607 end bearing for round ducts).
- E. Fire/ Smoke Damper: Multi-blade construction in accordance with CBC & CMC. UL 555 and UL 555S labels. Blades shall have metal-to-metal seals and not rely on actuator torque to maintain leakage rating. Prefco, Air Balance, Ruskin, Greenheck 5020-1 with 5800MB2 power open/spring close operator, or equal.
- F. Louvers: Refer to the Air Distribution Schedule on the drawings. Manufacturer's model numbers are listed to complete the description. Equivalent models of Ruskin, Greenheck, Dayton or approved equal. Contractor shall fabricate and provide 16 GA. galvanized perforated panel (50% Free Area) over exterior of all louvers and have field painted to

match exterior wall. Refer to the floor plans for all sizes.

2.3 DUCTWORK INSULATION MATERIALS

- A. General: All ductwork insulation materials shall have fire and smoke hazard ratings as tested under ASTM E-84 and UL-181 not exceeding a flame spread of 25 and smoke developed of 50.
- B. Acoustic Lining: Glass fiber. One side coated to prevent fiber erosion up to 6000 ft./ min. Average noise reduction coefficient of 0.90. 0.13 Btu/ hr – sq. ft. – degrees F conductivity at a mean temperature of 75 degrees F, R-8. CSG Insulation Corp., Schuller, Owens-Corning, Knauf or equal. Duct dimensions shown on drawings for lined duct are clear (net) opening inside of lining.
- C. Fiber Glass Blanket: Foil faced, 0.13 Btu/ hr – sq. ft. – degrees F conductivity at a mean temperature of 75 degrees F, R-8. CSG Insulation Corp., Schuller, Owens-Corning, Knauf or equal.
- D. Bonding Adhesive: Benjamin Foster 85-15 or equal.

2.4 PIPING MATERIALS

- A. Flue/ Combustion Air Piping:
 - 1. Gas Flue Piping: Schedule 40 PVC pipe with solvent weld fittings.
 - 2. Flue Cap: Designed to properly ventilate flue regardless of wind direction. Storm proof, bird proof. Factory concentric vent/ combustion air termination kit.
- B. Refrigerant Piping:
 - 1. Type L hard temper seamless copper, ASTM B88. Wrought copper fittings ANSI B16.22. 95/ 5 tin-silver brazed joints. Provide schedule 40 PVC sleeve pipe for all below grade refrigerant piping. All piping shall be sized per equipment manufacturer requirements.
 - 2. Valves and Specialties:
 - a. Line Valves: Bronze body, ball type, TFE locked in seals. Back seated valve stem. Contromatics C-11.
 - b. Filter-Drier: Replaceable core. Capacity in accordance with ARI Standard 710. Sporlan "Catch-All".
 - c. Moisture Indicator-Sight Glass: Double port. Henry, Sporlan.
 - d. Vibration Isolating Connection: Seamless flexible bronze tubing, braid covered. Suitable for system pressure. American, Flexonics.
- C. Miscellaneous Piping Items:
 - 1. Pipe Support:
 - a. Pipe Hanger: Adjustable split ring, swivel hanger and rod. Black malleable iron. Size and maximum loads per manufacturer's recommendation. Felt Lined, Kin-Line 450 F.
 - b. Construction Channel: 12 gage 1-5/8" x 1-5/8" steel channel. Single or multiple sections. Self-locking nuts and fittings. Kin-Line, Unistrut.
 - 2. Pipe Sleeves: 24 gage galvanized steel. Adjus-to-Crete #10 with #99 thimble for floors. #100 for walls.
- D. Flashing: Flashing for piping through roof shall be prefabricated 24 gage galvanized steel roof jacks with 8" square flange around pipe. Seal with weatherproofing mastic.

2.5 PIPING INSULATION MATERIALS

- A. General: All piping insulation materials shall have fire and smoke hazard ratings as tested under ASTM E-84 and UL 723 not exceeding a flame spread of 25 and smoke developed of 50.
- B. Refrigerant Piping: Rubber based elastomeric preformed pipe insulation. Thermal conductivity shall not exceed 0.25 Btu-in/hr-SF-degree F at mean temperature of 75 degrees F., 3/4" thick. Provide aluminum pipe and fitting jacketing. 0.016" thickness for straight pipe, 0.024" thickness for fittings with integral moisture barrier, pre-fabricated strapping and seals for piping exposed to weather, Childers, Pabco or equal.
 - 1. Insulation shall be provided on both refrigerant lines for ductless split systems.

2.6 EQUIPMENT

- A. General Requirements:
 - 1. Capacity: Capacities shall be in accordance with schedules shown on drawings. Capacities are to be considered minimum.
 - 2. Dimensions: Equipment must conform to space requirements and limitations as indicated on drawings and as required for operation and maintenance. Where Architectural screening is indicated, equipment shall not extend above or beyond screening. Equipment will not be accepted that does not readily conform to space conditions. Prepare and submit layout drawings for all proposed equipment (different than scheduled units) showing actual job conditions, required clearances for proper operation, maintenance, etc.
 - 3. Ratings:
 - a. Electrical: Electrical equipment shall be in accordance with NEMA Standards and UL or ETL listed where applicable standards have been established.
 - 4. Piping: Each item or assembly of items shall be furnished completely piped for connection to services. Control valves and devices shall be provided. Equipment requiring domestic water for non-potable use shall be provided with backflow preventer acceptable for intended use by local governing authorities.
 - 5. Electrical:
 - a. General: Each item or assembly of items shall be furnished completely wired to individual terminal blocks for connection to single branch electrical circuit. All electrical accessories and controls required by equipment shall be furnished. Provide terminal blocks for controls and interlocks not included in equipment package. Manual and magnetic starters shall have ambient compensating running overcurrent protection in all ungrounded conductors. Magnetic starters shall be manual reset, shall have H-O-A switches and auxiliary contacts. Controllers and other devices shall be in NEMA 1 or 3R enclosures as applicable.
 - b. Wiring: Conductors, conduit, and wiring shall be in accordance with Electrical Specifications. Individual items within assembly shall be separately protected with dead front, fused disconnect, fuse block, or circuit breaker for each ungrounded conductor, all accessible on operating side of equipment. Switches, contacts, and other devices shall be in ungrounded conductors.
 - c. Motors: Shall be rated, constructed, and applied in accordance with NEMA and ANSI Standards without using service factor. Single-phase motor shall be of type to suit application. Three-phase motors shall be open drip proof, NEMA B design on pumps and fans, NEMA C on reciprocating equipment, sealed ball bearing, three-phase induction unless otherwise noted. Design shall limit starting inrush current and running current to values shown on drawings. Motors 1 horsepower and larger shall be the premium efficiency type, tested according to IEEE Standard 112, Method B. Motors exposed to weather shall be TEFC. Motors in a fan air stream shall be TEFC or TEO. Vertical motors outdoors shall be ODP or TEFC and shall have rain caps.
 - d. Starters: Motor starters shall be furnished for all equipment except where starter is in a motor control center as designated on the electrical drawings. Deliver starter

- to Electrical Contractor for installation and wiring.
- e. Control Voltage: Equipment connected to greater than 240 volts shall be provided with 120 volt control circuit from integral protected transformer if separate source is not indicated on plans. 240 volt control is acceptable if confined within control panel.
- f. Submittals: Included in shop drawings shall be internal wiring diagrams and manufacturer's recommend external wiring.
- 6. Fan Selection:
 - a. Fan Curves: Performance curves shall be submitted for all units of 3000 CFM or greater. Operating point for forward curved fans shall be from point of maximum efficiency towards increased CFM limited by horsepower scheduled. Operating point for backward inclined fans shall be selected near point of maximum efficiency. Curves shall plot CFM verses static pressure with constant brake horsepower, RPM, and efficiency lines.
 - b. Static Pressure: Unless otherwise noted, pressure scheduled as external static pressure (ESP) includes all ductwork and accessory losses external to the unit housing. Unless otherwise noted, pressure scheduled as total static pressure includes all ductwork, filter, coil, cabinet, damper, and other accessory losses. Unless otherwise noted, pressure scheduled as duct static pressure includes all supply and return ductwork and accessory losses external to the unit housing and plenum (as applicable). The allowance for filter losses is 0.3" WC, unless otherwise noted. Submit itemized static pressure losses for all components.
- 7. Filters:
 - a. General: Tested and rated in accordance with ASHRAE Standard 52.2 and Title 24, C.C.R. Furnish and install one complete change of all filters after air balance in completed and prior to acceptance. Provide pressure differential gage across all filter banks.
 - b. Filter Media: 2" media. MERV 13. Clean filter resistance 0.25" water at 500 fpm. Throw-away frame. Class 2. Camfil Farr AP.
 - c. Pressure Differential Gage: Diaphragm actuated. 4" dial. Zero adjustment. Accuracy +/- 2% of full scale. Range as required. Provide static pressure sensors, tubing, and mounting brackets. Dwyer Series 2000. Mark gage to indicate filter replacement pressure, coordinate point with filter and equipment manufacturers.
- 8. Mixing Dampers: Opposed blade, 16-gage. Six-inch maximum blade width, 48" maximum length. Nylon or oil impregnated bronze bearings. One-half inch diameter pin shaft. 16-gage channel frame. One percent maximum leakage at 4" WC in accordance with AMCA 500 for outside air dampers. Actuating rod out of air stream. Arrow.
- 9. Sound Ratings: Shall be in accordance with ASHRAE 36-72. Sound ratings shall not exceed scheduled values.
- 10. Drives: Unless noted as direct connected, drives shall be V-belt, rated at 150% of motor horsepower. Multiple drive belts shall be matched set. Drive sheaves shall be dynamically balanced, adjustable, range +/- 10%, selected at mid-range. Adjustable relative movement shall be lockable to shaft. Belts shall be aligned within 1-1/2 degrees at all times. Open drives shall be provided with OSHA approved open mesh belt guards. Belt guards exposed to weather shall be weatherproof enclosure with louvered face for adequate ventilation. Driving motor shall be mounted on adjustable rails. T.B. Woods, Browning. Submit RPM range of driven machine with drive selection.
- B. Heat Pump Unit:
 - 1. General Unit Description:
 - a. Units furnished and installed shall be electric packaged rooftops as scheduled on contract documents and these specifications. Cooling capacity ratings shall be based on ARI Standard 210. Units shall consist of insulated weather-tight casing with compressor(s), air-cooled condenser coil, condenser fans, evaporator coil,

- return-air filters, supply motors and unit controls and drives.
- b. Units shall be 100% factory run tested and fully charged with R454B refrigerant.
- c. Units shall have labels, decals, and/or tags to aid in the service of the unit and indicate caution areas.
- d. Units shall be convertible airflow design as manufactured.
- e. Units shall operate between 0 deg F and 115 deg F.
- 2. Unit Casing:
 - a. Cabinet: Galvanized steel, phosphatized, and finished with an air-dry paint coating with removable access panels. Structural members shall be 18 gauge with access doors and removable panels of minimum 20 gauge.
 - b. Units cabinet surface shall be tested 1000 hours in salt spray test in compliance with ASTM B117.
 - c. Cabinet construction shall allow for all service/ maintenance from one side of the unit.
 - d. Cabinet top cover shall be one piece construction or where seams exists, it shall be double-hemmed and gasket-sealed.
 - e. Hinged Access Panels: Hinged water- and air-tight panels with handles shall provide access to filters, heating section, return air fan section, supply air fan section, evaporator coil section, and unit control section.
 - f. Units base pan shall have a raised 1 1/8 inch high lip around the supply and return openings for water integrity.
 - g. Insulation: Provide 1/2 inch thick fiberglass insulation with foil face on all exposed vertical panels and top covers in the indoor air sections. The insulation shall be fire-retardant and odorless. All edges must be captured so that there is no insulation exposed in the air stream. The base of the unit shall be insulated with 1/2 inch, 1 pound density foil faced, closed-cell material.
 - h. Provide openings either on side of unit or through the base for power, control, condensate, and gas connections.
 - i. The base of the unit shall have 3 sides for forklift provisions. The base of the units shall have rigging/lifting holes for crane maneuvering.
 - j. Provide through the base electrical access with non-fused disconnect Switch (If required on equipment schedule)
 - k. Provide factory mounted phase monitor to provide 100% protection for motors and compressors against problems caused by phase loss, phase imbalance, and phase reversal. Phase monitor shall be equipped with an LED that provides an ON or FAULT indicator.
 - l. Provide unit with the following factory installed items/ accessories (If specified on schedule):
 - 1) Thru-the-base electrical with non-fused disconnect switch
 - 2) Un-powered GFCI, 120V/ 15amp convenience outlet
 - 3) Supply air smoke detector
 - 4) BACnet® over MS/TP communication card
- 3. Air Filters: Factory installed 2 inch MERV13 30% efficiency throwaway filters.
- 4. Fans and Motors:
 - a. Provide unit shall be equipped with a direct drive plenum fan design. Plenum fan design shall include a backward-curved fan wheel along with an external rotor direct drive variable speed indoor motor.
 - b. Provide self-aligning, grease lubricated, ball or sleeve bearings with permanent lubrication fittings.
 - c. Provide units with multiple speed, dynamically balanced supply fans. Provide oversized motors where necessary to meet scheduled external static pressures.
 - d. Outdoor and Indoor Fan motors shall be permanently lubricated and have internal thermal overload protection.
 - e. Outdoor fans shall be direct drive, statically and dynamically balanced, draw through in the vertical discharge position.
 - f. Provide shafts constructed of solid hot rolled steel, ground and polished, with key-

- way, and protectively coated with lubricating oil.
5. Evaporator and Condenser Coils:
 - a. Evaporator coil shall be all aluminum microchannel.
 - b. Provide an independent expansion device for each refrigeration circuit. Factory pressure tested at 600 psig and leak tested at 465 psig.
 - c. Provide standard IAQ sensitive removable, reversible, cleanable, double sloped drain pan for base of evaporator coil
 - d. Microchannel Condensers are acceptable.
 - e. Provide tool-less factory installed corrosion resistant louvered hail/vandalism guards to protect condenser coils from hail or physical damage.
 6. Compressors:
 - a. Compressor(s): Provide direct drive scroll compressors operating at 3600 rpm with centrifugal type oil pumps. Motors shall be suction gas cooled and have a voltage utilization range of +/- 10% of unit nameplate voltage.
 - b. Crankcase Heaters shall be factory installed.
 - c. 17 Plus series shall be 2 stage scroll type compressors with centrifugal type oil pumps. Motor shall be suction gas cooled and shall have a voltage utilization range of plus or minus 10 percent of unit nameplate.
 - d. Provide with thermostatic temperature motor winding control for protection against excessive temperatures caused by over/under voltage operation or loss of charge. Also provide high and low pressure switches.
 - e. Thermal Expansion valves are standard for all models.
 - f. Units shall have cooling capabilities down to 0 degree F as standard with microprocessor controls (40 degrees F with electromechanical controls. For field-installed low ambient accessory, the manufacturer shall provide a factory-authorized service technician that will assure proper installation and operation.
 - g. Provide each unit with refrigerant circuit(s) factory-supplied completely piped with liquid line filter-drier, suction and liquid line pressure ports.
 - h. For heat pump units, provide reversing valve, discharge muffler, flow control check valve, and electronic adaptive demand defrost control on all units.
 7. Refrigerant Circuits:
 - a. Provide each refrigerant circuit completely piped with liquid line filter-drier, suction and liquid line pressure ports.
 - b. Provide factory installed thermal expansion valve (TXV) for each refrigerant circuit.
 8. Economizer with Power Exhaust: Economizer shall be a modulating power exhaust type where the unit will exhaust at the minimum outside air setpoint and exhaust 100% during economizer mode. Economizer with power exhaust is shipped separately and shall be field installed and wired under this section.
 - a. Provide plastic air sampling tube to sense pressure in room for control of power exhaust. Tube shall be placed thru ceiling with escutcheon plate in room that unit serves.
 - b. Modulating Economizer Sequence of Operation: The economizer system initially responds to a signal from the cooling thermostat and functions as a true first stage for cooling, while providing maximum fuel economy. The economizer is automatically locked out during the heating mode and holds the outdoor air damper at the minimum position settings. During the occupied period, the discharge sensor provides a signal to the actuator during free cooling or economizer mode. The signal opens the economizer damper until the discharge temperature drops below 50 degrees F. At this time, the signal causes the motor to drive the damper back to minimum position. As the discharge temperature climbs to 60 degrees F the motor will drive back open. During the occupied period, the actuator will not close past the minimum position. **(The setpoints maybe changed by Commissioning Contractor to optimize controls for LEED Certification or Title 24 Requirements.)** If the fully open actuator cannot satisfy the space demand, mechanical cooling is sequenced on. During the unoccupied period, the actuator will override minimum position setting and drive fully closed. On a loss of power,

the actuator will spring return fully closed. When in heating operation, or when outdoor air temperature or enthalpy conditions are high, economizer operation is locked out, and actuator is held at minimum position. The staging relay is used when the first stage compressors must provide mechanical cooling when assisting the economizer. The staging relay can be omitted when the second stage compressors can be used to assist the economizer with mechanical cooling.

- c. CO2 Sensor Economizer Integration: When a CO2 sensor is used in conjunction with an economizer, the minimum position jumper between P and P1 on the logic is removed, and the sensor connected. When the CO2 sensor gets a reading higher than the setpoint, the sensor will signal the logic to modulate the o/a dampers open. The HVAC unit functions as if there is no economizer during the CO2 call for fresh air. When the CO2 level falls below the setpoint, the damper modulates back to the minimum position.
 - d. Modulating Power Exhaust Sequence of Operation: The MicroMetl version of the Lenze i510 Variable Frequency Drive (VFD) is enabled when circuit 24V and DI1 is closed. This can be done by installing a jumper between the two, or via a remote contact. This contact can be the Exhaust Option on the Economizer Logic marked EF and EF1 on the electromechanical W7212, the EXF 2-pin connector on the unit controller – see Economizer Instructions for Sequence of Operation, the Auxiliary Switch option on the Actuator Motor, or a relay. See wire Diagram Options for details. A Pressure Transducer is utilized to monitor the building pressure. The Transducer provides a 0-10VDC signal to terminals AI2 and GND, or a 4-20mA signal at terminals AI1 and GND on the VFD to control the motor speed. On a scale of 0" to .10" WG and 0-10Vdc, for example, the transducer will output ~ 3.0 VDC (8.5mA) @ .03" WG and ~ 5.0 VDC (11.5mA) @ .05" WG. If a jumper between 24V and DI1 is used to enable the VFD the motor is commanded on and will run at minimum speed (15Hz) for a minimum of 2.5 minutes or 5 minutes, depending on the program, if the building pressure stays below the PI Setpoint (typically .03" to .05" w.c.). When the building pressure rises above Setpoint the frequency output to the motor will be increased for increased motor speed. If the pressure stays above Setpoint, the motor will continue to increase in speed until it achieves a maximum speed of 60Hz, or the building pressure decreases to below Setpoint. If the building pressure stays below or drops below the predetermined Setpoint for longer than 2.5 or 5 minutes mentioned earlier, the motor is commanded OFF and the display will show SLP. This feature is called the Sleep Mode. If the pressure rises above the Setpoint the motor will be commanded back on and the Sleep Timer will be reset. Assuming a Setpoint of .03" the transducer will output a VDC or mA signal in relation to the building pressure. Once the signal rises above the Setpoint the motor will begin to increase in speed. The PI Protocol of the VFD controls the response time, however. So, if the increase is only a spike the VFD may not respond right away, or possibly, not at all. Additionally, if the increase is minor and the pressure fails to decrease with the increase in motor speed, the VFD will continue to increase the frequency output to increase the motor speed. This is because the goal of the VFD is to try to maintain Setpoint. Because of this, the frequency output of the VFD does not always correspond with the Transducer VDC output.
9. Unit Controls and Power Requirements:
- a. Unit manufacturer shall provide microprocessor controls as standard that provide the following features and diagnostics preprogrammed and installed at the factory:
 - 1) Have built in anti-short cycle timer, time delay relay, and minimum on time controls.
 - 2) Have Adaptive Control that will allow the unit to continue to operate at predetermined temperature set points if a component goes astray.
 - 3) Service testing capabilities to automatically cycle through all of the operating settings.
 - 4) Unit shall be able to operate in cooling mode down to 0 deg F.
10. StartUp:

- a. Provide equipment startup to be performed by factory service technician.
 - b. Provide 4 hours of on-site owner training. Training to be performed by qualified factory service personnel.
 - c. Provide 8 hours of on-site Bacnet integration assistance. Integration to be performed by qualified factory service personnel.
 11. Guarantee: Provide 5 year extended parts warranty on the condenser coil and compressor.
- C. Ductless Split System Air Conditioning:
 1. Condensing Unit:
 - a. General: Self-contained unit designated for outdoor installation. Factory assembled and tested. Provide all starters and relays required for operation. 24 volt control circuit from integral transformer. Weatherproof cabinet, galvanized steel with enamel finish. Drain pan. ARI certified. Provide 3/4" x 18 GA. expanded metal coil guards. Daikin, Quietside, Carrier, York, Trane, and Mitsubishi.
 - b. Refrigeration: Sealed Hermetic compressor with internal vibration isolating mount. Crank case heater, high/low pressure switch, anti-recycle timer. Air-cooled condenser with propeller fan. Non-ferrous finned coil. Low ambient control to 25°F, unless otherwise noted.
 - c. Guarantee: Provide 5 year extended warranty on the condenser coil and compressor.
 2. Indoor Unit: Multi-speed direct drive blower on vibration mountings, filters, capacity as scheduled on plans. Daikin, Quietside, Carrier, York, Trane, and Mitsubishi.
 3. Coil Section: Encased coil. Casing shall be galvanized steel finished with baked enamel. Direct expansion evaporation coils complete with distribution piping, expansion valve, drain pan, and drain connection. Daikin, Quietside, Carrier, York, Trane, and Mitsubishi.
- D. Exhaust Fans:
 1. General: All exhaust fans shall be tested and rated in accordance with AMCA Standard 210. Fans exposed to the weather shall have ventilated weatherproof housing over motor and drive assembly.
 2. Roof Fan: Multi-vane centrifugal fan. Ball bearings. Vibration isolation mount. All aluminum curb base. Weatherproof disconnect switch. Down blast type UL listed. Cook, Greenheck, Penn, ACME or equal.
- E. Energy Recovery Units:
 1. General: Energy Recovery Ventilator shall be as manufactured by "Panasonic" or approved equal. Units shall be HVI Certified. Ventilators shall be UL Listed. Performance shall be as scheduled on plans. Outdoor air shall not mix with exhaust air in a common plenum.
 2. Unit Casing and Frames: Unit shall be of internal frame type construction of galvanized steel. Frame and panels shall be 20 GA steel. All metal-to-metal seams shall be sealed, requiring no caulking at job site. Baked enamel finish for all exterior parts.
 3. Access Doors: All components shall be easily accessible through removable doors for exhaust, supply, filter, and damper compartments.
 4. Fan Sections: Continuous duty, permanently lubricated motors. 36" power cord provided.
 5. Filters: Supply and exhaust air filters shall be 30 ppi washable reticulated foam.
 6. Electrical: All internal electrical components shall be factory wired for single point power connection. All electrical components shall be UL Listed, Approved or Classified where applicable and wired in compliance with the National Electrical Code.

PART 3 EXECUTION

3.1 DUCTWORK INSTALLATION

- A. General:
 - 1. Standards: Unless otherwise noted, all ductwork shall be constructed and installed in accordance with current SMACNA "HVAC Duct Construction Standards". Ductwork and accessories shall be installed in a manner to prevent vibration and rattling.
 - 2. Seismic bracing: All ducts shall be braced and supported per details on the drawings.
 - 3. Duct Access Doors: Provide access doors as required to adjust equipment and dampers.
 - 4. Flexible Connections: Connections of ductwork to all equipment shall be with 6" (min.) flexible connection. Install with ample slack and uniform gap after deflection of vibration isolators. There shall be no metal to metal contact across flexible connection. Protect outdoor connections with weatherproof metal shroud on top and sides, no metal-to-metal contact. Provide at all seismic joints.
 - 5. Ducted Returns: All air handling that is not directly located in the space that it serves shall have ducted returns.
 - 6. Open ends of ductwork shall be covered during construction to keep inside clean.
- B. Low Velocity-Low Pressure (up to 2000 ft/ min; up to 2.0 in. water):
 - 1. Sheet Metal Ductwork:
 - a. Ells: Ells with less than standard radius and square ells shall be fitted with turning vanes.
 - b. Tees: Tees shall be straight tap-in with extractor or 45 degree takeoff, as shown on drawings.
 - c. Duct Joints: Seal duct joints airtight with fiber tape and adhesive per manufacturer's printed instruction. Ducts in weather shall be sealed air and watertight with duct mastic before closing and taping.
 - 1) Where Ductmate type joints are used, the manufacturer's designated procedure shall be followed. Ductmate joints on roof shall have continuous cleat on top duct flange to prevent water from collecting on gasket.
 - d. Dampers: Install volume control damper and damper regulator in all branch ducts.
 - e. Duct dimensions shown on drawings for lined ducts, are clear net openings inside of lining.
 - f. Top of ducts exposed to weather shall be cross broken and sloped slightly to each side to allow rainwater to run off. Ducts that do not drain off top will be rejected and need to be replaced at contractors' expense.
 - 2. Flexible Glass Fiber Ductwork: Hangers shall be 2" wide metal straps spaced to prevent sagging, 3 feet spacing maximum. Insert 6" wide fiberglass pad between duct and hanging strap. All joints and fittings shall be sheet metal and shall be installed with metal bands or 3 (min) self-tapping screws and fiber tape. Maximum length of flexible duct shall be 5 ft. Single piece minimum length shall be 3 ft. Minimum turn radius shall be in accordance with SMACNA Standards (turn radius to duct centerline not less than 1.5 times the duct diameter).

3.2 AIR TERMINALS AND DUCT FITTINGS INSTALLATION

- A. General: Unless otherwise noted, all air terminals and duct fittings shall be installed in accordance with current SMACNA "HVAC Duct Construction Standards", details on drawings and manufacturer's instructions. Terminals and fittings shall be installed in a manner to prevent vibration and rattling.
- B. Fire Smoke Damper: Fire smoke dampers shall be installed in accordance with their State Fire Marshal approval and the manufacturer's recommendations.

3.3 DUCTWORK INSULATION INSTALLATION

- A. General: All supply and return sheet metal ductwork shall be insulated.
- B. Concealed Ductwork: Wrap ductwork with fiberglass blanket lapped 2" minimum. Secure with foil tape at all joints for a complete vapor barrier.
- C. Acoustic Lining: All ductwork in equipment rooms, where exposed to weather, and elsewhere as indicated on drawings, shall have acoustic lining. Increase each sheet metal dimension to accommodate lining and maintain clear inside duct dimensions shown on drawings. Apply lining with bonding adhesive in accordance with manufacturer's recommendations and secure with mechanical fasteners in accordance with SMACNA Standards. Seal exposed edges of lining with bonding adhesive.

3.4 PIPING INSTALLATION

- A. General:
 - 1. Piping Layout: Piping shall be concealed in walls, above the ceilings, or below grade unless otherwise noted. Exposed piping shall run parallel to room surfaces; location to be approved by Architect. No structural member shall be weakened by cutting, notching, boring or otherwise unless specifically allowed by structural drawings and/or specifications. Where such cutting is required, reinforcement shall be provided as specified or detailed. All piping shall be installed in a manner to ensure unrestricted flow, eliminate air pockets, prevent any unusual noise, and permit complete drainage of the system. All piping shall be installed to permit expansion and contraction without strain on piping or equipment. Expansion joints and/or flexible connectors shall be installed as required. Vertical lines shall be installed to allow for building settlement without damage to piping. Lines shall be adequately braced against vertical and lateral movement.
 - 2. Pipe Support:
 - a. General: Hangers shall be placed to support piping without strain on joints or fittings. Maximum spacing between supports shall be as specified below. Actual spacing requirements will depend on structural system. Refer to drawings for additional requirements and attachment to structure. Vertical piping shall be supported at floor and ceiling. Support pipe within 12" of all changes in direction. No perforated straphanger shall be used in any work.
 - b. Refrigerant Piping: Pipe shall be cut square. Joint surfaces shall be thoroughly cleaned, fitted, and erected before brazing. Install specified accessories. After installation, evacuate to 29 inches of mercury, ambient temperature during evacuation shall not be less than 70 degrees F. After evacuation, fill with dry nitrogen to 250 psi and maintain for two-hour period without additional charge. After nitrogen test, purge with refrigerant charged through dryer and maintain holding charge in system and equipment. Refrigerant piping below grade shall be run in 4" (min.) PVC conduit with long radius ells. Seal ends of conduit watertight.
 - c. Flue Piping: Flue piping shall be installed in accordance with its UL listing and manufacturer's instructions. All welders shall be certified in accordance with AWS Standard D9.1, Specifications for welding sheet metal.
 - d. PVC Piping: Shall be cut square and assembled prior to solvent weld. Apply primer per manufacturer's recommendations. Coat male joint fully with solvent, make joint before solvent dries and wipe exterior clean.

3.5 PIPING INSULATION INSTALLATION

- A. Refrigerant Piping: Cover suction piping with foamed plastic insulation. Longitudinal and end seams shall be thoroughly cemented with adhesive in accordance with manufacturer's recommendation. Cover all fittings, unions, valves, and connections. Piping exposed to weather shall be covered with aluminum jacketing, seal all joints and seams with grey outdoor mastic or silver silicone sealant. Piping exposed in room shall be covered with

pipng chase painted to match wall.

3.6 EQUIPMENT INSTALLATION

- A. General: It shall be the responsibility of the contractor to ensure that no work done under other specification sections shall in any way block, or otherwise hinder access panels or diminish the effectiveness of equipment vibration isolation.
- B. Connections to Equipment: Where size reductions are required for connections to equipment, they shall be made immediately adjacent to the equipment and, if possible, inside the equipment cabinet. Connections made to equipment mounted on vibration isolators shall be with flexible connectors, installed adjacent to equipment.
- C. Start Up: Engage manufacturer or factory-authorized service representative to perform start up supervision. Manufacturer shall provide on-site start up and commissioning assistance through job completion. Complete installation and start up checks according to manufacturer's written instructions.

3.7 TEMPERATURE CONTROL SYSTEM

- A. Thermostats shall have the capability of terminating all heating at a temperature of no more than 70 degrees F or terminating all cooling at a temperature of no less than 78 degrees F, and to provide a temperature range of up to 10 degrees F between full heating and full cooling. Thermostats shall be 7 day programmable, Carrier, Robertshaw or equal with sub-base capable of battery backup or capacitor to retain program in the event of a power outage. All control wiring, regardless of voltage, shall be installed in conduit.

3.8 SYSTEM AIR BALANCE

- A. Scope: Provide the services of a qualified independent test and balance agency certified by the Associated Air Balance Council (AABC) or The National Environmental Balancing Bureau (NEBB) to test, adjust and balance, retest, and record performance of the system to obtain design quantities as specified. Balancing contractor must also be TABB certified and have a C-20 license.
- B. Qualifications: Prior to commencing work, the agency shall be approved by the Owner's Representative.
- C. Instruments: All instruments shall be accurately calibrated; calibration histories shall be available for examination. Application of instrumentation shall be in accordance with AABC standards.
- D. Procedure: General: Balanced quantities shall be plus 5%, minus 5% of design quantities. All name-plate data, manufacturer, model, and serial numbers shall be recorded for each item tested. All outside air flow listed in minimum.
- E. Extended Warranty: The test and balance agency shall include an extended warranty of 90 days after completion of test and balance work, during which time the Owner's Representative at his discretion may request a recheck or resetting of any item or items in test report. The agency shall provide technicians to assist the Owner's Representative in making any tests he may require during this period of time.
- F. Air Balance Procedure (for each Air Handling System):
 - 1. All air filters shall be clean when air balance is performed.
 - 2. Provide a sketch of the equipment showing exactly where all pressure readings were

- taken.
3. Adjust blower RPM to design requirements.
 4. Record motor full load amperes.
 5. Make pitot tube traverse of main supply and return ducts and obtain design CFM at fans.
 6. Record system static pressures, inlet, and discharge.
 7. Record filter quantity, size(s) and pressure drop across filter(s) at each filter bank.
 8. Adjust system for design CFM recirculated air.
 9. Adjust system for design CFM outside air minimum settings.
 10. Record entering air temperatures. (DB heating, DB and WB cooling.)
 11. Record leaving air temperatures. (DB heating, DB and WB cooling.)
 12. Adjust all main supply and return air ducts to design CFM.
 13. Adjust all zones to design CFM, supply, and return.
 14. Adjust all diffusers, grilles, and registers to plus 10%, minus 0% of design requirements.
 15. Adjust CFM at all exhaust fans, make-up units, etc. (high and low speed, where applicable). Record applicable data from items 1 through 11 above.
 16. Each grille, diffuser and register shall be identified as to location.
 17. Verify proper diffusion pattern for all ceiling grilles and that all sidewall grilles are set for 5 degrees downward deflection unless otherwise noted. Make a notation of any that are not set properly.
 18. Size, type and manufacturer of diffusers, grilles, registers, and all tested items shall be identified and listed. Manufacturer's ratings shall be used to make required calculations on all items.
 19. Readings and tests of diffusers, grilles, and registers shall include required FPM velocity and test resultant velocity, required CFM and test resultant CFM after adjustments.
 20. In cooperation with the control manufacturer's representative, set adjustments of automatically operated dampers to operate as specified. Testing agency shall check all controls for proper calibrations and list all controls requiring adjustment by control installers.
 21. All diffusers, grilles and registers shall be adjusted for required air patterns and to minimize drafts.
 22. As a part of the work of this contract, THE AIR CONDITIONING CONTRACTOR shall make any changes in pulleys, belts, dampers, or the addition of dampers cleaning of insect screens and replacement of filters required for correct balance as recommended by air balance agency, at no additional cost to Owner.
 23. Set, test, and adjust packaged heating/ cooling unit economizer operation in cooperation with controls contractor. Record minimum and maximum outside and exhaust airflows.

END OF SECTION 23 00 01

SECTION 26 05 00 - COMMON WORK RESULTS FOR ELECTRICAL

CONDITIONS OF THE CONTRACT AND DIVISION 01, as applicable, apply to this Section.

PART 1 GENERAL

1.1 SUMMARY

- A. Provide all work for electrical systems required in the project to be properly installed, tested, and performing their intended function.

1.2 QUALITY ASSURANCE

- A. Perform all work in accordance with the latest edition of the California Electrical Code, and local codes.
- B. All electrical materials and distribution, and utilization equipment shall be UL Listed.
- C. All equipment and materials shall be new and unused and of United States Domestic manufacture unless approved otherwise by engineer or owner.
- D. Eliminate any abnormal sources of noise that are considered by the architect not to be an inherent part of the electrical systems as designed.

1.3 COORDINATION WITH OTHER TRADES

- A. Coordinate the work of this division with all other divisions to ensure that all components of the electrical system will be installed at the proper time and fit the available space.
- B. Locate and size all openings in work of other trades required for the proper installation of the electrical system components.
- C. Make all electrical connections to all equipment furnished by this division and any other division.
- D. Make all electrical connections from all 120 volt and greater dampers and switches to associated exhaust fan(s) furnished by any other division.

1.4 DRAWINGS

- A. The drawings are schematic in nature but show the various components of the systems approximately to scale and attempt to indicate how they are to be integrated with other parts of the building. Determine exact locations by review of equipment manufacturer's data, by job site measurements, by checking the requirements of other trades, and by reviewing all Contract Documents. The size of the electrical equipment indicated on the Drawings may be based on the dimensions of a particular manufacturer. While other listed manufacturers will be acceptable, it is the responsibility of the Contractor to determine if the equipment that Contractor proposes to furnish will fit in the space. The drawings are not intended to show exact locations of conduit and wire, or to indicate all wire terminators, connectors, conduit fittings, boxes or supports, but rather to indicate distribution, circuitry, and control.
- B. The Electrical Drawings are necessarily diagrammatic in character and cannot show every connection in detail or conduit in its exact location. These details are subject to the requirements of ordinances and also structural and architectural conditions. The Contractor

shall carefully investigate structural and finish conditions and shall coordinate the separate trades in order to avoid interference between the various phases of work. Work shall be laid out so that it will be concealed in furred chases and suspended ceilings, etc., in finished portions of the building, unless specifically noted to be exposed. Work shall be installed to avoid crippling of structural members. All exposed work shall be installed parallel or perpendicular to the lines of the building unless otherwise noted.

- C. When the mechanical and electrical Drawings do not give exact details as to the elevation of pipe, conduit, and ducts, physically arrange the systems to fit in the space available at the elevations intended with the proper grades for the functioning of the system involved. Exposed conduit is generally intended to be installed true and square to the building construction and located as high as possible against the structure in a neat and workmanlike manner. The Drawings do not show all required offsets and their location details. Work shall be concealed in all finished areas.

1.5 SUBMITTALS

- A. Specification Review:
 - 1. Include a paragraph-by-paragraph written specification review for each product listed requiring a submittal. Denote any proposed deviations from specifications.

1.6 EXISTING CONDITIONS

- A. Do all work required to maintain electrical services to the Owner occupied portions of the building during construction.
- B. No connection to existing services or utilities shall be made without Owner's knowledge and permission. All such connections shall be planned and scheduled to minimize the length of service interruption required. Request for shutdown shall be made to Owner at least two (2) weeks in advance and shall be accompanied by detailed written schedule of activities during shutdown and list of materials required for connection and renewal of service. It shall be understood that all such service interruptions shall be made at the Owner's convenience, not the Contractor's. No increase in contract amount will be allowed for reasons of premium time, inefficiency of operations or other considerations not calculated in original bid.
- C. All items removed shall be stored on-site. Schedule a review of the items with the Owner. Remove from site all items the Owner does not choose to keep. Deliver Owner designated items to Owner's storage facility.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Accept materials on site in original factory packaging, labeled with manufacturer's identification.
- B. Protect from weather and construction traffic, dirt, water, chemical, and mechanical damage, by storing in original packaging.
- C. Do not deliver items to project before time of installation. Limit shipment of bulk and multiple-use materials to quantities needed for immediate installation.

PART 2 EXECUTION

2.1 EXISTING WORK

- A. Disconnect electrical systems in walls, floors, and ceilings scheduled for removal.

- B. Provide temporary wiring and connections to maintain existing systems in service during construction.
- C. When performing work on energized equipment or circuits, use personnel experienced and trained in similar operations.
- D. Remove, relocate, and extend existing installations to accommodate new construction.
- E. Repair adjacent construction and finishes damaged during demolition and extension work.

2.2 OWNER INSTRUCTION

- A. Provide on-site Owner training for all new equipment.
- B. Use Operation and Maintenance manuals and actual equipment installed as basis for instruction.
- C. At conclusion of on-site training program have Owner personnel sign written certification they have completed training and understand equipment operation. Include copy of training certificates in final Operation and Maintenance manual submission.
- D. Supply record drawings to the district in PDF and the latest version of AutoCAD.

END OF SECTION 26 05 00

SECTION 26 05 19 - LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of this Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this section

1.2 SUMMARY

- A. Section includes:
 - 1. Wires and cables rated for 600 volts or less.
 - 2. Connectors, splices, and terminations rated for 600 volts or less.
 - 3. Lugs and pads rated for 600 volts or less.
- B. System Description:
 - 1. Provide wires, cables, connectors, lugs, strain reliefs, racking insulators for a complete and operational electrical system.
- C. Reference Standards:
 - 1. California Electrical Code (CEC) based on NFPA 70 (NEC). California Code of Regulations, Title 24, Part 3.
 - 2. National Electrical Manufacturers Association (NEMA):
 - a. WC 70 Power Cables Rated 2,000 V or Less for the Distribution of Electrical Energy.
 - 3. National Electrical Testing Association (NETA):
 - a. ATS Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems.
 - 4. Underwriters Laboratories, Inc. (UL):
 - a. 83 UL Standard for Safety Thermoplastic-Insulated Wires and Cables.
 - b. 486 Standard for Wire Connectors.
 - 5. American Society for Testing and Materials (ASTM):
 - a. B1 Standard Specification for Hard-Drawn Copper Wire.
 - b. B3 Standard Specification for Soft or Annealed Copper Wire.
 - c. B8 Standard Specification for Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard, or Soft.

1.3 SUBMITTALS

- A. Provide product data for the following equipment:
 - 1. Wires.
 - 2. Cables.
 - 3. Connectors.
 - 4. Lugs.
 - 5. Splice Kits.
- B. Provide the insulation cable testing report in the project closeout documentation, refer to Closeout Requirements in the General Conditions portion of this specification.

1.4 QUALITY ASSURANCE

- A. Regulatory Requirements:
 - 1. Confirm to requirements of the CEC, latest adopted version with amendments by local

- Authority Having Jurisdiction (AHJ).
2. Furnish products listed by UL or other testing firm acceptable to AHJ.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Wires and Cables:
1. Southwire Company
 2. Encore Wire Corporation
 3. Cerro Wire and Cable Co.
 4. General Cable Corp.; a brand of Prysmian Group
 5. Okonite Co.
 6. Alan Wire
 7. LS Cable and System USA
 8. American Wire and Cable
- B. Connectors:
1. FCI Burndy Corp.
 2. Cooper Crouse Hinds.
 3. O.Z./ Gedney Co.
 4. Thomas & Betts Co.
 5. 3-M Co.
 6. Ideal Industries Co.
 7. Polaris Electrical Connectors
 8. ILSCO
- C. Wire connectors shall be minimum 75 degree centigrade rated and properly sized for the number of conductors being connected, terminated, spliced etc. All above grade connectors shall be solderless lug or plastic wire nut type, screw on, pressure cable type (wire nut or spring nut type), 600 Volt, 105-degree C, with skirt to cover all portions of stripped wires. Connector shall be U.L. rated for number and size of conductors being joined together as a splice.
- D. Splices:
1. Branch Circuit Splices: Ideal, Scotch-Lock, 3M, or approved.
 2. Feeder Splices: Compression barrel splice with two layers Scotch 23 and four layers of Scotch 33+ as vapor barrier.
 3. Screw Terminal Lugs.
 4. Kearney Split Bolt.

2.2 WIRES AND CABLES FOR LINE VOLTAGE SYSTEM AND CONTROLS.

- A. Wire and Cable Shall Be:
1. Copper, 600 volt rated throughout. Conductors 12AWG to 10AWG, solid or stranded. Conductors 8AWG and larger, stranded.
 2. Phase color to be consistent at all feeder terminations; A-B-C, top to bottom, left to right, front to back. Phasing tape shall be permitted on sizes #6 and larger.
- B. Each phase wire shall be uniquely color-coded as indicated below:
1. 120/ 240 Volts
Phase A – Black
Phase B – Red
Neutral – White
Ground – Green

2. 120/ 208 Volts
Phase A – Black
Phase B – Red
Phase C – Blue
Neutral – White
Ground – Green
 3. 277/ 480 Volts
Phase A – Brown
Phase B – Orange
Phase C – Yellow
Neutral – White or Natural Gray
Ground – Green
 4. Isolated Grounds: Green with Yellow Stripes
- C. All conductors shall be copper unless otherwise noted. Minimum size for individual conductors shall be #12 AWG unless otherwise noted. Sizes #8 AWG and larger shall be stranded conductor. Individual conductors shall be insulated with type, XHHW, THW, THHN/ THWN 600- volt insulation unless otherwise noted. Control, signal, communication conductors shall be as dictated by the vendor of that equipment or as specified here-in. Proper insulation type shall be used for the proper environmental application (i.e., waterproof, wet location, plenum, temperature rated). If a condition exists where the application is uncertain, contact the Engineer for direction. Contractor is responsible to follow specific cabling requirements described in other sections of this specification relative to various communications and controls systems as well as the respective riser diagrams shown on plans. If a discrepancy occurs, communicate such discrepancy to the Architect and Engineer immediately for resolution.
- D. Insulation types THWN, THHN or XHHW. Minimum insulation rating of 90C for branch circuits.
- E. Refer to signal and communications specification sections for cable requirements.

2.3 CONNECTORS

- A. Copper Pads: Drilled and tapped for multiple conductor terminals.
- B. Lugs: Indent/ compression type for use with stranded branch circuit or control conductors.
- C. Solid Conductor Branch Circuits: Spring connectors, wire nuts, for conductors 12 through 8AWG.

2.4 LUGS AND PADS

- A. Ampacity: Cross-sectional area of pad for multiple conductor terminations to match ampere rating of panelboard bus or equipment line terminals.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Installation: Conductors shall not be installed until after conduit systems are permanently in place. Use an approved non-hardening type wire pulling lubricant if lubricant is to be used. Maintain all conduits and wire pulls free from foreign material. If due to field conditions, more than a total of 300 degrees of bend are required; a pull box shall be furnished and installed for ease of installation. Said pull boxes must be sized and rated for the appropriate

application and must remain easily accessible upon completion of the project (approval of the location shall be obtained from the Architect prior to installation). Show these pullboxes on the field record drawings. Conductors installed in underground raceways on site shall be duct sealed and taped where they exit the raceway to prevent the entrance of foreign material and moisture after the conductors are installed. Proper drainage shall be provided for underground pull and splice boxes.

- B. Insulation: Use proper insulation types where temperature and environment are a factor.
- C. Labeling: All conductors in panels, switchboards, terminal cabinets, vaults, pull boxes, and junction boxes shall be labeled with tape number markers indicating circuit number and identifying system. All labeling shall be permanent. See Section 26 05 53: Identification of Electrical Systems.
- D. All conductors, wiring, cable where installed below floor, slab or underground shall be considered wet locations, and shall be rated accordingly. Non-waterproof cabling is not allowed in any below grade or wet application.
- E. Cables routed together in cable tray shall be stacked, organized and tie wrapped together in a neat and workman like manner. Random cable routing is not acceptable.
- F. Cable and conductors routed through pull boxes and vaults shall be properly supported. Bend radius of cable or conductor shall not be less than six times the overall cable diameter.
- G. Wires and Cables:
 - 1. Conductor Installation:
 - a. Install conductors in raceways having adequate, code size cross-sectional area for wires indicated.
 - b. Install conductors with care to avoid damage to insulation.
 - c. Do not apply greater tension on conductors than recommended by manufacturer during installation.
 - d. Use of pulling compounds is permitted. Clean residue from exposed conductors and raceway entrances after conductor installation.
 - 2. Conductor Size and Quantity:
 - a. Install no conductors smaller than 12AWG unless otherwise shown (e.g. – Fire alarm and communications systems, as defined in their respective specifications sections and/ or drawings).
 - b. Provide all required conductors for a fully operable system.
 - 3. Provide dedicated neutrals (one neutral conductor for each phase conductor). Exceptions may only be granted with Electrical Engineer approval.
 - 4. Conductors in Cabinets:
 - a. Cable and train all wires in panels and cabinets for power and control neatly and uniformly. Use plastic ties in panels and cabinets.
 - b. Tie and bundle feeder conductors in wireways of panelboards.
 - c. Hold conductors away from sharp metal edges.

3.2 FIELD QUALITY CONTROL

- A. Field inspection and test shall be performed under provisions of NETA ATS section 7.3 (2) - Low Voltage Cables, 600-Volt Maximum as follows:
 - 1. Visual and Mechanical Inspection:
 - a. Compare cable data with drawings and specifications.
 - b. Inspect exposed sections of cable for physical damage and correct connection in accordance with single-line diagram.
 - c. Inspect all bolted electrical connections for high resistance using one of the following methods:

- 1) Use of low-resistance ohm-meter in accordance with NETA section 7.3.2.2 (Electrical Tests).
- 2) Verify tightness of accessible bolted electrical connections by calibrated torque-wrench method in accordance with manufacturer's published data from NETA ATS Table 10.12.
- d. Inspect compression-applied connectors for correct cable match and indentation.
- e. Verify cable color coding with applicable specifications and CEC.
2. Electrical Tests
 - a. Perform insulation-resistance test on each conductor with respect to ground and adjacent conductors. Applied potential shall be 500 volts dc for 300 volt rated cable and 1000 volts dc for 600 volt rated cable. Test duration shall be one minute.
 - b. Perform resistance measurements through all bolted connections with low-resistance ohmmeter, if applicable, in accordance with Section 7.3.2.1 (Visual and Mechanical Inspection).
 - c. Perform continuity test to insure correct cable connection.
 - d. Correct malfunctions and/ or deficiencies immediately as detected at no additional cost to the District, including additional verification testing.
 - e. Subsequent to final wire and cable terminations, energize all circuitry and demonstrate functional adequacy in accordance with system requirements.
3. Test Values
 - a. Compare bolted connection resistance to values of similar connections.
 - b. Bolt-torque levels should be in accordance with NETA ATS Table 10.12 unless otherwise specified by the manufacturer.
 - c. Micro-ohm or milli-volt drop values shall not exceed the high levels of the normal range as indicated in the manufacturer's published data. If manufacturer's data is not available, investigate any values which deviate from similar connections by more than 50 percent of the lowest value.
 - d. Minimum insulation-resistance values should not be less than 50 meg-ohms.
 - e. Investigate deviations between adjacent phases.

END OF SECTION 26 05 19

SECTION 26 05 26 - GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of this Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section Includes:
 - 1. Grounding and bonding requirements of electrical installations for personnel safety and to provide a low impedance path for possible ground fault currents as described in CEC Article 250.
 - 2. "Grounding electrode system" refers to all electrodes required by CEC, as well as including made, supplementary, lightning protection system and telecommunications system grounding electrodes.
 - 3. The terms "connect" and "bond" are used interchangeably in this specification and have the same meaning.
- B. Related Sections:
 - 1. Section 26 05 00: Common Work Results for Electrical.
 - 2. Section 26 05 19: Low-Voltage Electrical Power Conductors and Cables.
- C. Reference Standards:
 - 1. California Electrical Code (CEC) based on NFPA 70. California Code of Regulations, Title 24, Part 3.
 - 2. Institute of Electrical and Electronics Engineers (IEEE):
 - a. 81 IEEE Guide for Measuring Earth Resistivity, Ground Impedance, and Earth Surface Potentials of a Grounding System.
 - b. 142 Recommended Practice for Grounding of Industrial and Commercial Power Systems.
 - c. 1100 Recommended Practice for Powering and Grounding Electronic Equipment
 - 3. National Electrical Testing Association (NETA):
 - a. ATS Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems
 - 4. Underwriters Laboratories, Inc. (UL):
 - a. 83 UL Standard for Safety Thermoplastic-Insulated Wires and Cables.
 - b. 467 Grounding and Bonding Equipment.
 - 5. American Society for Testing and Materials (ASTM):
 - a. B1 Standard Specification for Hard-Drawn Copper Wire.
 - b. B3 Standard Specification for Soft or Annealed Copper Wire.
 - c. B8 Standard Specification for Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard, or Soft.

PART 2 PRODUCTS

2.1 GROUNDING AND BONDING CONDUCTORS

- A. Equipment grounding conductors shall be UL 83 insulated stranded copper, except that sizes No. 10 AWG and smaller shall be solid copper. Insulation color shall be continuous green for all equipment grounding conductors, except that wire sizes No. 4 AWG and larger shall be permitted to be identified per CEC.

- B. Bonding conductors shall be ASTM B8 bare stranded copper, except that sizes No. 10 AWG and smaller shall be ASTM B1 solid bare copper wire.
- C. Conductor sizes shall not be less than what is shown on the drawings and not less than required by the CEC, whichever is greater.

2.2 SPLICES AND TERMINATION COMPONENTS

- A. Components shall meet or exceed UL 467 and be clearly marked with the manufacturer, catalog number, and permitted conductor size(s).

PART 3 EXECUTION

3.1 GENERAL

- A. Ground in accordance with the CEC, as shown on drawings, and as hereinafter specified.
- B. System Grounding:
 - 1. Secondary service neutrals: Ground at the supply side of the secondary disconnecting means and at the related transformers.
 - 2. Separately derived systems (transformers downstream from the service entrance): Ground the secondary neutral.
- C. Equipment Grounding: Metallic structures (including ductwork and building steel), enclosures, fire sprinklers, plumbing piping, raceways, junction boxes, outlet boxes, cabinets, machine frames, and other conductive items in close proximity with electrical circuits shall be bonded and grounded.

3.2 INACCESSIBLE GROUNDING CONNECTIONS

- A. Make grounding connections which are buried or otherwise normally inaccessible (except connections for which periodic testing access is required) by exothermic weld.

3.3 SECONDARY EQUIPMENT AND CIRCUITS

- A. Main Bonding Jumper: Bond the secondary service neutral to the ground bus in the service equipment.
- B. Metallic Piping, Building Steel, and Supplemental Electrode(s):
 - 1. Provide a grounding electrode conductor sized per CEC between the service equipment ground bus and all metallic water and gas pipe systems, building steel, and supplemental or made electrodes. Jumper insulating joints in the metallic piping. All connections to electrodes shall be made with fittings that conform to UL 467.
 - 2. Provide a supplemental ground electrode and bond to the grounding electrode system.
- C. Service Disconnect: Provide a ground bar bolted to the enclosure with lugs for connecting the various grounding conductors.
- D. Switchgear, Switchboards, and Motor Control Centers:
 - 1. Connect the various feeder equipment grounding conductors to the ground bus in the enclosure with suitable pressure connectors.
 - 2. For service entrance equipment, connect the grounding electrode conductor to the ground bus.
 - 3. Connect metallic conduits, which terminate without mechanical connection to the housing, by grounding bushings and grounding conductor to the equipment ground

bus.

- E. Transformers:
 - 1. Exterior: Exterior transformers supplying interior service equipment shall have the neutral grounded at the transformer secondary. Provide a grounding electrode at the transformer.
 - 2. Separately derived systems (transformers downstream from service equipment): Ground the secondary neutral at the transformer. Provide a grounding electrode conductor from bar at the service equipment.
- F. Conduit Systems:
 - 1. Ground all metallic conduit systems. All metallic conduit systems shall contain an equipment grounding conductor sized per CEC.
 - 2. Nonmetallic conduit systems shall contain an equipment grounding conductor, except that non-metallic feeder conduits which carry a grounded conductor from exterior transformers to interior or building-mounted service entrance equipment need not contain an equipment grounding conductor.
 - 3. Metal conduit containing only a grounding conductor, and which is provided for mechanical protection of the conductor, shall be bonded to that conductor at the entrance and exit from the conduit.
- G. Feeders and Branch Circuits: Install equipment grounding conductors with all feeders, power, and lighting branch circuits.
- H. Boxes, Cabinets, Enclosures, and Panelboards:
 - 1. Bond the equipment grounding conductor to each pullbox, junction box, outlet box, device box, cabinets, and other enclosures through which the conductor passes.
 - 2. Provide lugs in each box and enclosure for equipment grounding conductor termination.
 - 3. Provide ground bars in panelboards, bolted to the housing, with sufficient lugs to terminate the equipment grounding conductors.
- I. Motors and Starters: Provide lugs in motor terminal box and starter housing or motor control center compartment to terminate equipment grounding conductors.
- J. Receptacles shall not be grounded through their mounting screws. Ground with a jumper from the receptacle green ground terminal to the device box ground screw and the branch circuit equipment grounding conductor.
- K. Ground lighting fixtures to the equipment grounding conductor of the wiring system when the green ground is provided; otherwise, ground the fixtures through the conduit systems. Fixtures connected with flexible conduit shall have a green ground wire included with the power wires from the fixture through the flexible conduit to the first outlet box.
- L. Fixed electrical appliances and equipment shall be provided with a ground lug for termination of the equipment grounding conductor.

3.4 CONDUCTIVE PIPING

- A. Bond all conductive piping systems, interior and exterior, to the building to the grounding electrode system. Bonding connections shall be made as close as practical to the equipment ground bus.

3.5 TELECOMMUNICATIONS SYSTEM

- A. Bond telecommunications system grounding equipment to the electrical grounding electrode

system. Refer to communications backbone cabling specification section.

3.6 GROUND RESISTANCE

- A. Grounding system resistance to ground shall not exceed 15 ohms. Make necessary modifications or additions to the grounding electrode system for compliance without additional cost to the Owner. Final tests shall assure that this requirement is met, and test results shall be submitted to the Owner with final close out documents.
- B. Resistance of the grounding electrode system shall be measured using a four-terminal fall-of-potential method as defined in IEEE Standard 81. Ground resistance measurements shall be made before the electrical distribution system is energized and shall be made in normally dry conditions not less than 48 hours after the last rainfall. Resistance measurements of separate grounding electrode systems shall be made before the systems are bonded together below grade. The combined resistance of separate systems may be used to meet the required resistance, but the specified number of electrodes must still be provided.
- C. Below-grade connections shall be visually inspected by the Inspector of Record (IOR) prior to backfilling. The Contractor shall notify the IOR 24 hours before the connections are ready for inspection.
- D. Furnish a copy of tests to Owner at completion of project.

END OF SECTION 26 05 26

SECTION 26 05 29 - HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

CONDITIONS OF THE CONTRACT AND DIVISION 01, as applicable, apply to this Section.

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Conduit supports.
 - 2. Formed steel channel.
 - 3. Spring steel clips.
 - 4. Sleeves.
 - 5. Mechanical sleeve seals.
 - 6. Firestopping relating to electrical work.
 - 7. Firestopping accessories.
 - 8. Equipment bases and supports.

1.2 REFERENCES

- A. Underwriters Laboratories Inc.:
 - 1. UL 263 - Fire Tests of Building Construction and Materials.
 - 2. UL 723 - Tests for Surface Burning Characteristics of Building Materials.
 - 3. UL 1479 - Fire Tests of Through-Penetration Firestops.
 - 4. UL - Fire Resistance Directory.

1.3 DEFINITIONS

- A. Firestopping (Through-Penetration Protection System): Sealing or stuffing material or assembly placed in spaces between and penetrations through building materials to arrest movement of fire, smoke, heat, and hot gases through fire rated construction.

1.4 PERFORMANCE REQUIREMENTS

- A. Firestopping: Conform to Building Code and UL for fire resistance ratings and surface burning characteristics.

1.5 SUBMITTALS

- A. Product Data:
 - 1. Hangers and Supports: Submit manufacturers catalog data including load capacity.

1.6 QUALITY ASSURANCE

- A. Perform Work in accordance with the Building Code.

PART 2 PRODUCTS

2.1 CONDUIT SUPPORTS

- A. Manufacturers:
 - 1. Allied Tube & Conduit Corp.
 - 2. Electroline Manufacturing Company.

3. O-Z Gedney Co.
 4. Appleton.
- B. Hanger Rods: Threaded high tensile strength galvanized carbon steel with free running threads.
- C. Beam Clamps: Malleable Iron, with tapered hole in base and back to accept either bolt or hanger rod. Set screw: hardened steel.
- D. Conduit clamps for trapeze hangers: Galvanized steel, notched to fit trapeze with single bolt to tighten.
- E. Conduit clamps - general purpose: One hole malleable iron for surface mounted conduits.
- F. Cable Ties: High strength nylon temperature rated to 185 degrees F. Self-locking. With Stainless tooth.

2.2 FORMED STEEL CHANNEL

- A. Manufacturers:
1. Allied Tube & Conduit Corp.
 2. B-Line Systems.
 3. Midland Ross Corporation, Electrical Products Division.
 4. Unistrut Corp.
- B. Product Description: Galvanized 12 gage thick steel. With holes 1-1/2 inches on center.

2.3 SLEEVES

- A. Sleeves for raceway Through Non-fire Rated Floors: 18 gage galvanized steel.
- B. Sleeves for raceway Through Non-fire Rated Beams, Walls, Footings, and Potentially Wet Floors: Steel pipe or 18 gage galvanized steel.
- C. Sleeves for raceway Through Fire Rated and Fire Resistive Floors and Walls, and Fire Proofing: Prefabricated fire rated sleeves including seals, UL Listed.
- D. Fire-stopping Insulation: Glass fiber type, non-combustible.

2.4 SPRING STEEL CLIPS

- A. Product Description: Mounting clamp, and screw.

2.5 MECHANICAL SLEEVE SEALS

- A. Manufacturers:
1. Thunderline Link-Seal, Inc.
 2. NMP Corporation.
- B. Product Description: Modular mechanical type, consisting of interlocking synthetic rubber links shaped to continuously fill annular space between object and sleeve, connected with bolts and pressure plates causing rubber sealing elements to expand when tightened, providing watertight seal and electrical insulation.

2.6 FIRESTOPPING

- A. Manufacturers:
 - 1. Dow Corning Corp.
 - 2. Fire Trak Corp.
 - 3. Hilti Corp.
 - 4. International Protective Coating Corp.
 - 5. 3M fire Protection Products.
 - 6. Specified Technology, Inc.
- B. Product Description: Different types of products by multiple manufacturers are acceptable as required to meet specified system description and performance requirements; provide only one type for each similar application.
 - 1. Silicone Firestopping Elastomeric Firestopping: Multiple component silicone elastomeric compound and compatible silicone sealant.
 - 2. Foam Firestopping Compounds: Multiple component foam compound.
 - 3. Formulated Firestopping Compound of Incombustible Fibers: Formulated compound mixed with incombustible non-asbestos fibers.
 - 4. Fiber Stuffing and Sealant Firestopping: Composite of mineral or ceramic fiber stuffing insulation with silicone elastomer for smoke stopping.
 - 5. Mechanical Firestopping Device with Fillers: Mechanical device with incombustible fillers and silicone elastomer, covered with sheet stainless steel jacket, joined with collars, penetration sealed with flanged stops.
 - 6. Intumescent Firestopping: Intumescent putty compound which expands on exposure to surface heat gain.
 - 7. Firestop Pillows: Formed mineral fiber pillows.

2.7 FIRESTOPPING ACCESSORIES

- A. Installation Accessories: Provide clips, collars, fasteners, temporary stops or dams, and other devices required to position and retain materials in place.
- B. General:
 - 1. Furnish UL Listed products.
 - 2. Select products with rating not less than rating of wall or floor being penetrated.
- C. Non-Rated Surfaces:
 - 1. Stamped steel, chrome plated, hinged, split ring escutcheons or floor plates or ceiling plates for covering openings in occupied areas where conduit is exposed.
 - 2. For exterior wall openings below grade, furnish modular mechanical type seal consisting of interlocking synthetic rubber links shaped to continuously fill annular space between conduit and cored opening or water-stop type wall sleeve.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify openings are ready to receive sleeves.
- B. Verify openings are ready to receive firestopping.

3.2 INSTALLATION - HANGERS AND SUPPORTS

- A. Anchors and Fasteners:
 - 1. Concrete Structural Elements: Provide precast inserts, expansion anchors, powder actuated anchors or preset inserts as required.
 - 2. Steel Structural Elements: Provide beam clamps, spring steel clips, steel ramset

- fasteners or welded fasteners as required.
 - 3. Concrete Surfaces: Provide self-drilling anchors and expansion anchors as required.
 - 4. Hollow Masonry, Plaster, and Gypsum Board Partitions: Provide toggle bolts or hollow wall fasteners as required.
 - 5. Solid Masonry Walls: Provide expansion anchors or preset inserts as required.
 - 6. Sheet Metal: Provide sheet metal screws.
 - 7. Wood Elements: Provide wood screws.
- B. Inserts:
- 1. Install inserts for placement in concrete forms.
 - 2. Install inserts for suspending hangers from reinforced concrete slabs and sides of reinforced concrete beams.
 - 3. Provide hooked rod to concrete reinforcement section for inserts carrying pipe over four (4) inches.
 - 4. Where concrete slabs form finished ceiling, locate inserts flush with slab surface.
 - 5. Where inserts are omitted, drill through concrete slab from below and provide through-bolt with recessed square steel plate and nut recessed into and grouted flush with slab.
- C. Install conduit and raceway support and spacing in accordance with CEC.
- D. Do not fasten supports to suspended ceiling support system, pipes, ducts, mechanical equipment, or conduit.
- E. Install multiple conduit runs on common hangers.
- F. Supports:
- 1. Fabricate supports from structural steel or formed steel channel. Install hexagon head bolts to present neat appearance with adequate strength and rigidity. Install spring lock washers under nuts.
 - 2. Install surface mounted cabinets and panelboards with minimum of four anchors.
 - 3. In wet and damp locations install steel channel supports to stand cabinets and panelboards one (1) inch off wall.
 - 4. Support vertical conduit at every floor.

3.3 INSTALLATION - FIRESTOPPING

- A. Install material at fire rated construction perimeters and openings containing penetrating sleeves, piping, ductwork, conduit, and other items, requiring firestopping.
- B. Apply primer where recommended by manufacturer for type of firestopping material and substrate involved, and as required for compliance with required fire ratings.
- C. Apply firestopping material in sufficient thickness to achieve required fire and smoke rating.
- D. Compress fibered material to maximum 40 percent of its uncompressed size.
- E. Place intumescent coating in sufficient coats to achieve rating required.
- F. Remove dam material after firestopping material has cured.
- G. Fire Rated Surface:
 - 1. Seal opening at all rated floors and walls as follows:
 - a. Install sleeve through opening and extending beyond minimum of one (1) inch on both sides of building element.
 - b. Size sleeve allowing minimum of one (1) inch void between sleeve and building

- element.
 - c. Pack void with backing material.
 - d. Seal ends of sleeve with UL Listed fire resistive silicone compound to meet fire rating of structure penetrated.
 - 2. Where cable tray, bus, or conduit, penetrates fire rated surface, install firestopping product in accordance with manufacturer's instructions.
- H. Non-Rated Surfaces:
- 1. Seal opening through non-fire rated floors and walls as follows:
 - a. Install sleeve through opening and extending beyond minimum of one (1) inch on both sides of building element.
 - b. Size sleeve allowing minimum of one (1) inch void between sleeve and building element.
 - c. Install type of firestopping material recommended by manufacturer.
 - 2. Install escutcheons where conduit, penetrates non-fire rated surfaces in occupied spaces. Occupied spaces include rooms with finished ceilings and where penetration occurs below finished ceiling.
 - 3. Exterior wall openings below grade: Assemble rubber links of mechanical seal to size of conduit and tighten in place, in accordance with manufacturer's instructions.

3.4 INSTALLATION - SLEEVES

- A. Exterior watertight entries: Provide mechanical sleeve seals.
- B. Interior conduit penetrations not required to be watertight: Sleeve and fill with silicon foam.
- C. Set sleeves in position in forms. Provide reinforcing around sleeves.
- D. Size sleeves large enough to allow for movement due to expansion and contraction. Provide for continuous insulation wrapping.
- E. Extend sleeves through floors and walls one (1) inch above finished floor level. Caulk sleeves.

END OF SECTION 26 05 29

SECTION 26 05 33 - RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of this Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
1. Conduit and fittings.
 2. Outlet boxes.
 3. Weatherproof outlet boxes.
 4. Junction and pull boxes.
 5. Floor boxes.
 6. Cabinets, termination cabinets.
 7. Gutters.

1.3 SUBMITTALS

- A. Provide Product Data for the Following Equipment:
1. Conduit and fittings.
 2. Outlet boxes.
 3. Weatherproof outlet boxes.
 4. Junction and pull boxes.
 5. Floor boxes.
 6. Cabinets, termination cabinets.
 7. Gutters.
 8. Putty pads.
 9. Raceways
- B. Submit detailed conduit routing plan, for review and approval, prior to installation as follows:
1. Exposed and/ or concealed in building walls for conduits larger than 2-inch outside diameter.
 2. All underground conduits (3/4-inch and larger) in duct bank; concealed in floor slabs, equipment pads and concrete slabs.

1.4 SUBMITTALS

- A. Minimum acceptable conduit sizes are summarized in the following table:

	Minimum Size
Underground, site wiring	1"
Underground <ul style="list-style-type: none">• Building Wiring Aboveground <ul style="list-style-type: none">• Equipment or panel feeders• Telecommunications	3/4"
Aboveground <ul style="list-style-type: none">• Lighting or branch circuit wiring• Fire alarm• Security	1/2"

Other	3/4"
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1.5 QUALITY ASSURANCE

- A. Regulatory Requirements:
 - 1. Conform to requirements of the CEC, latest adopted version with amendments by local AHJs.
 - 2. Furnish products listed by UL or other independent and nationally recognized testing firm.

1.6 DELIVERY, STORAGE AND HANDLING

- A. Protect conduit from corrosion and entrance of debris by storing above grade. Provide appropriate covering.
- B. Protect PVC and PVC-coated metallic conduit from sunlight.
- C. Protection of and cleanliness of pathways and raceways must be assured during the construction process in order to eliminate the possibility of debris entering the conduit, duct, pathway resulting in decreased wire capacity and potential damage to installed conductors and cables.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Polyvinyl Chloride (PVC) coated galvanized rigid steel conduit and intermediate metal conduit shall be in accordance with NEMA RN 1. Coating shall be applied under controlled factory conditions. Prior to coating, conduit shall meet requirements of ANSI C80.1 and UL 6 or ANSI C80.6 and UL 1242 as appropriate. PVC coated conduits shall have ultra-violet (UV) inhibitor in the coating material.
- B. Intermediate Metal Conduit (IMC). Raceway shall be hot dipped galvanized mild steel in accordance with ANSI C80.6 and UL 1242 and shall bear the UL label. Conduit shall have same characteristics of rigid steel except for thinner wall.
- C. Galvanized Rigid Steel Conduit (GRSC or RGS), couplings and elbows shall be hot dip galvanized, rigid mild steel in accordance with ANSI C80.1 and UL 6. The conduit interior and exterior surfaces shall have a continuous zinc coating with a transparent overcoat of enamel, lacquer, or zinc chromate. Conduit shall be formed with continuous welded seams with a uniform wall thickness, in minimum 10-foot lengths, with threaded ends.
- D. Electrical Metallic Tubing (EMT). Electrical metallic tubing, including elbows and bends, shall be zinc coated, mild steel in accordance with the requirements of ANSI C80.3 and UL 797. The interior and exterior surfaces of the tubing shall have a continuous zinc coating. Conduit shall be formed with a continuous welded seam, with a uniform wall thickness, in minimum 10-foot lengths.
- E. Non-Metallic Conduit shall be as follows:
 - 1. Schedule 40: Conduit shall be 90 degree Celsius, polyvinyl chloride in conformance with NEMA TC-2 and UL 651 requirements.
 - 2. Spacers used in duct bank installations shall be high impact plastic, interlocking bases, and intermediate type spacers. Place spacers between 6 and 10 feet apart.

- F. Flexible Metal Conduit shall be galvanized steel meeting the requirements of UL 1. Flexible aluminum conduit is not permitted.
- G. Liquid-Tight Flexible Metal Conduit shall be plastic jacketed, galvanized steel, "Sealtite" Type EF for general service areas or Type HC for high temperature when used under raised floor or in air plenums. Conduit shall be UL listed.
- H. Manufacturers:
 - 1. Outlet Boxes: Bowers, Raco, Orbit, Steel City or equal.
 - 2. Weatherproof Outlet Boxes: Bell, Red Dot, Carlon or equal.
 - 3. Floor Boxes: Wiremold/ Walker, Hubbell, Steel City, or equal.
 - 4. Junction and Pull Boxes: Circle AW, Hoffman, Wireguard or equal.
 - 5. Box Extension Adapter: Bell, Red Dot, Carlon or equal.
 - 6. Conduit Fittings: O-Z Gedney, Thomas & Betts, Raco, Crouse Hinds, or equal.
 - 7. Putty pads: 3M, Hilti, or equal.
 - 8. Heavy wall rigid non-metallic conduit, Carlon, Certainteed, R&G Sloane or equal.
 - 9. Extra heavy wall non-metallic conduit, Carlon, Certainteed, R&G Sloane or equal.
 - 10. Flexible Metal Conduit (FMC), Alfex, American Flexible Conduit or equal.
 - 11. Liquid tight flexible metal conduit, Anacanda (type UA), Electri-flex Liguatite or equal.
 - 12. Floor Boxes, Single Gang, Walker/ Wiremold 880 CS Series or approved equal.
 - 13. Floor Boxes, Multiple Gang, Walker/ Wiremold RFB Series or Walker Omnibox multi-service floor box with carpet plates, and/ or water resistant device covers.
 - 14. Masonry Boxes, outlets in concrete, Raco Series 690 or equal.
- I. Listed products for termination, coupling, extending, benching supports of raceways shall be used.

2.2 OUTLET BOXES

- A. NEMA 1 gutter, junction and pull boxes shall be fabricated from code gage steel finished in grey enamel with screw cover fronts and concentric knockouts in all sides.
- B. NEMA 3R gutter, junction and pull boxes shall be fabricated from code gage galvanized steel with screw cover fronts and concentric knockouts in the bottom only. Any penetrations to the side, top or back shall be weatherproofed in an approved manner such as "MYERS" gasketed type hub or equal.
- C. Steel outlet boxes and plaster rings shall be galvanized rigid assemblies, either one piece pressed or factory welded construction containing the size and number of knockouts required. Steel outlet boxes shall be manufactured, sized and installed in accordance with CECArticle 314. Device Outlet: Installation of one or two devices at common location, minimum 4" square, minimum 1-1/2" deep. Single or 2 gang flush device plaster ring. Raco or equal.
- D. Luminaire Outlet: minimum 4" square with correct plaster ring depth, minimum 1-1/2" deep with 3/8" luminaire stud if required. Provide proper depth plaster ring on bracket outlets and on ceiling outlets.
- E. Construction: Provide galvanized steel interior outlet wiring boxes, of the type, shape and size, including depth of box, to suit each respective location and installation; constructed with stamped knockouts in back and sides, and with threaded holes with screws for securing box covers or wiring devices. Boxes shall be properly secured to the structure such that they are flush with the finish surface. Boxes shall be made structurally secure by means of the proper fastening devices.

- F. Accessories: Provide outlet box accessories as required for each installation, including mounting brackets, wallboard hangers, extension rings, plaster rings, luminaire studs, cable clamps and metal straps for supporting outlet boxes, compatible with outlet boxes being used and meeting requirements of individual wiring situations.

2.3 JUNCTION AND PULL BOXES

- A. Construction: Provide galvanized sheet steel junction and pull boxes, with screw-on covers; of the type shape and size, to suit each respective location and installation; with welded seams and equipped with steel nuts, bolts, screws and washers.
- B. Location:
 - 1. Install junction boxes above accessible ceilings for drops into walls for receptacle outlets from overhead.
 - 2. Install junction boxes and pull boxes as required to facilitate the installation of conductors and limiting the accumulated angular sum of bends between boxes, cabinets and appliances to 300 degrees.
 - 3. Locations: Junction boxes shall be located only where necessary and only in equipment rooms, closets, and accessible attic and underfloor spaces. A horizontal distance of 24" shall separate outlet boxes on opposite sides of occupancy separation walls, fire-rated walls or partitions.
 - 4. Labeling: Junction box covers shall be marked with indelible ink indicated the circuit numbers passing through the box.

2.4 CONDUIT FITTINGS

- A. Requirements: Provide corrosion-resistant punched-steel box knockout closures, conduit locknuts and plastic conduit bushings of the type and size to suit each respective use and installation.
- B. Steel boxes may allow for field knock-out modifications, but shall in all other ways conform to code requirements.

2.5 FLOOR BOXES - SINGLE GANG

- A. Construction: Deep cast iron fully adjustable before and after concrete pour with all required components for complete activation. Verify required components for application of service fittings, covers, monuments, and the like, attached to floor boxes.
- B. Activations:
 - 1. Flush: Provide brass duplex or single signal cover, hinged with set screw lock. Carpet or tile finish ring.
 - 2. Monuments: Provide stainless steel monuments with power receptacle or data grommet as noted.
 - 3. Coordinate specific application of systems as noted on Drawings.

2.6 FLOOR BOXES - MULTIPLE GANG

- A. Construction: Deep cast iron, fully adjustable before and after pour. Equal to Walker/ Wiremold RFB Series or Walker Omnibox multi-service floor box with carpet plates, and/ or water resistant device covers. Verify color. Partition for different power or signal applications. Provide required power receptacle devices and signal grommets or receptacles as noted. Flange type shall be compatible with floor covering for either carpet or vinyl as required and shall be brass type not polycarbonate.

- B. Floor mounted boxes shall be water tight and cast iron when installed in grade level concrete slab floor, fully adjustable with interior and exterior leveling screws. Receptacle flange shall be brass with a duplex lift lid. Flange type shall be compatible with floor type. Before installation, coordinate exact location with Architect.

2.7 PUTTY PADS

- A. Intumescent moldable firestop putty designed to protect electrical outlet boxes.
- B. Provide putty pads of proper type around outlet boxes and/ or as detailed on plan to meet sound transmission restrictions and fire ratings of walls

PART 3 EXECUTION

3.1 INSTALLATION

- A. Conduit systems listed below are for use in installations where they are permitted to be used by CEC and/ or other occupancy restrictions. The below installation methods do not intend to suggest that these materials be installed in conflict with any applicable code. Special attention to applications shall be made in building types such as wet location, hazardous locations, assembly occupancy and multi-story, but not limited to these. Requirements which are more restrictive than the CEC may be called for by the drawings and/ or these specifications. These requirements must be adhered to. The Electrical Contractor shall be responsible to use the proper conduit system for the application. Exposed conduit is not allowed below ceilings or above slab of floor, without prior approval from Electrical Engineer. All conduits shall be concealed except in electrical and telecommunication rooms or where shown to be surface mounted. Exposed conduit (where allowed) shall be run square and plumb with building lines in an approved manner. Support roof mount conduits, where allowed, with minimum 12" wide approved rooftop supports (B-Line Durablok or approved equal) unless otherwise detailed in roof requirements or as specified in roofing specification. Strap conduits to blocks with proper sized conduit straps. Spacing of support shall be a minimum as provided for in the CEC. All exposed conduit mounted below 8' above finished grade shall be strapped at a minimum of 5' spacing.
- B. Non-Metallic Rigid Conduit shall be used in concrete slabs, below concrete slabs on grade, or underground outside of a building slab or foundation. Maintain minimum depth requirements and cover with appropriate fill material. Conduit shall be heavy wall Schedule 40 or 80, rigid PVC only. Rigid utility P&C duct shall not be used in any application. Properly sized grounding conductors shall be installed per CEC article 250, in all non-metallic conduit branch circuit and feeder runs. PVC conduit shall be formed or field bent only with the use of properly approved bending tools such as to not decrease the internal bore of the conduit. All conduits shall be cut square and reamed of burrs. Approved and compatible glue shall be used on all PVC fittings to attain watertight joints.
- C. Galvanized Rigid Steel (GRS) conduit shall be used where exposed less than 8'-0" above finished grade to 18" below finished grade and where subject to physical damage. Conduits shall be cut square and reamed to remove burrs and sharp edges. Strap conduit below 8' above grade at 5' intervals. Unless otherwise noted, threadless setscrew and threadless weathertight fittings may be used in lieu of threaded fittings. All threaded ends entering a junction box of any type shall require one locknut on the inside and one on the outside of the enclosure and be provided with a plastic bushing or grounding bushing where necessary for proper grounding. Where exposed to moisture, a watertight hub or other approved method shall be required. All conduits shall be stubbed up straight and uniform into junction boxes, panels, cabinets, etc., and shall be (GRS) properly supported and strapped. All GRS conduit located below grade, shall be tape wrapped.

- D. Electrical Metallic Tubing (EMT) shall be used as allowed by code and as permitted by this specification. It shall not be in contact with soil or the concrete slab on the ground floor of any structure. Connectors and couplings shall be steel insulated set screw type where installed in indoor dry locations not subject to moisture. Where the potential for moisture is present, compression type weathertight fittings are required. One hole conduit straps are permitted from 1/2" to 1" and two hole conduit straps are required for size 1-1/4" and larger. EMT shall not be allowed in areas subject to severe physical damage. Install copper ground wire sized per CEC 250-122 in all EMT conduits.
- E. Flexible conduit may be used where concealed in building construction or above dropped ceilings, but shall meet the following criteria: No individual circuit path from distribution panel to last device shall exceed a cumulative length of 6' of flexible conduit from start to end. Flexible conduit shall not exceed a total directional change of 270 bending degrees in any one run between conduit terminations. Squeeze type or Jake type steel flex fittings of a grounding type are required. Flexible conduit must be supported in accordance with CEC. Where exposed to the weather, moisture, or spray down flexible conduit shall be of the liquidtight type. Fittings shall be manufactured for use with liquidtight flexible conduit. All motor connections shall be made with liquidtight flex. Flexible conduit may not be used where exposed except for last 2' of equipment connection and unless otherwise noted or approved. A copper ground wire sized per CEC 250-122 shall be installed in all flexible conduit runs. Flexible conduit may not be used exposed. Weatherproof liquid tight conduit shall not be used at roof level for equipment connections with lengths exceeding 24" nor shall it be used to circumvent a rigid conduit system in a horizontal direction. Connect recessed lighting fixtures to conduit runs with a maximum of 6' of flexible metal conduit extending from junction box to fixture.
- F. Underground conduits and transition to above grade/ slab shall be as follows:
1. PVC elbows 2" and smaller are allowed, or if top of elbow is minimum 18" BFG or below top of slab, otherwise GRS elbows are required.
 2. GRS risers are required from elbow below grade to equipment (device, outlet, panel, cabinet, etc.) above grade.
 3. GRS elbows/risers to be PVC coated or 10 MIL tape wrapped (1/2" lapped) to 3" above finish grade or top of slab.
- G. Conduit Supports: Conduit runs may be supported by one-hole and two-hole straps or supports as manufactured by Unistrut, Minerallac, Caddy or equals. Supports may be fastened by means of anchors, shields, beam clamps, toggle bolts, or other approved methods appropriate for the application and size of conduit. Pipe nailers (J-hooks) may only be used for 1" conduit and smaller and only in wood frame construction. Conduit support methods are subject to review by the engineer and authority having jurisdiction for adequacy. Installations deemed inadequate shall be corrected by the contractor at no cost to the Owner.
- H. Bends and offsets shall be made with approved tools for the type of conduit being utilized. Bends shall be made without kinking or destroying the smooth bore of the conduit. Parallel conduits shall be run straight and true with bends uniform and symmetrical. Minimum radii shall be per CEC 344-24.
- I. Conduit Stub-outs below grade shall be capped with plastic cap, and identified by placing a pull box marked with correctly identified utility such as "Elec", "Tel", etc. Dimension for exact location on field record drawings. Provide lids for proper field application (i.e. traffic, incidental, pedestrian).
- J. Conduit Seals - Where below grade conduits enter structure through slab or retaining wall of building or basement, seal the inside of each conduit as follows:
1. Provide damming material around conductors 3" into conduit. Polywater or equal.

2. Fill 3" of conduit with 3M #2123 sealing compound.
 3. Wrap conductors where they exit the conduit with 3M #2229 "Scotch Seal" mastic tape. Lap tape to approximate diameter of the raceway and wrap outside of conduit opening with (minimum) one turn.
 4. Use conduit sealing bushings type CSB (O-Z/ Gedney) or equal.
 5. Empty conduits shall be sealed with standard non-hardening duct seal compound and then capped to prevent entrance of moisture and gases and to meet fire resistance requirements.
 6. Provide cable drip loop minimum 12" high.
- K. Marker tape: Place marker tape at 12" below finish grade along and above buried conduits. Label tape "CAUTION: ELECTRICAL LINES BELOW" or similar wording.
- L. Electrical and communications systems raceways routed underground shall not occupy the same trench as plumbing utilities such as sewer, water, storm drain, gas or other wet or dry gaseous utility system. A minimum of 12" of undisturbed earth is required. Where utilities must cross in closer proximity to each other due to physical constraints, 6" minimum crossing distances are allowed.
- M. Conduits, routed below footings, slabs, grade beams, columns, and other structural elements shall be installed in strict compliance with structural details and criteria shown on structural plans. Clearances below structural elements and sleeves through structural elements must be carefully planned to avoid conflict and must be approved by the structural engineer if conflict arises.
- N. All conduit or raceways passing through fire rated walls, floors, or ceilings shall be installed with a listed penetration method which protects the opening to the same rating as the assembly and is non hardening.
- O. Location: Locate boxes and conduit bodies so as to ensure accessibility of electrical wiring.
- P. Anchoring: Secure boxes rigidly to the substrate upon which they are being mounted, or solidly embed boxes in concrete or masonry.
- Q. Special Application: Provide weatherproof outlets for locations exposed to weather or moisture.
- R. Knockout Closures: Provide knockout closures to cap unused knockout holes where blanks have been removed.
- S. Mount outlet boxes, unless otherwise required by ADA, or noted on drawings, the following distances above the finished floor:
1. Receptacles, Telephone, TV & Data outlets. (measured to bottom of outlet box): +15".
 2. Outlet above counter (measured to top of outlet box): +46".
 3. Control (light) Switches. (measured to top of outlet box): +48".
 4. Fire Alarm Manual Pull Stations, T-stats. (measured to top of outlet box): +48".
 5. Fire Alarm Visuals: the lower of +80" to bottom of lens, or 6" below ceiling.
 6. Other Outlets: As indicated in other sections of specifications or as detailed on drawings.
- T. Coordinate all electrical device locations with the architectural floor plan and interior and exterior elevations to prevent mounting devices within elements that they may conflict such as cabinetry, mirrors, planters, etc.
- U. Size outlet and junction boxes to minimum wire fill space requirements. Upsize box as

required to allow ease of wire installation and device installation.

- V. Outlet and junction boxes in fire rated walls shall be gauged and spaced so as not to exceed the maximum penetration allowed by the assembly without compromising the fire rating. If a conflict arises relative to a specific condition, the contractor shall follow the requirements of the fire authority and ask for guidance from the design team. At no time should a larger box be installed prior to resolution of conflict.

END OF SECTION 26 05 33

SECTION 26 05 53 - IDENTIFICATION OF ELECTRICAL SYSTEMS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of this Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section Includes:
 - 1. Nameplates and warning signs where specified herein and as shown on contract documents including the following:
 - a. Nameplates and warning signs permanently installed on all electrical equipment and devices including, but not limited to, the following items:
 - 1) Enclosures for transformers, switchboards, motor control, panels, pullboxes, cabinets, motors, generators, transfer switches.
 - 2) Enclosures for all separately enclosed devices including, but not limited to, disconnect switches, circuit breakers, contactors, time switches, control stations and relays, fire alarm panels and lighting control panel.
 - 3) Wall switches not within sight of outlet controlled.
 - 4) Special systems such as, but not limited to, telephone, fire alarm, warning, and signal systems. Identification shall be at each equipment rack, terminal cabinet, control panel, annunciator and pullbox.
 - 5) Devices mounted within and part of equipment including circuit breakers, switches, control devices, control transformers, relays, indication devices and instruments.
 - 2. Conductor and Cable Identification.
- B. Related Sections:
 - 1. Section 26 05 00: Common Work Results for Electrical.
 - 2. Section 26 05 19: Low-Voltage Electrical Power Conductors and Cables.
 - 3. Section 26 20 00 Electrical Distribution Equipment.
- C. Reference Standards:
 - 1. California Electrical Code (CEC) based on NFPA 70 (NEC). California Code of Regulations, Title 24, Part 3.
 - 2. National Fire Protection Agency (NFPA):
 - a. 70E Standard for Electrical Safety in the Workplace.
 - 3. American National Standards Institute (ANSI):
 - a. A13.1 Pipe Markers.
 - b. Z535 Standards for Safety Signs and Labels.
 - 4. Underwriters Laboratories, Inc. (UL):
 - a. 969 Standard for Marking and Labeling Systems.
 - 5. Code of Federal Regulations, Title 29, Part 1910:
 - a. 144 Safety color code for marking physical hazards.
 - b. 145 Specifications for accident prevention signs and tags.

PART 2 PRODUCTS

2.1 EQUIPMENT LABEL DESIGNATIONS

- A. Equipment labels indicating equipment designations both emergency and normal.

Designation per drawings or to be supplied with shop drawings approval.

- B. Panelboard labels showing panel designation, voltage, phase, and source.
- C. Distribution panels, transformers, safety switches, transfer equipment, etc. Labels shall be per ANSI Z535.4 guidelines.

2.2 MATERIALS

- A. For Labels: Three layer laminated plastic or micarta with engraved white letters over black background.
- B. For Emergency Equipment: Use engraved white letters over red background.
- C. For Warning Signs: Minimum 18 gauge steel with red lettering on white porcelain enamel finish.
- D. Arc flash labels shall be provided as required by CEC Article 70E.
- E. Conductor tape number markers: TayMac MX4280 Series non-fading permanent adhesive.

PART 3 EXECUTION

3.1 MOUNTING

- A. Equipment labels shall be mounted by self-tapping, threaded screws, and bolts, or by rivets. Adhesive types are not acceptable unless specifically noted in this section.
- B. Conductor tape markers shall be consistently placed for ready conductor identification.

3.2 HEIGHTS ON LABELS

- A. Panelboards, Switchboards and Motor Control Centers and Special Systems Enclosures: 1/4" identify equipment designation; 1/8" identify voltage rating and source.
- B. Individual Circuit Breakers, Switches, and Motor Starters in Panelboards, Switchboards, and Motor Control Centers: 3/16" identify circuit and load served, including location of equipment.
- C. Enclosed Circuit Breakers, Enclosed Switches, and Motor Starters: 3/16" identify load served.
- D. Transformers: 3/16" identify equipment designation; 1/8" identify primary and secondary voltages, primary source, and secondary load. Include location of primary source or secondary load if remote from transformer.

3.3 WARNING SIGNS

- A. Warning signs shall be permanently mounted with cadmium plated steel screws or nickel-plated brass bolts.
- B. Warning signs to read "DANGER - HIGH VOLTAGE", with letters 1-1/2" high, 3/16" stroke minimum.

- C. Provide warning sign on all doors or immediately next to door for equipment rooms, enclosures or closets containing equipment energized above 150 volts to ground as per CEC, and/ or as directed by the Architect. For interior finish spaces and interior doors, signage shall be coordinated and approved with the Architect in advance of installation.

END OF SECTION 26 05 53

SECTION 26 09 43.13 - DIGITAL-NETWORK LIGHTING CONTROLS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. System Software Interfaces.
2. System Backbone and Integration Equipment.
3. Wired Networked Devices.

B. Related Requirements:

1. Div. 26: Section 260010 "Supplemental Requirements for Electrical" for additional abbreviations, definitions, submittals, qualifications, testing agencies, and other Project requirements applicable to Work specified in this Section.
2. Section 260011 "Facility Performance Requirements for Electrical" for seismic-load, wind-load, acoustical, and other field conditions applicable to Work specified in this Section.
3. Section 262726 "Wiring Devices" for wired switches and dimmers and other Project requirements applicable to Work specified in this Section.

1.2 DEFINITIONS

- A. Data Bus: A wired interface used to communicate with connected devices.
- B. Device: A collective term for connected devices, including fluorescent ballasts, LED drivers, incandescent luminaires, manual switches, switching relays, sensors, and similar.
- C. Global: Communication between devices in otherwise separate spaces using a bridging device or system controller.
- D. Group: A set of devices that communicate together.
- E. Monitoring: Acquisition, processing, communication, and display of equipment status data, metered electrical parameter values, power quality evaluation data, event and alarm signals, tabulated reports, and event logs.
- F. Scene: Digital light level associated with a preset.
- G. System Backbone: Devices used to connect and manage otherwise separate spaces, including bridging devices and gateways or system controllers. Used to expose devices to software configuration via TCP/IP.

1.3 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at **Project site**.
- B. Preinstallation Coordination Meeting(s): For digital-network lighting controls. Conduct meeting(s) **as videoconference**.
 - 1. Attendees: Installers, fabricators, representatives of manufacturers, and administrators for field tests and inspections. Notify Architect of scheduled meeting dates.
 - 2. Engage factory-authorized service representative to attend preinstallation conference and review the submittal drawing, sequence of operation, and device installation best practices with Project team.
 - 3. Engage factory-authorized service representative to perform cellular signal strength measurements during site walk through and compare to Project plans to verify the placement of cellular antennas and quantity of lighting control system RF access points.

1.4 ACTION SUBMITTALS

- A. Product Data:
 - 1. Bill of Materials necessary to install the networked lighting control system.
 - 2. Product Specification Sheets indicating general device descriptions, dimensions, electrical specifications, wiring details, and nomenclature.
 - 3. Information Technology (IT) connection information pertaining to interconnection with facility IT networking equipment and third-party systems.
 - 4. Other Diagrams and Operational Descriptions - as needed to indicate system operation or interaction with other system(s).
- B. Shop Drawings:
 - 1. Riser Diagrams showing device wiring connections of system backbone and typical per room/area type.

1.5 INFORMATIONAL SUBMITTALS

- A. Contractor Startup/Commissioning Worksheet.
- B. Service Specification Sheets indicating general service descriptions, including startup, training, post-startup support, and service contract terms.
- C. Field quality-control reports.
- D. Sample Warranty: For manufacturer's special warranty.

1.6 CLOSEOUT SUBMITTALS

- A. Maintenance Contracts:
 - 1. Hardware and Software Operation Manuals
 - 2. Maintenance service agreement.
 - 3. Software service agreement.
- B. Warranty documentation.

1.7 QUALITY ASSURANCE

- A. Manufacturer Qualifications:
 - 1. Phone Support: Toll-free technical support available from manufacturer through an online tool to schedule a technical support appointment and provide 24/7 emergency support.
 - 2. Remote Support: Manufacturer capable of providing remote support and ability to virtually connect with customers to address issues with visual guidance overlaid on images of real-world objects.
 - 3. Cellular Connectivity: Manufacturer capable of cellular connectivity to a networked lighting control systems available to provide remote support within the continental United States.
 - 4. On-Site Support: Manufacturer capable of providing a 72-hour, on-site response time within the continental United States.
 - 5. Service Contracts: Manufacturer capable of providing service contracts for continued on-site and remote support of the lighting control system post-installation for terms up to 10 years from substantial completion, including:
 - a. Remote and on-site emergency response.
 - b. Remote system performance checks.
 - c. Remote diagnostics.
 - d. Replacement parts.

1.8 WARRANTY

- A. Warranty: Manufacturer and Installer warrant that installed lighting control devices perform in accordance with specified requirements and agree to repair or replace, including labor, materials, and equipment, devices that fail to perform as specified within extended warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Faulty operation of lighting control hardware.
 - b. Faulty operation of lighting control firmware.
 - 2. Minimum Warranty Period: Five years from date of shipment.

PART 2 - PRODUCTS

2.1 SYSTEM COMPLIANCE

- A. System components manufactured in accordance with UL 916 and UL 924 standards where applicable.
- B. System components manufactured in accordance with CFR Title 47, Part 15 standards where applicable.
- C. System components manufactured in accordance with ISED Canada RSS-247 standards where applicable.
- D. System components manufactured in accordance with IFT-008-2015 and NOM-208-SCFI-2016 standards where applicable.
- E. System listed as qualified under DesignLights Consortium Networked Lighting Control System Specification v5.0.
- F. Performance Criteria:
 - 1. Regulatory Requirements:
 - a. Listed and labeled in accordance with NFPA 70, by qualified electrical testing laboratory recognized by authorities having jurisdiction, and marked for intended location and application.

2.2 SYSTEM PERFORMANCE REQUIREMENTS

- A. System Architecture:
 - 1. System architecture based upon the following concepts:
 - a. Networkable intelligent lighting control devices.
 - b. Standalone lighting control zones using distributed intelligence.
 - c. Optional system backbone for remote, time-based, and global operation.
 - 2. Intelligent lighting control devices with individually addressable network communication capability and having one or more basic lighting control components including: occupancy sensor, photosensor, relay, dimming output, contact closure input, analog 0-10 V(dc) input, and manual wall station capable of indicating switching, dimming, and/or scene control. Combining one or more of these components into a single device enclosure permissible to minimize overall system device count.
 - 3. System capable of interfacing directly with networked luminaires such that either low-voltage network cabling is used to interconnect networked luminaires with control components such as sensors, switches, and system backbone.

4. Networked luminaires and intelligent lighting control devices support individual (unique) configuration of device settings and properties, with such configuration residing within the networked luminaires and intelligent control devices.
5. Lighting control zones consisting of one or more networked luminaires and intelligent lighting control devices capable of providing automatic control from sensors (occupancy and/or photosensor) and manual control from local wall stations without requiring connection to a higher-level system backbone.
 - a. Lighting control zones (wired) support at least 128 devices per zone.
 - b. Capable of being networked with a higher-level system backbone to provide time-based control, control from inputs or systems external to control zone, and remote configuration and monitoring through a software interface.
6. Networked luminaires and intelligent lighting control devices with distributed intelligence programming stored in non-volatile memory, such that following any loss of power the lighting control zones operate according to their defined default settings and sequence of operations.
7. System to include one or more system controllers that provide time-based control.
8. System controller provides means of connecting the lighting control system to a system software interface and building management systems via BACnet/IP or BACnet MS/TP protocol.
9. System controller supports low-voltage wired within a single controller device.
10. System devices support firmware update, either remotely or from within the application space, for purposes of upgrading functionality at a later date.
11. System capable of reporting lighting system events and performance data to management software for display and analysis.

B. Wired Networked Control Zone Characteristics:

1. Connections to devices within a wired networked lighting control zone and to backbone components accomplished with a single type of low-voltage network cable, compliant with CAT5e specifications or higher. Use of mixed types of low-voltage network cables is unacceptable.
2. Devices connected in "daisy-chain" topology. "Hub-and-spoke" topology, requiring all individual networked devices to be connected to a central component, is unacceptable, to reduce the total amount of network cable required for each control zone.
3. Pre-terminated, plenum-rated, low-voltage network cabling supplied with hardware.
4. Following proper installation and provision of power, all networked devices connected with low-voltage network cable must automatically form a functional lighting control zone without requiring any type of programming, regardless of the programming mechanism (e.g. software application, handheld remote, pushbutton).
 - a. The "out of box" default sequence of operation is intended to provide typical sequence of operation to minimize the system startup and

programming requirements and to also have functional lighting control operation prior to system startup and programming.

5. System software capable of automatic discovery of all connected devices without requiring any provisioning of system or zone addresses.
6. Networked devices capable of detecting improper communication wiring and LED notification to alert installation/startup personnel.
7. Networked control devices suitable for control of egress or emergency light sources without additional, externally mounted UL 924 shunting or 0-10 V(dc) disconnect devices, to provide a compliant sequence of operation while reducing the overall installation and wiring costs of the system. Capable of supporting the following sequence of operation:
 - a. Low-Voltage Power Sensing: Devices automatically provide 100 percent light level upon detection of loss of power sensed via low-voltage network cable connection where applicable.
 - b. Line-Voltage Power Sensing: Devices listed as UL 924 emergency relays which automatically close load-control relay and provide 100 percent light output upon detection of loss of power sensed via line voltage connection to normal power.
8. Global Control Zones: Networked luminaires and intelligent lighting control devices located in different areas able to transmit and track information within at least 128 system-wide control zones to support required sequences of operation that may span multiple areas. Occupancy, photosensor inhibit, and switch commands available across multiple controllers.
9. Wired Networked Wall Station Scene-Control Capabilities:
 - a. Preset Scenes that activate a specific combination of light levels across multiple local and global channels.
 - b. Local Profile Support: Profile Scenes that modify the sequence of operation for devices in the area (group) in response to a button press to dynamically optimize occupant experience and lighting energy usage.
 - 1) Wall stations able to manually start and stop local profiles, or local profile capable of ending after a specific duration of time between five minutes and 12 hours.
 - 2) Configurable Parameters:
 - a) Fixture light level.
 - b) Occupancy time delay.
 - c) Response to occupancy sensors (including enabling/disabling response).
 - d) Response to daylight sensors (including enabling/disabling response).
 - e) Enabling/disabling wall stations.
 - c. Three-Way or Multi-Way Control: Multiple wall stations capable of controlling the same local and global control zones, to support "multi-way" preset scene and profile scene control.

C. System Integration Capabilities:

1. Capable of interface with third-party building management systems (BMS) to support two-way communication using BACnet/IP protocol, BACnet MS/TP protocol, and RESTful API including the following system integration capabilities:
 - a. "Write" messages for control of individual devices, including control of relay and dimming output.
 - b. "Write" messages for control of groups of devices through a single command, including control of relay and dimming output of all devices.
 - c. "Read" messages for individual device status information.
 - 1) Available status will vary based on device type and capabilities, which may include relay state, dimming output, power measurement, occupancy sensor status, and photosensor light measurement.
 - d. "Read" messages for group status information for occupancy, relay state, and dimming output.
 - e. Activation of pre-defined system Global Profiles.
2. Activation of Global Profiles from third-party systems via dry contact closure output signals or digital commands via RS-232 or RS-485.
3. Activation of demand response levels from Demand Response Automation Servers (DRAS) via OpenADR 2.0a protocol.

D. Supported Sequence of Operations:

1. Control Zones:
 - a. Local Control Zones: Networked luminaires and intelligent lighting control devices installed in an area (also referred to as a group of devices) capable of transmitting and tracking occupancy sensor, photosensor, and manual switch information within at least 48 unique control zones to support different and reconfigurable sequences of operation within area. These will also be referred to as local control zones.
 - b. Adjacent Control Zones: Networked luminaires and intelligent lighting control devices capable of tracking occupancy broadcasts from adjacent zones. When this feature is enabled, luminaire output for a vacant zone will reduce to a configurable dimmed state if one or more adjacent zones are occupied. Luminaires will turn off when both primary and adjacent zones are vacant.
 - c. Global Control Zones: Networked luminaires and intelligent lighting control devices located in different areas able to transmit and track information within at least 128 system-wide control zones to support required sequences of operation that may span across multiple areas. Occupancy, photosensor inhibit, and switch commands available across multiple controllers.
2. Wall Station Capabilities:

- a. Wall stations support the following capabilities:
 - 1) On/Off of a local or global control zone.
 - 2) Continuous dimming control of light level of a local or global control zone.
 - b. Multi-Way Control: Multiple wall stations capable of controlling the same local or global control zones, to support "multi-way" switching and dimming control.
3. Occupancy Sensing Capabilities:
- a. Occupancy sensors configurable to control a local or global zone.
 - b. Multiple occupancy sensors capable of controlling the same local or global zones. This capability combines occupancy sensing coverage from multiple sensors without consuming multiple control zones.
 - c. Occupancy sensing sequence of operation modes:
 - 1) On/Off Occupancy Sensing.
 - 2) Partial-On Occupancy Sensing.
 - 3) Partial-Off Occupancy Sensing.
 - 4) Vacancy Sensing (Manual-On / Automatic-Off).
 - d. On/Off, Partial-On, and Partial-Off Occupancy Sensing Modes Sequence of Operation:
 - 1) Occupancy automatically turn lights on to a designated level when occupancy is detected. Designated occupied light level support at least 100 dimming levels.
 - 2) Occupancy sensors automatically turn lights off or to a dimmed state (Partial-Off) when vacancy occurs or if sufficient daylight is detected. Designated unoccupied dim level support at least 100 dimming levels.
 - 3) System capable of combining Partial-Off and Full-Off operation by dimming lights to a designated level when vacant and turning the lights off completely after an additional time delay.
 - 4) Photosensor readings, if enabled in occupancy sensing control zone, automatically adjust light levels during occupied or unoccupied conditions as necessary.
 - 5) Wall station activation changes the dimming level or turn lights off as selected by the occupant. Lights optionally remain in this manually specified light level until the zone becomes vacant. Upon vacancy, normal sequence of operation resumes.
 - e. Vacancy Sensing or Manual-On/Automatic-Off Mode Sequence of Operation:
 - 1) Activation of a wall station is required turn lights on. System capable of programming the zone to turn on to either a designated light level

- or previous user-set light level. Initially occupying the space without using a wall station must not result in lights turning on.
- 2) Occupancy sensors automatically turn lights off or to a dimmed state (Partial-Off) when vacancy occurs or if sufficient daylight is detected. Designated unoccupied dim level support at least 100 dimming levels.
 - 3) System capable of dimming the lights when vacant and then turning the lights off completely after an additional time delay.
 - 4) System capable of an "automatic grace period" immediately following detection of vacancy, during which time any detected occupancy results in the lights reverting to the previous level. After the grace period has expired, the use of a wall station is required to turn lights on.
 - 5) Photosensor readings, if enabled in the Occupancy Sensing control zone, capable of automatically adjusting the light level during occupied or unoccupied conditions as necessary.
 - 6) Wall station interaction changes the dimming level or turn lights off as selected by occupant. Lights remain at manually specified light level until zone becomes vacant; normal sequence of operation resumes upon vacancy.
- f. Occupancy time delays before dimming or shutting off lights separately programmable for all control zones from 15 seconds to 2 hours.
4. Photosensor Sensing Capabilities (Automatic Daylight Sensing):
- a. Photosensor devices configurable to control a local zone.
 - b. Photosensor-Based Control:
 - 1) Continuous Dimming: Control zone automatically adjusts dimming output in response to photosensor readings, to maintain a minimum light level consisting of both electric light and daylight sources. Photosensor response configurable to adjust set point and dimming rates.
5. Schedule Capabilities:
- a. System capable of time schedules for time-of-day to override devices including offsets from dusk and dawn.
 - b. System capable of providing a visible "blink warning" five minutes prior to the end of the schedule.
 - c. Wall stations may be programmed to provide timed extensions/overrides that turn the lights on for an additional time period.
 - 1) Timed override/extension duration programmable for each individual device, zone of devices, or customized group of devices, from five minutes to 12 hours.
6. Global Profile Capabilities:

- a. System capable of automatically modifying the sequence of operation for selected devices in response to any of the following:
 - 1) Time-of-day schedule.
 - 2) Contact closure input state.
 - 3) Manually triggered wired wall station input.
 - 4) RS-232/RS-485 command to wired input device.
 - 5) BACnet input command.
- b. Global Profile Capabilities:
 - 1) Global Profiles stored within and executed from the system controller (via internal timeclock). Dedicated software host or server is not required to be online to support automatic scheduling and/or operation of Global Profiles.
 - 2) Global Profile time-of-day schedules capable of recurrence settings including daily, specific days of week, every "n" number of days, weekly, monthly, and yearly. Lighting control global profile schedules support definition of start date, end date, end after "n" recurrences, or never ending.
 - 3) Daylight savings time adjustments capable of being performed automatically, if desired.
 - 4) Global Profile holiday schedules follow recurrent settings for specific U.S. holiday dates regardless if they always occur on a specific date or are determined by day/week of the month.
 - 5) Global Profiles capable of being scheduled to run according to timed offsets relative to sunrise or sunset. Sunrise/sunset times automatically derived from location information using an astronomical clock.
 - 6) Software management interface capable of displaying a graphic calendar view of profile schedules for each control zone.
 - 7) Global Profiles capable of manual activation directly from system controller, specially programmed wired input devices, scene-capable wired wall stations, and software management interface.
 - 8) Global Profiles selectable to apply to a single device, zone of devices, or customized group of devices.
 - 9) Global Profile Configurable Parameters:
 - a) Fixture light level.
 - b) Occupancy time delay.
 - c) Response to occupancy sensors (including enabling/disabling response).
 - d) Response to daylight sensors (including enabling/disabling response).
 - e) Enabling/disabling of wall stations.
- c. Local and Global Profiles backed up and stored on software's host server such that Profile backup can be applied to a replacement system controller or wired wall station.

7. System supports automated demand response capabilities with automatic reduction of light level to at least three levels of demand response, configurable for each output device.

2.3 SYSTEMS SOFTWARE INTERFACES

A. Management Interface:

1. Web-based management interface for remote system control, live status monitoring, and configuration of lighting control settings and schedules.
2. Compatible with industry-standard web browser clients.
3. Minimum of 100 unique password-protected user accounts.
4. Minimum of three user permission levels: read-only, read and change settings, and full administrative system access.
5. Capable of restricting access for user accounts to specific devices within the system.
6. All system devices capable of being given user-defined names.
7. Device identification information displayed in the Management interface including:
 - a. Model number.
 - b. Model description.
 - c. Serial number or network ID.
 - d. Manufacturing date code.
 - e. Custom label.
 - f. Parent network device.
8. Management interface capable of displaying live status of a networked luminaire or intelligent control device including:
 - a. Luminaire on/off status.
 - b. Dim level.
 - c. Power consumption.
 - d. Device temperature.
 - e. PIR occupancy sensor status.
 - f. Microphonic occupancy sensor status.
 - g. Remaining occupancy time delay.
 - h. Photosensor reading.
 - i. Active Profiles.
9. Management interface capable of displaying and modifying the current active settings of a networked luminaire or intelligent control device including:
 - a. Dimming trim levels.
 - b. Occupancy sensor and photosensor enable/disable.
 - c. Occupancy sensor time delay and light level settings.
 - d. Occupancy sensor response (normal or vacancy).
 - e. Photosensor setpoints and transition time delays.

10. Management interface capable of applying settings changes for a zone of devices or a group of selected devices using a single action that does not require the user to apply settings changes for each individual device.
11. Management interface capable of compiling a printable network inventory report.
12. Management interface capable of compiling a printable report detailing all system profiles.
13. All sensitive information stored encrypted.
14. System software updates available for automatic download and installation via the Internet.

B. System Energy Analysis and Reporting:

1. Intuitive graphical screens to facilitate simple viewing of system energy performance.
2. Energy Scorecard: Summarized display that indicates calculated energy savings in dollars or KWh.
3. Software calculates allocation of energy savings by control measures including occupancy sensors, photosensors, and manual switching.
4. Energy savings data calculated for the system as a whole.
5. Time-scaled graph showing all relay transitions.
6. Time-scaled graph showing zone occupancy time delays.
7. Time-scaled graph showing the total light level.
8. Software capable of storing information remotely onto an open-source, object-relational database, such as PostgreSQL.
9. Data stored in the database will be accessed utilizing an open standard, application programming interface, such as Open Database Connectivity (ODBC).

C. Visualization and Programming Interfaces:

1. System provides an optional web-based visualization interface that displays a graphical floorplan.
2. Graphical floorplan will offer the following types of system visualization:
 - a. Full Device Option: Master graphic of entire building, by floor, showing each control device installed with zones outlined including:
 - 1) Controls embedded light fixtures.
 - 2) Controls devices not embedded in light fixtures.
 - 3) Daylight sensors.
 - 4) Occupancy sensors.
 - 5) Wall switches and dimmers.
 - 6) Scene controllers.
 - 7) Networked relays.
 - 8) Wired bridges.
 - 9) System Controllers.
 - 10) Wired relay panels.
 - 11) Group outlines.

- b. Group-Only Option: Master graphic of the entire building, by floor, showing only control groups outlined.
 - c. Pan and zoom commands supported to allow smaller areas to be displayed on a larger scale simply by panning and zooming each floor's master graphic.
 - d. Selecting any control device displays the following as applicable:
 - 1) Device catalog number.
 - 2) Device name and custom label.
 - 3) Device diagnostic information.
 - 4) Link to further information on device including status or current configuration.
3. Programming capabilities through the application will include the following:
- a. Switch, occupancy sensor, and photosensor zone configuration.
 - b. Manual-on or automatic-on modes.
 - c. Turn-on and dim to dimming levels.
 - d. Occupancy sensor time delays and PIR sensitivity.
 - e. Dual technology occupancy sensors sensitivity.
 - f. Photosensor calibration adjustment and auto-setpoint.
 - g. Multiple photosensor zone offset.
 - h. Trim level settings.
 - i. Preset scene creation and copy for scene-capable devices.
 - j. Application of custom device labels to the Bluetooth Low-Energy Programming Devices and individual connected lighting control devices.
 - k. Fade rate settings.

D. Smartphone Programming Interface for Wired Devices:

- 1. Interface provided for both Apple iOS and Android operating systems that allows configuration of lighting control settings.
- 2. Application supports configuration of wired networked control devices.
 - a. Connected device access granted through user-defined passcode at initial install.
 - b. Indication of signal strength where multiple Bluetooth Low-Energy Programming Devices are available for configuration.
- 3. Programming Capabilities:
 - a. Switch, occupancy sensor, and photosensor group configuration.
 - b. Manual-on or automatic-on modes.
 - c. Turn-on and dim to dimming levels.
 - d. Occupancy sensor time delays and PIR sensitivity.
 - e. Dual technology occupancy sensors sensitivity.
 - f. Photosensor calibration adjustment and auto-setpoint.
 - g. Multiple photosensor zone offset.
 - h. Trim level settings.
 - i. Preset scene creation.

- j. Application of custom device labels for individual connected lighting control devices.
- k. Fade rate settings.

2.4 SYSTEM BACKBONE AND SYSTEM INTEGRATION EQUIPMENT

- A. System Controller: Multi-tasking, real-time digital control processor consisting of modular hardware with plug-in enclosed processors, communication controllers, and power supplies.
 - 1. Basis-of-Design Product: Subject to compliance with requirements, provide nLight; Acuity Brands Lighting, Inc.; nECY or comparable product by one of the following:
 - a. Cooper Industries, Inc.
 - b. Leviton Manufacturing Co., Inc.
 - 2. System Controller Processor: 32-bit microprocessor operating at a minimum of 1 GHz.
 - 3. System Controller Memory: Minimum of 512MB memory, with a minimum of 4GB non-volatile flash, to support operating system and databases.
 - 4. System Controller Functions:
 - a. Time-based control of downstream wired network devices.
 - b. Linking into an Ethernet network.
 - c. Integration with Building Management Systems (BMS) and Heating, Ventilation and Air Conditioning (HVAC) equipment.
 - d. Connection to various software interfaces, including management interface, historical database and analytics interface, and visualization interface.
 - 5. Integral web server to support system controller configuration and diagnostics.
 - a. Web Server Control Interface:
 - 1) Display associated devices within the context of a graphical floorplan.
 - 2) Provide control of output-capable devices through virtual sliders, toggle buttons, preset level widgets, and transparent layers on floorplan.
 - 3) Control Capabilities:
 - a) Control of individual output devices, including control of relay state and analog dimming level where applicable.
 - b) Control of local lighting control zones, including control of relay state and analog dimming level where applicable.
 - c) Control of global lighting control zones, including control of relay state and analog dimming level where applicable.
 - d) Control of Global Profiles.

- b. Visualization Interface:
 - 1) Customizable display with the ability to superimpose colored, transparent layers representing real-time property values, including occupancy status, dimming level status, light level status, and online or offline status where applicable.
 - 2) Ad hoc display of trended information via an intuitive values-over-time graph.
 - 3) Report Creation:
 - a) Reports accept and graphically display trended status datasets for creator selected devices or zones of devices.
 - b) Report information displayed over a user-defined interval and date range.
 - c) Reports exportable to a standard CSV format.
- 6. Graphical touch screen to support configuration and diagnostics.
- 7. Minimum of three RJ-45 networked lighting control ports for connection to any of the following:
 - a. Graphical touch screen.
 - b. Wired communication bridges.
 - c. Direct connection to networked wired luminaires and intelligent lighting control devices (up to 128 total devices per port).
- 8. Device will automatically detect all network-connected devices.
- 9. Capable of managing and operating a minimum of 750 networked devices (wired) per system controller.
- 10. Multiple System Controllers capable of connection via LAN for scalability to a minimum of 20,000 networked devices.
- 11. Supports BACnet/IP and BACnet MS/TP protocols to directly interface with BMS and HVAC equipment without additional protocol translation gateways.
 - a. BACnet MS/TP Connection Speed: 9600 to 115200 baud rate.
 - b. BACnet Testing Laboratory (BTL listed) using Device Profile BACnet Building Controller (B-BC) with outlined enhanced features.
- 12. Integral FIPS 140-2, Level 1 cryptographic module.
- 13. Supports RESTful API for control of BACnet objects, user management, date and time, and file management.
- 14. NEMA 1 enclosure with Class 1 and Class 2 separation.
 - a. Power Supply Voltage: **120 to 277V(ac)**.
- 15. System Controller Security Provisions:
 - a. Disallow the use of default passwords and require passwords to be updated prior to use.
 - b. Support user role-based access, such as administrator, user, and viewer.

- c. Signed firmware to ensure that unmodified, authentic software is always installed.
 - d. IP-based communication protected with strong encryption algorithms such as AES or TLS1.2+.
 - e. Prevent rollback of firmware to firmware versions with known, critical vulnerabilities.
 - f. Valid cybersecurity listing through a third party.
16. Cellular Remote Access: Cellular router and modem for remote access.
- a. Router supports remote access to at least five system controllers on its local area network or network subnet.
 - b. Remote access capable of device setting updates, schedule updates, system performance optimization, and diagnostics.
 - c. Remote access enabled through outbound communication from router to an outside source. Solutions that begin communication via inbound requests for network access are unacceptable.
 - d. Router supports outbound communication to manufacturer-hosted portal using TLS1.2 or greater in-transit encryption over a cellular or Ethernet connection.
 - e. Router with integral firewall to prevent unauthorized access to devices connected to its local area network port.
 - f. Router includes cellular SIM capable of connection to AT&T, T-Mobile, Sprint, US Cellular, Alaska Wireless, Telefonica, Tellus, Bell, or Sasktel networks where carrier service is available.
 - g. Outbound communication from the router limited to whitelisted endpoints. Devices that allow unrestricted communication are unacceptable.
 - h. Outbound communication from router includes only lighting control system information.

2.5 WIRED NETWORKED DEVICES

A. Wired Networked Wall Switches, Dimmers, Scene Controllers:

- 1. Basis-of-Design Product: Subject to compliance with requirements, provide nLight; Acuity Brands Lighting, Inc.; or comparable product by one of the following:
 - a. Cooper Industries, Inc.
 - b. Leviton Manufacturing Co., Inc.
- 2. Mounting: Suitable for installation in single-gang switch box.
- 3. Communication and low-voltage power delivered via standard low-voltage network cabling with RJ-45 connectors.
- 4. All switches detect valid communication and blink a unique LED pattern to visually indicate a potential wiring issue.
- 5. Devices with mechanical push buttons provide tactile and LED user feedback.
- 6. Devices with mechanical push buttons manufactured with custom button labeling.
- 7. Wall switch and dimmer options:

- a. Control Types Supported:
 - 1) On/Off.
 - 2) On/Off/Dimming.
 - 3) On/Off/Dimming/Correlated Color Temperature Control for specific luminaire types.
 - b. Color: **White**.
8. Scene Controller Options:
- a. Control Types Supported:
 - 1) On/Off.
 - 2) On/Off/Dimming.
 - 3) Preset Level Scene Type.
 - 4) On/Off/Dimming/Preset Level for Correlated Color Temperature.
 - 5) Reprogramming of other devices within daisy-chained zone to implement user-selected lighting scene including manual start/stop from the scene controller, or optionally programmed automatic stop after a user-selectable duration between five minutes and 12 hours.
 - 6) Selecting a lighting profile to be run by device's upstream controller to implement a selected lighting profile across multiple zones including manual start/stop from the scene controller, or optionally programmed automatic stop after a user selectable duration between five minutes and 12 hours.
 - b. Color: **White**.

B. Networked Graphic Wall Stations:

- 1. Basis-of-Design Product: Subject to compliance with requirements, provide nLight; Acuity Brands Lighting, Inc.; nPOD TOUCH or comparable product by one of the following:
 - a. Cooper Industries, Inc.
 - b. Leviton Manufacturing Co., Inc.
- 2. Mounting: Suitable for installation in single-gang switch box.
- 3. Integral 3.5-inch (88 mm) capacitive full-color touch screen.
- 4. Power via polarity insensitive Class 2 low-voltage 15 to 24V (dc) power supply.
- 5. Device enables mobile application control of control zones and scenes through Bluetooth.
- 6. Communication over standard low-voltage network cabling with RJ-45 connectors.
- 7. User-customizable screen saver utilizing uploaded image file in common file format including jpg, png, gif, bmp, or tif.
- 8. Capable of configuration of all switches, dimmers, control zones, and lighting preset scenes via password-protected setup screens.
- 9. Graphic Wall Station Options:

- a. Number of Control Zones: Up to 16.
- b. Number of Scenes: Up to 16.
- c. Profile Scene Duration: User configurable from five minutes to 12 hours.
- d. Color: **White**.

C. Digital Time Clock:

- 1. Basis-of-Design Product: Subject to compliance with requirements, provide nLight; Acuity Brands Lighting, Inc.; nDTC or comparable product by one of the following:
 - a. Cooper Industries, Inc.
 - b. Leviton Manufacturing Co., Inc.
- 2. Controls a linear bus of lighting devices supplying all time functions without connection to a system controller.
 - a. Programming of the linear bus of lighting devices must not require additional hardware, including computers, specialized dongles, or other connection devices.
 - b. Programming of the linear bus exclusively done through the touch-screen interface.
- 3. Capable of up to 32 schedules. Each schedule consists of one set of On and Off times per day for each day of the week and for each of two holiday lists. Schedules assignable to any individual relay or group of relays.
- 4. Operates from non-volatile memory so that all system programming is retained indefinitely.
- 5. Mounted inside a relay panel to eliminate the necessity for additional enclosures for complete installation.
- 6. Capacitive 3.5-inch (88 mm), full-color touch screen.

D. Wired Networked Digital Key Switches:

- 1. Basis-of-Design Product: Subject to compliance with requirements, provide nLight; Acuity Brands Lighting, Inc.; nPODA KEY or comparable product by one of the following:
 - a. Cooper Industries, Inc.
 - b. Leviton Manufacturing Co., Inc.
- 2. Mounting: Suitable for installation in single-gang switch box.
- 3. Communication and low-voltage power delivered via standard low-voltage network cabling with RJ-45 connectors.
- 4. All switches detect valid communication and blink a unique LED pattern to visually indicate a potential wiring issue.
- 5. LED user feedback to provide indication of on/off status of the programmed lights or scene, as well as indication of device power.
- 6. Digital Key Switch Options:

a. Control Types Supported:

- 1) On/Off.
- 2) On/Off/Dimming.
- 3) Preset Level Scene Type.
- 4) On/Off/Dimming/Preset Level for Correlated Color Temperature.
- 5) User-programmed local lighting scene run within a daisy-chained group including manual start/stop from the switch, or optionally programmed automatic-stop after a user-selectable duration between five minutes and 12 hours.
- 6) User-programmed global lighting profile run by an upstream controller across multiple groups including manual start/stop from the switch, or optionally programmed automatic-stop after a user-selectable duration between five minutes and 12 hours.

b. Color: **White**.

E. Wired Networked Auxiliary Input / Output (I/O) Devices:

1. Basis-of-Design Product: Subject to compliance with requirements, provide nLight; Acuity Brands Lighting, Inc.; nIO series or comparable product by one of the following:
 - a. Cooper Industries, Inc.
 - b. Leviton Manufacturing Co., Inc.
2. Plenum rated.
3. Communication and low-voltage power delivered to each device via standard low-voltage network cabling with RJ-45 connectors.
4. Auxiliary Input/Output Devices Options:
 - a. Contact closure or pull-high input.
 - 1) Input programmable to support maintained or momentary inputs that can activate local or global scenes and profiles, activate lights at a preconfigured level, ramp light level up or down, or toggle lights on/off.
 - b. 0-10V analog input.
 - 1) Input supports zero to 10 V dimming output control from a dimmer switch.
 - 2) Input programmable to function as a daylight sensor.
 - c. RS-232/RS-485 digital input.
 - 1) Input supports activation of up to four local or global scenes and profiles, and on/off/dimming control of up to 16 local control zones.
 - 2) Provides relay and dimming level status to external device (e.g. Touchscreen) when polled.

- d. 0-10V dimming control output, capable of sinking up to 20mA.
 - 1) Output programmable to support all standard sequence of operations supported by system.
- e. Digital control output via eldoLED LEDcode communication.
 - 1) Output programmable to support light intensity control, as well as optional correlated color temperature (CCT) control, of the connected luminaire.

F. Wired Networked DMX Interface Stations:

- 1. Basis-of-Design Product: Subject to compliance with requirements, provide nLight; Acuity Brands Lighting, Inc.; nPWDMX or comparable product by one of the following:
 - a. ETC.
 - b. Lutron.
- 2. Description: Multi-protocol, bidirectional DMX512 playback (snapshot) and lighting control gateway.
 - a. Capable of control of networked luminaire or all normal power lighting load types.
 - b. Capable of control of DMX lighting through:
 - 1) DMX input for snapshot capture of lighting presets.
 - 2) Live control of intensity, hue, and saturation of configured DMX Zones from connected stations.
 - c. Integral LED indicators for power, network traffic, processor health, identify, DMX port configuration and status.
 - d. Support recall of up to 16 (total):
 - 1) Prerecorded scenes/snapshots for playback.
 - 2) DMX zones.
 - e. Capable of preset playback as activated by any connected control station.
 - f. Capable of DMX pass-through for real-time output of incoming DMX levels.
 - g. Support four universes of ANSI E1.31 sACN-Streaming ACN (sACN), including priorities, for snapshot capture and recall.
 - h. Support ANSI E1.20 RDM with PC-based software.
 - i. Act as an ANSI E1.33 RDMnet controller.
- 3. General Requirements:
 - a. Operating Voltages:
 - 1) PoE Class 2 Device.
 - 2) 24 V(dc) (not used if using PoE), 7 W maximum power consumption.

- b. Operating Temperature: Minus 32 to plus 113 deg F (0 to 45 deg C).
- c. DIN-Rail Mounted on DIN 43880 (35/7.5) rail.
- d. NEMA Type 1 enclosure.
 - 1) Enclosure Size: 10 inches (260 mm) wide by 13 inches (330 mm) high by 4.5 inches (114 mm) deep.

4. Features:

- a. Lighting control ports supports:
 - 1) Communication through lighting control (RJ-45) ports that supply 40 mA of power to each device via standard Category 5e low-voltage network cabling.
 - 2) Detection of valid communication and blinking of a unique LED pattern to visually indicate a potential wiring issue.
- b. DMX Ports:
 - 1) Comply with the requirements of ANSI E1.11 USITT DMX512-A standards.
 - 2) Configurable as Input or Outputs.
 - 3) Support ANSI E1.31 sACN.
 - 4) Support Pathway Secure Streaming ACN (ssACN).
 - 5) Comply with California Title 1.81.26.
 - 6) Comply with ANSI E1.20 RDM.
 - 7) Capable of withstanding fault voltages of up to 250 V(ac) without damage.
- c. Dry contact closure input to connect with external control systems to control a lighting control zone or scene.
- d. Ethernet Ports:
 - 1) Support IEEE 802.3af Power-over-Ethernet in absence of 24 V(dc).
 - 2) Support auto-negotiated 10/100MB connections speeds.
 - 3) Support IEEE 802.1AB Link Layer Discovery Protocol.
- e. Test Functions:
 - 1) Operate without need of a configuration PC to check local wiring.
 - 2) Test connectivity with DMX lights and networked luminaire or all normal power lighting load types.
- f. Complies with the following:
 - 1) RoHS 2011/65/EU + A1 2015/863.
 - 2) FCC.

G. Wired Networked Occupancy and Photosensors:

1. Basis-of-Design Product: Subject to compliance with requirements, provide nLight; Acuity Brands Lighting, Inc.; or comparable product by one of the following:
 - a. Cooper Industries, Inc.
 - b. Leviton Manufacturing Co., Inc.
2. Detect the presence of human activity within space and fully control the on/off function of lights.
3. Utilize passive infrared (PIR) technology, which detects occupant motion, to initially turn lights on from an off state, thus preventing false on conditions. Ultrasonic and Microwave-based sensing technologies are unacceptable.
4. Dual technology sensors used in locations where a second method of sensing is necessary to adequately detect maintained occupancy (such as in rooms with obstructions).
5. Dual technology sensors must have one sensing technology not motion dependent to detect occupancy. Acceptable dual technology includes PIR/Microphonics (also known as Passive Dual Technology or PDT), which detects both occupant motion and sounds indicating occupants. Sensors where both technologies detect motion (PIR/Ultrasonic) are unacceptable.
6. All sensing technologies are acoustically passive, meaning they do not transmit sounds waves of any frequency (for example in the Ultrasonic range), as these technologies have the potential for interference with other electronic devices within the space (such as electronic white board readers and hearing devices). Acceptable detection technologies include Passive Infrared (PIR), and/or Microphonic technology. Ultrasonic and Microwave-based sensing technologies are unacceptable.
7. Ceiling, fixture, recessed, and corner mounted sensors available, with multiple lens options available customized for specific applications.
8. Communication and low-voltage power delivered to each device via standard low-voltage network cabling with RJ-45 connectors.
9. All sensors detect valid communication and blink a unique LED pattern to visually indicate a potential wiring issue.
10. Sensor programming parameter available and configurable remotely from the software and locally via the device push button.
11. Ceiling mount occupancy sensors include one integrated dry contact switching relay, capable of switching 1 A at 24 V, resistive only.
12. Sensors available with one or two occupancy "poles," each of which provides a programmable time delay.
13. Photosensor/daylight override, automatic dimming control, and low temperature/high humidity operation.
14. Photosensor provide one on/off set-point and include a dead band to prevent the artificial light from cycling. Delay incorporated into the photosensor to prevent rapid response to passing clouds.
15. Photosensor and dimming sensor's set-point and dead band automatically calibrated through the sensor's microprocessor by initiating an "Automatic Set-Point Programming" procedure. Min and max dim settings as well as set-point may be manually entered or modified.

16. Dead band setting verified and modified by the sensor automatically every time the lights cycle to accommodate physical changes in the space (i.e., furniture layouts, lamp depreciation, or lamp outages).
17. Dual zone option available for On/Off Photosensor, Automatic Dimming Control Photosensor, or Combination units. The secondary daylight zone capable of being controlled as an "offset" from the primary zone.

H. Wired Networked Wall Switch Sensors:

1. Basis-of-Design Product: Subject to compliance with requirements, provide nLight; Acuity Brands Lighting, Inc.; or comparable product by one of the following:
 - a. Cooper Industries, Inc.
 - b. Leviton Manufacturing Co., Inc.
2. Mounting: Suitable for installation in single-gang switch box.
3. Communication and low-voltage power delivered via standard low-voltage network cabling with RJ-45 connectors.
4. All switches detect valid communication and blink a unique LED pattern to visually indicate a potential wiring issue.
5. Devices with mechanical push buttons provide tactile and LED user feedback.
6. Wall Switch Sensor Options:
 - a. User Input Control Types: **On/Off/Dimming**.
 - b. Occupancy Sensing Technology: **PIR only**.
 - c. Daylight Sensing Option: Inhibit Photosensor.
 - d. Color: **White**.

I. Wired Networked Embedded Fixture Sensors:

1. Basis-of-Design Product: Subject to compliance with requirements, provide nLight; Acuity Brands Lighting, Inc.; nES or comparable product by one of the following:
 - a. Cooper Industries, Inc.
 - b. Leviton Manufacturing Co., Inc.
2. Network system sensors with occupancy sensors and/or dimming photosensors that can be embedded into luminaire such that only the lens shows on luminaire face.
3. Occupancy sensor detection pattern suitable for 7.5 to 20-ft. (2.2 to 6-m) mounting heights.

J. Wired Networked Power Packs:

1. Basis-of-Design Product: Subject to compliance with requirements, provide nLight; Acuity Brands Lighting, Inc.; nPP16 series or comparable product by one of the following:

- a. Cooper Industries, Inc.
 - b. Leviton Manufacturing Co., Inc.
2. Plenum rated.
3. Communication will be delivered to each device via standard low-voltage network cabling with RJ-45 connectors.
4. Supply Voltage: **120 to 277V(ac)**.
5. Relay Output: Class 1 relay rated for 16 A at **277 V(ac)** and 1/2 HP at 120 V(ac).
6. Dimming Output: 0-10 VDC Dimming output.
7. Sink Current: 100 mA at 0-10 V(dc).
8. Mounting: Integral 1/2-inch (16-mm) chase nipple. Plastic clips into junction box are unacceptable.

K. Wired Networked Relay and Dimming Panel:

1. Basis-of-Design Product: Subject to compliance with requirements, provide nLight; Acuity Brands Lighting, Inc.; ARP or comparable product by one of the following:
 - a. Cooper Industries, Inc.
 - b. Leviton Manufacturing Co., Inc.
2. Field Configurable Relays (FCR):
 - a. Field configurable to operate in single-, double-, or triple-pole relay groupings.
 - b. Field configurable to operate as normally closed or normally open.
 - c. Provides visual status of current state and manual override control of each relay.
 - d. Minimum Relay Contact Ratings:
 - 1) 40 A at 120-480 V(ac) Ballast.
 - 2) 16 A at 120-277 V(ac) Electronic.
 - 3) 20 A at 120-277 V(ac) Tungsten.
 - 4) 20 A at 48V (dc) Resistive.
 - 5) 2 HP at 120 V(ac).
 - 6) 3 HP at 240-277 V(ac).
 - 7) 65kA SCCR at 480 V(ac).
3. Dimming Output Rating: Minimum of 100 mA sink current per dimming output.
4. Relay and dimming outputs individually programmable.
5. Listing: UL 924 for control of emergency lighting circuits.
6. Power Supply: Integrated **120-277V(ac)** supply.
7. Low-Voltage Sensor Input:
 - a. Configurable to support any of the following input types:
 - 1) Indoor Photosensor.
 - 2) Outdoor Photosensor.
 - 3) Occupancy Sensor.
 - 4) Contact Closure.

- b. Low-voltage sensor input provides 24 V(dc) power for sensor so additional auxiliary power supplies are not required.
 - c. Sensor input supports all standard sequence of operations.
 - 8. Integrated Digital Time Clock for local schedule control.
 - 9. Contact Closure Input: One for each group of eight output relays that acts as a panel override to activate the normally configured state of all associated relays (i.e., normally open or normally closed).
 - 10. Panel supplies current limited low-voltage power to other networked devices connected via low-voltage network cable.
 - 11. Enclosure:
 - a. Enclosure Rating: NEMA 1.
 - b. Mounting: **Surface** mounted.
 - c. Cover: **Hinged cover with keyed lock.**
- L. Wired Networked Bluetooth Low-Energy Programming Device:
 - 1. Basis-of-Design Product: Subject to compliance with requirements, provide nLight; Acuity Brands Lighting, Inc.; nIO BT or comparable product by one of the following:
 - a. Cooper Industries, Inc.
 - b. Leviton Manufacturing Co., Inc.
 - 2. Plenum rated, inline wired, and screw mountable.
 - 3. Communication and low-voltage power delivered to device via standard low-voltage network cabling with RJ-45 connectors.
 - 4. Bluetooth communication allows connection from smartphone application for programming device settings within the local daisy-chain zone.
 - 5. Device provides visual indication of remote Bluetooth connection via LED integrated into device enclosure such that it is visible from all angles while the zone is being programmed.
- M. Wired Networked Communication Bridge:
 - 1. Basis-of-Design Product: Subject to compliance with requirements, provide nLight; Acuity Brands Lighting, Inc.; nBRG or comparable product by one of the following:
 - a. Cooper Industries, Inc.
 - b. Leviton Manufacturing Co., Inc.
 - 2. Suitable for surface mount to a standard 4 by 4-inch (100 by 100 mm) square junction box.
 - 3. Communication Ports: Eight RJ-45 ports for connection to lighting control zones (up to 128 devices per port), additional network bridges, and System Controller.
 - 4. Capable of aggregating communication from multiple lighting control zones for purposes of minimizing backbone wiring requirements back to System Controller.

5. Power Input: Class 2 low-voltage supplied locally via a directly wired power supply.
6. Wired Bridge capable of redistributing power from its local supply and connected lighting control zones with excess power to lighting control zones with insufficient local power. Architecture enables loss of power to a particular area to be less impactful on network lighting control system.

PART 3 - EXECUTION

3.1 INSTALLATION OF WIRING

- A. Wiring Method: Comply with Section 260519 "Low-Voltage Electrical Power Conductors and Cables" and Section 260523 "Control-Voltage Electrical Power Cables." Minimum conduit size is 1/2 inch (13 mm).
 1. Comply with requirements for cable trays specified in Section 260536 "Cable Trays for Electrical Systems."
 2. Comply with requirements for raceways and boxes specified in Section 260533.13 "Conduits for Electrical Systems," and Section 260533.16 "Boxes and Covers for Electrical Systems,"
- B. Wiring within Enclosures: Bundle, lace, and train conductors to terminal points with no excess and without exceeding manufacturer's limitations on bending radii. Install lacing bars and distribution spools.

3.2 IDENTIFICATION

- A. Identify system components, wiring, cabling, boxes, cabinets, and terminals. Comply with identification requirements specified in Section 260553 "Identification for Electrical Systems."
- B. Identify field-installed conductors, interconnecting wiring, and components; install warning signs complying with Section 260553 "Identification for Electrical Systems."
- C. Identify all controls with device address.
- D. Label each device cable within 6 inch (152 mm) of connection to bus power supply or termination block.

3.3 FIELD QUALITY CONTROL

- A. Acceptance Testing Preparation:
 1. Test continuity of each circuit.
- B. Field tests and inspections must be witnessed by **Architect**.

- C. Tests and Inspections: **Engage a factory-authorized service representative to perform** test inspections.
 - 1. Test each zone using local and remote control hardware.
 - 2. Perform each visual and mechanical inspection and electrical test stated in NETA ATS. Certify compliance with test parameters.
- D. Nonconforming Work:
 - 1. Lighting controls will be considered defective if they do not pass tests and inspections.
 - 2. Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest.
- E. Field Test Reports: **Engage a factory-authorized service representative to prepare** field test reports.
 - 1. Prepare functionality and inspection reports, including a certified report that identifies controls included and describes test results. Include notation of deficiencies detected, remedial action taken, and observations made after remedial action.
 - 2. Include list of all points created from actual tests of all addressed control points for lamps, ballasts, manual controls, and sensors.

3.4 REMOTE ACCESS

- A. Digital network lighting control system capable of remote access by manufacturer with the following features:
 - 1. System diagnostics including detection of fault condition in hardware or connected devices.
 - 2. Access to all connected devices for complete programming including scheduling of time-of-day events and device parameters necessary to meet required sequence of operations.
 - 3. Browser-based interface to verify system functionality.
 - 4. On-demand access to manufacturer technical support for remote troubleshooting, diagnostics, configuration, and programming.
 - 5. Owner training on the digital network lighting control system available remotely.
- B. Remote access system fully functional over commercial cellular connection or Internet-connected ethernet network.
- C. All hardware associated with remote access including cellular modem and cellular antenna are to remain on-site regardless of warranty or cellular contract status.

3.5 SYSTEM STARTUP

- A. **Engage a factory-authorized service representative to perform** startup service.

1. Complete installation and startup checks in accordance with manufacturer's published instructions.
 2. Activate luminaires and verify that all maximum output levels match output levels detailed in an Owner-approved sequence of operations.
 3. Confirm correct communications wiring, initiate communications between control devices and controller/gateways, and program the lighting control system in accordance with approved configuration schedules, time-of-day schedules, and input override assignments.
 4. Program network devices to meet required sequence of operations.
 5. Program and verify all sequence of operations.
 6. Create backup of system programming.
 7. Assist in installation of system software on customer-provided workstation or server.
 8. Verify bidirectional communication of manufacturer-provided cellular router with manufacturer-managed remote access portal.
- B. Commissioning Walkthrough: **Engage factory-authorized service representative to collaborate with third-party commissioning agent** to demonstrate lighting control system functionality and verify the system meets the specified Project requirements.

3.6 CLOSEOUT ACTIVITIES

- A. Enhanced Documentation: Engage lighting system manufacturer to provide comprehensive system documentation including detailed programming, sequence of operation data per Project specifications, and related code requirements.
- B. Training: Engage lighting system manufacturer to provide comprehensive system overview, software overview, and documentation relating to system operation and maintenance.

3.7 PROTECTION

- A. After installation, protect digital network lighting controls from construction activities. Remove and replace items that are contaminated, defaced, damaged, or otherwise caused to be unfit for use prior to acceptance by Owner.

3.8 MAINTENANCE

- A. Engage a factory-authorized service representative to perform on-site system adjustments.
1. On-Site Occupancy Adjustments: When requested within 12 months from date of Substantial Completion, provide on-site settings adjustments to suit actual occupied conditions. Provide up to **two** visits to Project during other-than-normal occupancy hours for this purpose.
 2. Prepare and submit report after each visit that details activities performed.

- B. Engage a factory-authorized service representative to perform remote system adjustments.
 - 1. Remote Occupancy Adjustments: When requested within 12 months from date of Substantial Completion and project registration with lighting control system manufacturer, provide remote settings adjustments to suit actual occupied conditions. Provide up to 2 sessions to Project during other-than-normal occupancy hours for this purpose.
 - a. System to include manufacturer-provided cellular communication hardware and connection to the system for a minimum of 12months after substantial completion to allow for factory representative assistance with settings adjustments and system sustainment.
 - b. For the remaining duration of the maintenance term, or in the event cellular connectivity is not available, manufacturer assistance must be available through an Owner-provided, Internet-connected network.
 - 2. Prepare and submit report after each session that details activities performed.
- C. Maintenance Service Agreement:
 - 1. Beginning at Substantial Completion, verify that maintenance service agreement includes 12 months' full maintenance by manufacturer's authorized service representative.
 - 2. Preventative maintenance to include:
 - a. System diagnostic reports.
 - b. System performance checks.
 - c. Device firmware updates.
 - d. Programming adjustment as required for proper lighting system operation.
 - e. Expedited factory direct warranty processing, replacement, and programming of defective components.
 - 3. Verify that parts and supplies are manufacturer's authorized replacement parts and supplies.

END OF SECTION 260943.13

SECTION 26 20 00 - ELECTRICAL DISTRIBUTION EQUIPMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Conditions of the Contract Documents and Division 01 - General Requirements as applicable, apply to this Section.

1.2 SUMMARY

- A. Provide all electrical distribution and motor control equipment and accessories required to distribute electrical power to all motors, outlets and systems requiring power.

1.3 QUALITY ASSURANCE

- A. New: Provide all new equipment.
- B. Single Manufacturer: All equipment of each type shall be the product of one manufacturer.
- C. UL: Equipment shall be UL listed. Service entrance equipment shall bear UL Service Entrance label.
- D. CEC: Equipment and installation shall comply with the California Electrical Code.
- E. Wet Locations: Equipment and enclosures installed outdoors and in wet locations shall be approved for this purpose.
- F. IEEE: Institute of Electrical and Electronics Engineers Standard 1015-1997 (Blue Book) Recommended Practice for Applying Low-Voltage Circuit Breakers Used in Industrial and Commercial Power Systems.

1.4 LABELING

- A. Nameplates and labeling shall be provided in accordance with Section 26 05 53. All feeders shall be labeled on the feeder device.

1.5 FINISHES

- A. All equipment shall have a factory applied gray finish applied over a rust inhibiting treatment. Any items which have the finish marred shall be touched up or refinished to a new condition before final acceptance. This shall include, but shall not be limited to, sanding and properly removing rust or other contaminants and completely repainting equipment if damage is extensive. Overall acceptance is subject to approval of the Engineer.

1.6 SUBMITTALS

- A. Provide complete product data for each equipment type. Provide electric service studies when required.
- B. Submittal shall include written recommendation from manufacturer of settings for all electronic trip adjustment setting on all equipment furnished with adjustable trip settings. Contractor is responsible for adjusting all electronic trip settings per manufacturer recommendations.
- C. Electrical connections to all equipment furnished by any other division shall be coordinated with final approved equipment submittals from other divisions including but not limited to circuit

breaker sizes, conduit sizes, wire sizes, fuse sizes, disconnect switch sizes and starter sizes that differ from those shown on the drawings prior to submitting Electrical Distribution Equipment submittal.

1.7 SHORT CIRCUIT CURRENT RATINGS

- A. General: All switchboards and panelboards shall be fully rated and marked with a maximum short circuit current rating. The equipment manufacturer shall have verified this rating with high-amperage testing. All short circuit current ratings are expressed as amperes RMS symmetrical at the applied voltage unless otherwise noted. All equipment shall withstand the specified level of fault current. All overcurrent devices shall interrupt the specified level of fault current.

1.8 ELECTRIC SERVICE STUDIES

- A. Standard: Submit studies in accordance with ANSI/ IEEE Standard 242 Recommended Practice for Protection and Coordination of Industrial and Commercial Power Systems.
- B. Submit one-line diagram for each electrical service. Key all equipment and components on diagram to items in the studies.
- C. Provide a short-circuit current analysis for each main switchboard. Short-circuit analysis shall calculate short-circuit levels at service transformer secondary, switchboard main breaker, each feeder breaker and all levels of downstream distribution equipment. Assume infinite source bus.
- D. Provide a time-current coordination study for each main switchboard. Coordination study shall compare the operating levels and times of the protective devices to the withstand levels and times that the equipment can sustain without damage or failure. Determine electronic trip unit settings necessary to achieve optimal selective coordination between 480 volt main service circuit breakers and first level of feeder distribution devices. Determine setting for all adjustments of trip units of all electronic circuit breakers that are linked by zone-selective-interlocking. Furnish time-current curves for the two (or more) levels of distribution protected with electronic trips, plus the first additional distribution level served from the switchboard feeder. Show a separate composite plot for each feeder breaker trip rating with the main breaker. Plot composite time-current curves on log-log background. Add a typical frame size of downstream molded-case circuit breaker to each switchboard feeder composite plot.
- E. Provide arc-flash calculation and labeling for equipment in the project.
- F. The contractor shall make all adjustments to circuit breakers per electric service study and provide written documentation that all adjustments have been made.

1.9 OWNER'S INSTRUCTION

- A. Provide a four-hour period of instruction to the Owner's designated personnel upon completion of the main switchboard's installation. Review manufacturer's recommended switchboard maintenance. The Operations and Maintenance Manual shall be complete and on-site at the time of Owner instruction.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Unless indicated otherwise, all equipment in this section shall be provided by a single manufacturer. The product designations listed are to establish a level of quality. Acceptable manufacturers are:
 - 1. Square D.
 - 2. Siemens.
 - 3. G.E.
 - 4. Cutler-Hammer.

2.2 ENCLOSED SWITCHES

- A. General: Provide heavy duty enclosed switches similar to Square D Class 3100 Type HD.
- B. Switch Interior:
 - 1. All switches shall have switchblades which are visible when the switch is OFF and the cover is open.
 - 2. Lugs shall be front removable and UL Listed for 75 degrees Celsius conductors.
 - 3. All current carrying parts shall be plated to resist corrosion.
 - 4. Switches shall have removable arc suppressors to facilitate easy access to line side lugs.
 - 5. Switches shall have provisions for a field installable electrical interlock.
- C. Switch Mechanism:
 - 1. Switch operating mechanism shall be quick-make, quick-break such that, during normal operation of the switch, the operation of the contacts shall not be capable of being restrained by the operating handle after the closing or opening action of the contacts has started.
 - 2. The operating handle shall be an integral part of the box, not the cover.
 - 3. Provisions for padlocking the switch in the OFF position with at least three padlocks shall be provided.
 - 4. The handle position shall travel at least 90 degrees between OFF and ON positions to clearly distinguish and indicate handle position.
 - 5. All switches shall have a dual cover interlock mechanism to prevent unintentional opening of the switch cover when the switch is ON and prevent turning the switch ON when the cover is open. The cover interlock mechanism shall have an externally operated override, but the override shall not permanently disable the interlock mechanism. The tool used to override the cover interlock mechanism shall not be required to enter the enclosure in order to override the interlock.
- D. Switch Enclosures:
 - 1. Switch covers shall be attached with welded pin-type hinges.
 - 2. The enclosure shall be finished with gray baked enamel paint, which is electrodeposited on cleaned, phosphate pre-treated steel.
 - 3. The enclosure shall have ON and OFF markings stamped onto the cover.
 - 4. The operating handle shall be provided with a dual colored, red/ black position indication.
 - 5. All switches shall have provisions to accept up to three (3) 3/8-inch hasp padlocks to lock the operating handle in the OFF position.
 - 6. Tangential knockouts shall be provided to facilitate ease of conduit entry.
- E. Switch Ratings:
 - 1. Switches shall be horsepower rated for ac and/ or dc as indicated on the plans.
 - 2. The UL Listed short circuit current rating of the switches shall be 200,000 rms symmetrical amperes when used with or protected by Class J fuses.
 - 3. Non-Fusible: 10,000 rms symmetrical amps.
- F. Fuse Clips: NEMA FU 1, Class J fuses.

2.3 SINGLE CIRCUIT BREAKERS WITH ENCLOSURES

- A. Product Description: Enclosed, molded-case circuit breaker conforming to NEMA AB 1, suitable for use as service entrance equipment where applied.
- B. Circuit Breakers: Molded case, quick make, quick break, trip free, common thermal magnetic trip.
- C. Ratings: Continuous current, poles as required, 480 volt system breaker shall interrupt short circuits up to 14,000 rms amps symmetrical; on 120/ 208 - 240 volt system, 10,000 amp rms symmetrical.
- D. Enclosure: NEMA AB 1, to meet conditions. Fabricate enclosure from steel finished with manufacturer's standard gray enamel.
 - 1. Interior Dry Locations: Type 1.
 - 2. Exterior Locations: Type 3R.
- E. Nameplate: Provide a nameplate showing load served.

2.4 FRACTIONAL HORSEPOWER MANUAL MOTOR CONTROLLER

- A. Square D - Class 2510 Type F:
 - 1. Description: NEMA ICS 2, ac general-purpose Class A manually operated, full-voltage controller for fractional horsepower induction motors, with thermal overload unit, red pilot light and toggle operator.
 - 2. Enclosures: ANSI/ NEMA ICS 6, Type as indicated.

2.5 MAGNETIC MOTOR CONTROLLERS

- A. Square D - Class 8536 Type S:
 - 1. Description: NEMA ICS 2, ac general-purpose Class A magnetic controller for induction motors rated in horsepower.
 - 2. Coil Operating Voltage: Provide as required to interface with controls system, including control power transformer.
 - 3. Coil: Be of encapsulated type.
 - 4. Poles: as indicated.
 - 5. Size: as indicated.
 - 6. Contacts: Totally enclosed, double-break, silver-cadmium-oxide power contacts. Contact inspection and replacement shall be possible without disturbing line or load wiring.
 - 7. Wiring: Straight-through wiring with all terminals clearly marked.
 - 8. Overload Relay: NEMA ICS:
 - a. Solid State: Trip current rating will be established by selection of overload relay and shall be adjustable (3 to 1 current range). The overload shall be self-powered. Provide phase loss, phase unbalance protection, permanent tamper guard, Trip Class 10 or 20 and a mechanical test function.
 - b. Outputs: Units shall be designed for addition of either a normally open or normally closed auxiliary contact and shall be field convertible. Provide one (1) set of N.O. and N.C. contacts in each starter.
 - c. Reset: Unit shall include both manual reset and remote reset using an external module.
 - d. Select overload current setting based on the motor nameplate data of the actual motor to be protected. All standard NEMA sizes may be used for the overload relay, including Size 00.
 - 9. Enclosure: ANSI/ NEMA ICS 6, Type 1, 3R or 4X.

10. Control Power Transformers: 120 volt secondary. VA minimum, in each motor starter. Provide fused primary and secondary.
11. Provide red LED running pilot light and H-O-A switch.

2.6 MAGNETIC MOTOR CONTROLLERS - TWO - SPEED

- A. Square D - Class 8810 Type S:
1. Description: Include integral time delay transition between FAST and SLOW speeds. Starters shall be electrically and mechanically interlocked to prohibit both starters being energized simultaneously.
 2. Coil operating voltage: Provide as required to interface with controls system, including control power transformer.
 3. Coil: Be of encapsulated type.
 4. Poles: as indicated.
 5. Size: as indicated.
 6. Contacts: Totally enclosed, double-break, silver-cadmium-oxide power contacts.
 7. Contact inspection and replacement shall be possible without disturbing line or load wiring.
 8. Wiring: Straight-through wiring with all terminals clearly marked.
 9. Overload Relay: NEMA ICS.
 - a. Solid State: Trip current rating will be established by selection of overload relay and shall be adjustable (3 to 1 current range). The overload shall be self-powered. Provide phase loss, phase unbalance protection, permanent tamper guard, Trip Class 10 or 20 and a mechanical test function.
 - b. Outputs: Units shall be designed for addition of either a normally open or normally closed auxiliary contact and shall be field convertible. Provide one (1) set of N.O. and N.C. contacts in each starter.
 - c. Reset: Unit shall include both manual reset and remote reset using an external module.
 - d. Select overload current setting based on the motor nameplate data of the actual motor to be protected. All standard NEMA sizes may be used for the overload relay, including Size 00.
 10. Enclosure: ANSI/ NEMA ICS 6, Type 1, 3R or 4X.
 11. Two speed motor controllers shall be designed for type of motor winding specified in Division 23 Mechanical Specifications, Drawings, or Equipment Schedule. Coordinate with Division 23 prior to submittal.
 12. Provide red-high, amber-low running pilot lights and H-O-L-A switch.
 13. Provide two speed motor controllers for all two speed motors specified in Division 23 Mechanical Specifications, Drawings, or Equipment Schedule. Coordinate with Division 23 prior to submittal.

2.7 COMBINATION DISCONNECT/ MOTOR STARTERS

- A. Square D - Class 8538 Type S (Fusible or no fuse, as shown on plans):
1. Description: Combine magnetic motor controllers with fusible switch disconnect in common enclosure. The switch shall have a color coded externally operated handle. Operating handle shall give positive visual indication of ON/ OFF with red and black color-coding.
 2. Fusible Switch Assemblies: NEMA KS 1, enclosed knife switch with externally operable handle. Fuse clips: Designed to accommodate Class J fuses and visible blades. Operating handle shall give positive visual indication of ON/ OFF with color-coded operating handle.
 3. Magnetic Motor Controllers: Refer to paragraph(s) specifying magnetic motor controllers for requirements.

2.8 FUSES (600 VOLTS AND BELOW)

- A. Manufacturers:
 - 1. Bussmann.
 - 2. Little Fuse.
 - 3. Ferraz Shawmut.
- B. Dimensions and Performance: NEMA FU 1, Class as specified or as indicated on Drawings.
- C. Voltage: Rating suitable for circuit phase-to-phase voltage.
- D. Class J (Time Delay) Fuses:
 - 1. Dimensions and Performance: NEMA FU 1.
 - 2. Voltage: Rating suitable for circuit phase-to-phase voltage.
 - 3. Dual-element, time delay ten (10) seconds (minimum) at 500 percent rated current.
- E. Spares: Spare fuses shall be provided in the amount of ten (10) percent of each type and size installed. Replacement for fuses and limiters blown during construction shall not count as spares.

2.9 TWO-WINDING TRANSFORMERS

- A. Product Description: Provide transformers in accordance with the following standards, where applicable:
 - 1. Underwriter's Laboratory 1561, Standard for Safety for Dry-Type General Purpose and Power Transformers.
 - 2. Underwriter's Laboratory 506, Standard for Safety for Specialty Transformers.
 - 3. NEMA ST 20, Dry Type Transformers for General Applications.
 - 4. NEMA 250, Enclosures for Electrical Equipment (1000 V Max).
 - 5. ANSI/ IEEE C57.12.91, Standard Test Code for Dry-Type Distribution and Power Transformers.
 - 6. U.S. Department of Energy 10 CFR Part 431 Energy Conservation Program: Energy Conservation Standards for Distribution Transformers; Final Rule, dated April 18, 2013. These efficiency standards shall take effect January 1, 2016. All transformers covered in the scope of this document and this specification, manufactured after December 31, 2015, shall be compliant with the new standard.
- B. Ratings as indicated on Drawing.
- C. Primary Voltage: 480 volts, 3 phase or as indicated on plans.
- D. Secondary Voltage: 208Y/ 120 Volts, 3 phase or as indicated on plans.
- E. Insulation system and average winding temperature rise 150 degrees Celsius over 40 degrees Celsius ambient.
- F. Winding Taps:
 - 1. 2 at 2.5 percent above rated voltage.
 - 2. 4 at 2.5 percent below rated voltage.
- G. Sound Levels: NEMA ST 20. Noise levels shall not exceed NEMA and ANSI Standards.
- H. Basic Impulse Level: 10 kV for transformers less than 300 kVA.

- I. Ground core and coil assembly to enclosure by means of visible flexible copper grounding strap.
- J. Mounting:
 - 1. 1-15 kVA: Suitable for wall mounting.
 - 2. 16-75 kVA: Suitable for floor mounting.
 - 3. Larger than 75 kVA: Suitable for floor mounting.
- K. Coil Conductors: Continuous copper windings with terminations brazed or welded.
- L. Enclosure: NEMA ST 20, Type 1 or Type 3R ventilated. Furnish lifting eyes or brackets.
- M. Isolate core and coil from enclosure using vibration-absorbing mounts.
- N. Nameplate: Include transformer connection data and overload capacity based on rated allowable temperature rise.

2.10 TRANSFORMERS FOR NONLINEAR LOADS

- A. Nonlinear load transformer shall be as specified for two winding transformers except as modified by this Section.
- B. Product Description: NEMA ST 20, factory-assembled, air cooled dry type transformers, designed to supply nonlinear load, UL K-9 rated.
- C. Primary Voltage: 480 volts, 3 phase.
- D. Secondary Voltage: 208Y/ 120 volts, 3 phase.
- E. Insulation and temperature rise: Class 220 insulation system with 115 degrees Celsius average winding temperature rise over 40 degrees Celsius ambient.
- F. Coil Conductors: Continuous copper windings with terminations brazed or welded. Individually insulate secondary conductors and arrange to minimize hysteresis and eddy current losses at harmonic frequencies. Size secondary neutral conductor at 1.73 times the phase conductor ampacity.
- G. Enclosure: NEMA ST 20, Type 1 or Type 3R ventilated. Furnish lifting eyes or brackets.
- H. Isolate core and coil from enclosure using vibration-absorbing mounts.
- I. Nameplate: Include transformer connection data and overload capacity based on rated allowable temperature rise.

2.11 DISTRIBUTION PANELBOARDS

- A. Product Description: NEMA PB 1, circuit breaker type panelboard.
- B. Panelboard Bus: copper current carrying components, ratings as indicated on Drawings. Furnish copper ground bus in each panelboard.
- C. Continuous current rating shall be sufficient to protect wiring and equipment served:
 - 1. Panels 400A and smaller, 35,000 amperes rms symmetrical.
 - 2. Panels greater than 400A: 65,000 amperes rms symmetrical.

- D. Molded Case Circuit Breakers: NEMA AB 1, circuit breakers with integral thermal and instantaneous magnetic trip in each pole. Furnish circuit breakers UL listed as Type HACR for air conditioning equipment branch circuits.
- E. Main Circuit Breaker:
 - 1. When distribution panel has main circuit breaker, provide molded case circuit breaker with electronic trip unit. Current sensing to be true-rms.
 - 2. Main breaker shall have minimum interrupting rating of 65,000 amperes rms symmetrical at applied voltage.
 - 3. Electronic trip shall be Square D micrologic with adjustable long-time, short-time and instantaneous pick-up set points.
- F. Cabinet Front: Safety dead front type. Conform to NEMA 1; NEMA 3R if located outdoors. All panelboards located in kitchen areas shall be flush mount with NEMA 4X Stainless Steel enclosures.

2.12 BRANCH CIRCUIT PANELBOARDS

- A. Product Description: NEMA PB1, circuit breaker type, lighting and appliance branch circuit panelboard.
- B. Panelboard Bus: Copper current carrying components, ratings as indicated on Drawings. Furnish copper ground bus in each panelboard.
- C. For non-linear load applications subject to harmonics furnish 173 percent rated, plated copper, solid neutral.
- D. Minimum Integrated Short Circuit Rating: 10,000 amperes rms symmetrical for 208-240/ 120 volt panelboards; 22,000 amperes rms symmetrical for 480 volt panelboards.
- E. Molded Case Circuit Breakers: NEMA AB 1, bolt-on type thermal magnetic trip circuit breakers, with common trip handle for all poles, listed as Type SWD for lighting circuits, Type HACR for air conditioning equipment circuits, Class A ground fault interrupter circuit breakers as indicated on Drawings. Do not use tandem circuit breakers.
- F. Enclosure: NEMA PB 1, Type 1 or Type 3R. All panelboards located in kitchen areas shall be flush mount with NEMA 4X Stainless Steel enclosures.
- G. Cabinet Front: Safety dead front type with concealed trim clamps, concealed hinge, metal directory frame, and flush lock keyed alike. Finish in manufacturer's standard gray enamel.
- H. Provide ground-fault circuit breaker for each heat trace branch circuit.
- I. Panelboards indicated to have thru-feed lugs shall be furnished with thru-feed lugs in all sections of panelboard.

2.13 MOTOR CONTROL CENTERS

- A. General:
 - 1. Provide totally enclosed, freestanding, motor control center with sections joined together to form one rigid unit. Motor control centers shall be similar to Square D Model 6 Class 8998.
 - 2. NEMA Class: I.
 - 3. NEMA Wiring Class: Type B.
 - 4. Standard: NEMA Standard ICS 2 Industrial Control and Systems.

5. Underwriters Laboratories: UL 845 "Electric Motor Control Centers". Each vertical section shall be UL listed. Each motor control unit shall be UL listed.
- B. Installation: Freestanding on a four (4) inch concrete pad. Bolt the entire enclosure to the pad.
- C. Structure:
1. Fabricated of code gage steel with steel doors formed into standardized units. Each vertical section shall have an independent isolated vertical wiring trough with full height hinged door. Back-to-back mounted devices in the same vertical bus module are unacceptable.
 2. Structures shall be totally enclosed, dead front, freestanding assemblies.
 3. Structure shall be NEMA type 1 gasketed general purpose.
 4. Motor control center structures shall have continuous removable base channels. The top plate(s) shall be removable to facilitate cutting of conduit entry openings.
 5. All steel parts shall be provided with a UL listed acrylic baked enamel or powder coat paint finish, except plated parts used for ground connections. All painted parts shall undergo a multi-stage treatment process, followed by the finishing paint coat.
 6. Structures shall contain a minimum 12-inch high horizontal wireway at the top of each section and a minimum six (6) inch high horizontal wireway at the bottom of each section. These wireways shall run the full length of the motor control center to allow room for power and control cable to connect between units in different sections.
 7. A vertical wireway shall be provided in each motor control center section that accepts modular plug-in units. The vertical wireway shall connect with both the top and bottom horizontal wireways. The vertical wireway shall be barriered from control units and have a separate hinged door.
 8. Unused spaces and spares shall have hinged doors.
- D. Bussing:
1. Provide complete horizontal and vertical bussing with wiring spaces at top, bottom, and vertically in each section. All bussing shall be silver plated 98 percent conductivity copper.
 2. The main horizontal bus shall be fully rated and shall extend the full length of the motor control center. Include provisions for splicing additional sections onto either end of the motor control center.
 3. Each section that accepts plug-in units shall be provided with a vertical bus for distributing power from the main bus to the individual plug-in starter units. This bus shall be of the same material and plating as the main bus and shall be rated no less than 125 percent of motor FLA in that section. Vertical bus shall extend full height of section, including all spare and space units. For purposes of calculating vertical bus ampacity, each space shall count no less than FLA of smallest motor served in that section.
 4. A tin or silver plated copper ground bus shall be provided that runs the entire length of the motor control center. The ground bus shall be rated no less than 1/3 of horizontal main bus amps. Provide a vertical ground bus in each section used for plug-in units. Plug-in units shall have a ground stab arranged for first-make, last-break relative to the power bus stabs.
 5. Motor control centers shall be separated into shipping blocks of no more than three vertical sections each.
 6. All power bussing and splice connections shall be isolated from the unit compartments and the wireways. The horizontal bus shall be isolated from the horizontal wireways and starters. Barriers shall be removable to allow access to the bus and connections for maintenance.
 7. The vertical bus shall be housed in modular glass filled polyester supports that provide bus insulation. These supports shall have openings every three (3) inches for unit stab-on connections. Each opening shall be provided with a closing plug to close off the stab opening.

- E. Terminations:
1. Provide proper incoming line lugs. Size lugs to accommodate wire which is to be installed.
 2. All starter units shall be provided with unit control terminal blocks.
 3. Terminal blocks shall be the pull-apart type rated at 20 amps. The stationary portion shall be used for field connections and will remain attached to the cubicle when the unit is removed. The removable portion of the terminal blocks shall be used for the unit wiring factory connections.
- F. Protective Devices:
1. Class J Fusible Switch-Starter Units: Plug in type with silver plated pressure type line disconnecting stabs of high strength copper alloy. Each unit shall be totally enclosed and effectively barriered and shall be so designed that it can be located anywhere within the structure using the same overload heaters for the same load. Fusible switches shall be manually operated quick make, quick break, horsepower rated. Coordinate fuses and overload heaters for proper acceleration time of motors provided. Operating handle shall clearly indicate ON or OFF. Provide for locking each switch in OFF position by 1 to 3 padlocks. Provide Class J fuse clips. Provide magnetic starter components as specified in Article MOTOR CONTROLLERS. Provide fuses field-installed in accordance with Article FUSES.
 2. Circuit Breakers (with no motor controller): Molded case, bolted type, quick make, quick break, trip free, common thermal magnetic trips. Operating handle shall clearly indicate ON or OFF. Means shall be provided for locking each breaker in OFF position with one to three padlocks. Automatic tripping indicated by handle at center position.
 3. Fused Switch (with no motor controller): Quick make, quick break, horsepower rated. Operating handle shall clearly indicate ON or OFF. Provide for locking each switch in OFF position with one to three padlocks. Provide Class J Type fuse clips. Provide fuses in accordance with Article FUSES located in this section.
 4. Starters: all starters for motor control center to be size 1 minimum or larger.
- G. Short Circuit Current Ratings:
1. Protective devices, together with the bussing and bracing, shall safely and without failure withstand and interrupt short circuits on a system capable of delivering up to 65,000 amps RMS symmetrical at nominal system voltage. Provide higher ratings when indicated on the Drawings.
 2. Bus bracing shall be provided for the entire bus network to withstand the mechanical forces generated during the specified short circuit.
 3. The main device serving the motor control center, every motor control unit and other overcurrent devices installed in the motor control center shall have an interrupt rating no less than the specified short circuit.
 4. The entire motor control center shall be suitable for operation at the specified available fault current. The motor control center shall be labeled by the manufacturer to indicate the maximum available fault current rating, taking into account the structure, bussing, main feeder and all units and devices included in the motor control center. This fault current withstand rating shall be the basis for the UL Short-Circuit Current Rating.
- H. Nameplate:
1. Identify each device with nameplate showing load served. Refer to "Labeling" in Section 26 05 53.
 2. Provide a master nameplate on face of units similar to following, with correct data shown:
Motor Control Center
480 Volts, 3 Phase, 3 Wire, 60 Hertz
Main Bus: _____amps. braced for _____ amperes RMS Symmetrical
Date Installed: _____
 3. Provide a nameplate for each vertical section marked with section characteristics and factory identification. This nameplate may be manufacturer's standard construction.

4. Provide UL listing marks on each section and unit in manufacturer's standard format.
- I. Submittal: Include at least the following:
 1. Manufacturer and Model Numbers.
 2. Dimensions.
 3. Cable Termination Provisions.
 4. Current Ratings.
 5. Voltage Ratings.
 6. Short Circuit Ratings including proof of any UL-listed series ratings (if series rating allowed by specification).
 7. Motor Controller and Protective Device Ratings, including catalog pages for all current-limiting devices.
 8. Identify NEMA Class of submitted mcc.
 9. Identify NEMA Wiring Type of submitted mcc.
 10. Single Phase Relay.
 11. Unit Elevation.
 12. Bussing Schematic, Sizes and statement of Conductor and Plating Material.
 13. Original Manufacturer Brochure and Specifications.

2.14 MAIN SWITCHBOARDS

- A. General: Provide universal building-type switchboards fabricated in accordance with NEMA Standard PB-2, UL Standard 891, and bearing a UL Service Entrance Label. Switchboard characteristics are 480/ 277 volts, 3 phase, 4 wire. Main connection and unit-mounted branch connections shall be from the rear. Group mounted branch connections shall be from the front or the rear. The entire switchboard assembly shall be similar to Square D Type QED-2.
- B. Structure:
 1. The switchboard shall be freestanding and have front and rear alignment. Provide rear access to main device(s) and all unit-mount branch devices (2000A and less can be front access only). Provide front or rear access to group-mounted devices. Formed up steel channels bolted together to form a rigid structure to which formed up fronts, side sheets, and rear covers are bolted. Galvanized 1-1/2" x 3" mounting channels on bottom, rear, left, and right sides to close all openings at the bottom. Arrange for easy addition of future cubicles at end. Provide pull box, fabricated with unit at factory, on top of switchboard if required for proper entrances and exits of feeders.
 2. When "SPACE" is indicated on one-line diagram, provide full bussing extension to serve that space and all overcurrent device mounting hardware for the given frame size.
- C. Installation: Freestanding, level and bolted to a four (4) inch concrete pad.
- D. Instrumentation:
 1. General: Monitor the incoming line with a Square D PM 5563 meter with BACnet IP communication port protocol.
 2. Meter shall have digital display adjustable to select phase. Monitor with an ammeter any feeder devices indicated on the Drawings.
 3. Wiring Lugs: Provide ring lugs for all wiring terminations of potential transformers (PTs), current transformers (CTs) and current sensors. Fork lugs are not acceptable. Ring lugs are intended to minimize the chance of leads pulling apart and creating an open circuit. (Zero current reading).

- E. Phase, Neutral and Ground Bussing: Silver plated 98% conductivity copper sized to comply with NEMA Temperature Rise Standard. In addition, copper bus shall be sized on the basis of a maximum temperature rise of 65 degree C. The vertical bussing per cubicle shall be sized not less than the sum of all devices, including spare spaces, to be served from that cubicle. **The vertical bus shall be a minimum of 2500 amperes and shall be full height.** Bus supports, connections, and joints shall be bolted with SAE Grade 5 medium carbon steel bolts employing Belleville washers. Provide complete bussing, mounting provisions for circuit protective devices and space screw cover wherever the drawings indicate space only. Arrange and drill bussing for **future full capacity extension**. Provide a full length ground bus, with minimum ampacity of 1/3 phase bus ampacity. Provide full-size neutral rated at 100 percent of phase bus.
- F. Terminations: Provide proper incoming line lugs to accommodate cable shown on plans.
- G. Short Circuit Ratings:
 - 1. Switchboard assembly of protective devices, together with the bussing and bracing, shall be fully-rated to withstand and interrupt short circuits on a system capable of delivering up to 65,000 amps RMS symmetrical at nominal system voltage.
- H. Provisions for Auto Power Factor Controller (APFC):
 - 1. Provide a circuit breaker with adjustable electronic tripping to protect and disconnect the automatic power factor controller.
 - 2. Set amp trip at minimum 150 percent of ampacity for the actual KVAR installed.
 - 3. Provide buss CTs on main incoming buss for use by the remote auto pf controller. These CTs shall be separate and in addition to all other CTs required for switchboard metering. Install a shorting terminal block on CT until the auto pf controller is installed at the job site.
- I. Protective Devices:
 - 1. Switchboard Main Breaker:
 - a. Stationary mounted, manually operated, 100 percent rated molded case circuit breakers with electronic tripping system and stored energy closing mechanisms. The electronic tripping system shall be similar to Square D Micrologic Full Function Trip unit. Main breakers shall be Square D RJ (1600-2500A) 65KA ampere frame size.
 - b. The breaker shall be UL Listed for continuous duty at 100% of the current rating.
 - c. Minimum interrupting rating of 65,000 amperes rms symmetrical at 480/ 277 Volts.
 - d. Local trip indicators: overload, short circuit and ground fault.
 - e. Electronic sensing systems shall be true-RMS sensing and not susceptible to adverse harmonic current effects.
 - f. Adjustments:
 - 1) The electronic trip unit shall have LSIG Trip functions.
 - 2. Feeder Devices:
 - a. Breakers 700 Amps and Larger:
 - 1) Branch feeder breakers 700 amp and larger shall be molded case circuit breakers rated 100% with electronic trip units, similar to Square D RJ (1600-2500A 65kaic 100%)
 - 2) Interrupting rating shall be at least 65,000 amperes rms symmetrical at 480/ 277 Volts.
 - 3) The electronic trip unit shall have LSI trip functions.
 - 4) The breaker shall be UL Listed for continuous duty at 100% of the current rating.
 - b. Breakers 600 amps and smaller shall be type L (600A and 400A frame), J (250A frame), and H (150A frame) molded circuit breakers, AIC rating to match main breaker.

- c. The breaker shall be UL Listed for continuous duty at 100% of the current rating.
- J. Transient Voltage Surge Suppressor (TVSS):
 - 1. General: Provide a Square D Class 1310 240kA surge current rated mounted in the switchboard mounted above the main circuit breaker compartment.
- K. Lightning and Overvoltage Surge Arrester:
 - 1. General: Provide a Square D SDSA3650 lightning and overvoltage surge arrester inside the switchboard housing, connected between the service entrance bussing and the ground bus.
 - 2. Description: Device shall be a heavy duty, three-phase, zinc metal oxide varistor (MOV), secondary class arrester rated for 650 volts and U.L. listed in Category (OWHX) of the Electrical Construction Materials Directory (Green Book). Device shall comply with ANSI/ IEEE C62.11-1987 Standard for Metal Oxide Surge Arresters for AC Power Circuits.
 - 3. Installation shall comply with CEC Article 280. Provide fusing if required by installation instructions from arrester manufacturer.
- L. Identification:
 - 1. General: Identify each device and meter with a nameplate showing load served. Refer to Article on LABELING in Section 26 05 00.
 - 2. Master Nameplate: Provide a master nameplate on face of boards similar to following, with correct data shown:

Main Switchboard _____
480/ 277 Volts, 3 Phase, 4 Wire, 60 Hertz
Main Bus: ___ amps. braced for ___ RMS sym. amps.
Date Installed: _____
- M. Submittal: Include at least the following:
 - 1. Manufacturer and Model Numbers.
 - 2. Dimensions.
 - 3. Cable Termination Provisions.
 - 4. Current Ratings.
 - 5. Voltage Ratings.
 - 6. Short Circuit Ratings.
 - 7. Protective Device Ratings.
 - 8. Electronic metering system.
 - 9. Surge Arrester.
 - 10. Unit Elevation.
 - 11. Bussing Schematic, Sizes and Statement of Conductor and Plating Materials.
 - 12. Original Manufacturer Brochure and Specifications.
 - 13. Coordination drawing using dimensions of actual switchboard submitted. Show board footprint, proper clearances, and other equipment in same room.
- N. Testing: Test all devices and systems to ensure proper operation.

2.15 SERVICE ENTRANCE CABLE TAP BOX (CTB)

- A. Cable Tap Box:
 - 1. General: Provide weatherproof, freestanding phase collection and cable tap box. Fabricate in strict accordance with Electric Utility requirements. Line side connection from building pad-mounted transformer shall be through underground conduit and wire, load side connections to the building main

2.16 ROOF MOUNTED PEDESTALS

- A. Roof Utility Pedestal with 20 Amp GFCI/ Weatherproof receptacle - Provide MAPA Products utility roof pedestal #MPX-20G: 36/ 12.
- B. Roof Pedestal with Non-Fused Disconnect Switch and 20 Amp GFCI/ Weatherproof receptacle - Provide MAPA Products roof pedestal. See plans for disconnect sizes.

PART 3 - EXECUTION

3.1 MOUNTING

- A. General: All equipment shall be securely fastened in place.
- B. Locations: In all cases mounting locations shall comply with the requirements of the California Electrical Code. This shall include providing suitable working clearances.
- C. Concrete Pads:
 - 1. Provide concrete in accordance with the Division of the Specifications for that product.
 - 2. Indoor concrete pads shall consist of a four (4) inch pad with beveled edges extending two (2) inches beyond the perimeter of supported equipment. Switchboards, motor control centers, transformers greater than 15 KVA, and engine generators shall be installed on a pad. Refer to the drawings and the specifications for each piece of equipment to determine what other equipment shall be mounted on a pad.
 - 3. All equipment, ground mounted outdoors, shall be mounted on a pad. Outdoor pads shall be minimum of one foot thick reinforced with #4 rebar one (1) foot on center each way. Size outdoor pads with at least four (4) feet working clearance in front of equipment and one (1) foot on all sides. Provide anchor bolts for pad-mounted equipment. Refer to Detail on drawings.
- B. Wall Mounted Equipment: Wall mounted equipment shall be suitably positioned on the wall. Equipment mounted on the exterior basement wall shall have unistrut channels between the wall and the equipment to prevent condensation problems. Where wall mounted equipment is specified, but a convenient wall not available, a suitable unistrut mounting stanchion anchored in concrete shall be provided. In lieu of this stanchion, small devices may be mounted on to the equipment served if approved by the equipment manufacturer.
- C. Motor rated disconnects: Install disconnects in a vertical orientation with off in the down position.

3.2 DELIVERY, STORAGE AND HANDLING

- A. General:
 - 1. Store all types of electrical power distribution equipment in a clean, heated building affording appropriate physical protection. Control access to prevent unauthorized tampering with the equipment. However, equipment may be stored in other inside or outside environments under approved conditions.
 - 2. Inspect equipment when received at Project site for shipping damage. Report as required by freight carrier to recover repair or replacement costs from the freight carrier in the event damage was sustained.
 - 3. Covers are required unless indoor, ventilated storage conditions exist. Canvas tarpaulins or the equivalent are preferred over other coverings because they provide better humidity control and enclosure scuff protection. Where exposed to moisture, covers shall be waterproof.

4. The manufacturer's shipping skids shall be left on the equipment to provide structural support until the equipment is set in the final resting place.
 5. Refer to Section 26 05 00 for additional requirements. Contractor shall furnish new equipment to replace any equipment that is exposed to weather or subjected to other deleterious effects of construction.
- B. Approved Conditions for Equipment Storage:
1. General: Where storage conditions specified above are not available, indoor or outdoor storage shall comply with the following.
 2. Switchboards, Motor Control and Other General Distribution and Utilization Equipment:
 - a. Store metal-enclosed equipment in an upright position. Provide good ventilation of the shelter and protection from dirt, moisture and physical damage.
 - b. Space heaters furnished with the equipment shall be connected to a continuous source of power of the proper rating. Where space heaters are supplied from auxiliary power transformers, care shall be taken that low-voltage heater circuits are properly isolated before power source connection to prevent inadvertent energizing of the auxiliary transformer and associated high-voltage primary wiring.
 - c. Ambient conditions may allow condensation inside waterproof covers. If condensation is occurring, temporary heaters or lamp banks shall be provided of sufficient wattage to prevent condensation.
 - d. Contractor shall ensure that equipment stored in shipping cases receives adequate ventilation to avoid mildew and prevent condensation.
- C. Transformer
1. Indoor storage shall be provided for all transformers.

3.3 GROUND FAULT PROTECTION OF EQUIPMENT

- A. General: Provide for system performance testing as required by the California Electrical Code. Provide each ground fault relay, sensing device or ground fault protection system with instructions and a test form. The form shall be retained by those in charge of the building's electrical installation and be available to the authority having jurisdiction. The instruction content shall be as required by UL.

3.4 TRANSFORMER VIBRATION ISOLATION

- A. Floor Mounted Transformers: Install on concrete housekeeping pad with Mason Industries Type WM Neoprene Waffle pad, or equal. Provide Type WM isolation for elevated rack installation.
- B. Wall Mounted Transformers: Install Mason Industries Type WM Neoprene Waffle pad between the wall brackets and the wall.
- C. Suspended Transformers: Install Mason Industries PC30 Pre-compressed spring hanger with neoprene isolator.
- D. Floor Mounted Transformers Greater than 150 kVA: Install on Mason Industries, Inc, or equal, unboxed spring isolators with acoustical pad bonded to bottom. Isolators shall be undamped free-standing spring isolators sized for a minimum of two (2) inches of static deflection. The spring outside diameter shall be no less than 80 percent of the spring operating height. The spring shall have remaining travel to solid of no less than 50 percent of the static deflection. Provide a 1/4-inch neoprene friction pad bonded to the spring base. Bolt each vibration isolator unit to concrete pad, and bolt transformers to the vibration isolator units, using the leveling bolts and nuts provided with the unit.

3.5 TRANSFORMER VENTILATION

- A. Transformers with ventilating openings shall be installed so that the ventilating openings are not blocked by walls or other obstructions. The required clearances shall be clearly marked on the transformer.

3.6 LABELING

- A. Nametag: Provide a nametag for each piece of distribution equipment; see Section 26 05 53, Electrical Identification.

END OF SECTION 26 20 00

SECTION 26 27 26 - WIRING DEVICES

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of this Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section Includes:
 - 1. Wiring devices.
- B. Related Sections:
 - 1. Section 26 05 00: Common Work Results for Electrical.
 - 2. Section 26 05 19: Low-Voltage Electrical Power Conductors and Cables.
 - 3. Section 26 05 26: Grounding and Bonding for Electrical Systems.
 - 4. Section 26 05 33: Raceway and Boxes for Electrical Systems.
- C. Reference Standards:
 - 1. California Electrical Code (CEC) based on NFPA 70 (NEC). California Code of Regulations, Title 24, Part 3.
 - 2. National Electrical Manufacturers Association (NEMA):
 - a. WD 1 General Color Requirements for Wiring Devices.
 - b. WD 6 Wiring Devices - Dimensional Specifications.
 - 3. National Electrical Manufacturers Association (NECA):
 - a. 1 Good Workmanship in Electrical Construction.
 - 4. National Electrical Testing Association (NETA):
 - a. ATS Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems.
 - 5. Underwriters Laboratories, Inc. (UL):
 - a. 20 Safety General-Use Snap Switches.
 - b. 231 Standard for Power Outlets.
 - c. 498 Attachment Plugs and Receptacles.
 - d. 943 Ground-Fault Circuit-Interrupters.
 - e. 1436 Standard for Outlet Circuit Testers and Similar Indicating Devices.
 - f. 1472 Solid-State Dimming Controls.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Receptacles, Switches, Wall Plates:
 - 1. Cooper Wiring Devices; Division of Cooper Industries, Inc.
 - 2. Hubbell Incorporated; Wiring Device-Kellems.
 - 3. Leviton Mfg. Company, Inc.
 - 4. Pass & Seymour/ Legrand.

2.2 RECEPTACLES

- A. General for all receptacles:
 - 1. Device shall be listed by UL

2. Mounting straps shall be plated steel, with break-off plaster ears and shall include a self-grounding feature (this feature does not substitute for a grounding conductor terminated on grounding strap of device). Terminal screws shall be brass, brass plated or a copper alloy metal.
 3. Receptacles shall be of a screw terminal type, "pressure type quick wire" terminations are not allowed.
- B. Duplex receptacles shall be premium specification grade single phase, 20 ampere, 120 volts, 2-pole, 3-wire, and conform to the NEMA 5-20R configuration in NEMA WD 6. The duplex type shall have bussing break-off feature for two-circuit operation. The ungrounded pole of each receptacle shall be provided with a separate terminal:
1. Wiring device color shall be standard white. Contractor to verify device color with Architect prior to procurement.
 2. Ground Fault Interrupter Duplex Receptacles - Shall be an integral unit suitable for mounting in a standard outlet box:
 - a. Ground fault interrupter shall be commercial grade and consist of a differential current transformer, solid state sensing circuitry and a circuit interrupter switch. It shall be rated for operation on a 60 Hz, 120 volt, 20-ampere branch circuit. Device shall meet CEC requirements. Device shall have a minimum nominal tripping time of 1/30th of a second. Devices shall meet UL 943.
- C. Receptacles; 20, 30 and 50 ampere, 250 volts: Shall be complete and match with appropriate cord grip plug. Devices shall meet UL 231.
- D. Weatherproof Receptacles: Shall consist of a listed weather resistant duplex receptacle, mounted in box with a gasketed, while in use weatherproof, cast metal cover plate and cap receptacle opening. The cap shall be permanently attached to the cover plate by a spring-hinged flap.

2.3 SWITCHES

- A. Toggle switches shall be totally enclosed tumbler type with bodies of phenolic compound. Toggle handles color to match receptacle device color unless otherwise specified:
1. Shall be single unit toggle, butt contact, quiet AC type, heavy-duty general-purpose use with an integral self-grounding mounting strap with break-off plaster ears and be of a screw terminal type.
 2. Shall be color coded for current rating, listed by UL, and meet the requirements of NEMA WD 1, Heavy-Duty and UL20.
 3. Ratings:
 - a. 120 volt circuits: 20 amperes at 120-277 volts AC.
 - b. 277 volt circuits: 20 amperes at 277 volts AC.
 4. The switches shall be mounted on the strike plate side of doors.
 5. Incorporate barriers between switches with multi-gang outlet boxes where required by the CEC.
 6. All toggle switches shall be of the same manufacturer.

2.4 WALL PLATES

- A. Wall plates for switches and receptacles shall be type 302 stainless steel.
- B. Standard NEMA design, so that products of different manufacturers will be interchangeable. Dimensions for openings in wall plates shall be accordance with NEMA WD1.
- C. For receptacles or switches ganged together, wall plates shall be a single ganged plate.

- D. Wall plates for data, telephone or other communication outlets shall be as specified in the associated specification.
- E. Surface mounted boxes, NEMA1, shall be industrial grade raised galvanized steel covers. In shop areas, all receptacles shall be dust proof and or waterproof where applicable.
- F. Waterproof device covers shall be cast iron, 4-corner screw type, for FS and FD type mounting. Device covers shall be zinc galvanized finish. Weatherproof covers shall be lockable.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Installation shall be in accordance with the CEC, NECA "Standard of Installation", and as shown as on the drawings.
- B. Ground terminal of each receptacle shall be bonded to the outlet box with an approved green bonding jumper, and also be connected to the green equipment grounding conductor.
- C. General: Devices shall be of the type specified herein. All devices shall be installed with "pigtailed" leads from the outlet box. No device shall be used in the "feed through" application. Screw terminals shall be used to connect all devices to the circuit and shall be grounded by means of a ground wire where grounding terminals are provided in the device.
- D. Installation: Devices and plates shall be installed in a "plumb" condition and must be flush with the finish surface of the wall where boxes are recessed.
- E. Mounting heights: All control and convenience devices shall comply with California Code of Regulations Title 24 and ADA with respect to accessibility requirements. Mounting heights indicated on plans shall have precedence.
- F. Install switches with the off position down.
- G. Clean debris from outlet boxes.
- H. Provide extension rings as required to bring outlet boxes flush with finished surface or casework.
- I. Test each receptacle device for proper polarity.

END OF SECTION 26 27 26

SECTION 26 33 23 - CENTRAL BATTERY EQUIPMENT FOR EMERGENCY LIGHTING

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section includes the following central battery and power conversion equipment rated 600 V and less for emergency lighting:
 - 1. Interruptible (slow-transfer) central battery equipment.
 - 2. Interruptible (fast-transfer) central battery equipment.
 - 3. Uninterruptible (UPS-type) central battery equipment.
- B. Related Requirements:
 - 1. Section 26 33 53 "Static Uninterruptible Power Supply" for power conversion equipment (UPS), with central batteries, not used for emergency lighting.

1.3 DEFINITIONS

- A. BAS: Building Automation System.
- B. Interruptible: As used in the Section Text, an off-line, passive-standby or line-interactive, inverter-only unit, with an intentional interruption of power to the load until an internal transfer switch picks up and transfers the load to the unit's inverter and internal battery source on loss of the "normal" source, and then retransfers to the "normal" source when it is restored. Transfer time can be "slow" (up to approximately 1 second) or "fast" (2-4 ms or 40-50 ms, depending on manufacturer).
- C. LED: Light-emitting diode.
- D. Low Voltage: As defined in NFPA 70 for circuits and equipment operating at less than 50 V or for remote-control, signaling power-limited circuits.
- E. NiCd: Nickel cadmium.
- F. OCPD: Overcurrent protective device.
- G. PC: Personal computer.
- H. PWM: Pulse-width modulated.
- I. TDD: Total demand (harmonic current) distortion (also listed as "THD" in catalog data by manufacturers).
- J. THD(V): Total harmonic voltage demand.
- K. Uninterruptible: As used in the Section Text, an on-line, double-conversion (rectifier/inverter) unit, with no interruption of power to the load on interruption and restoration of the "normal" source.

- L. UPS: Uninterruptible power supply.
- M. VRLA: Valve-regulated lead acid.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type and rating of central battery equipment unit.
 - 1. Include features, performance, electrical ratings, operating characteristics, shipping and operating weights, shipping splits, and furnished options, specialties, and accessories.
- B. Shop Drawings: For each type and rating of central battery equipment unit.
 - 1. Include plans, elevations, sections, and mounting details.
 - 2. Include details of equipment assemblies. Indicate dimensions, weights, loads, required clearances, ventilation requirements, method of field assembly, components, and location and size of each field connection.
 - 3. Include system one-line diagram, internal and interconnecting wiring, and diagrams for power, signal, and control wiring.
 - 4. Include elevation, details, and legends of control and indication displays.
 - 5. Include -circuit current (withstand) rating of unit.

1.5 INFORMATIONAL SUBMITTALS

- A. Coordination Drawings: Floor plans, drawn to scale, showing dimensioned layout, required working clearances, and required area above and around central battery equipment. Show central battery equipment layout and relationships between electrical components and adjacent structural and mechanical elements. Show support locations, type of support, and weight on each support. Indicate field measurements.
- B. Qualification Data: For testing agency.
- C. Seismic Qualification Certificates: For central battery equipment, accessories, and components, from manufacturer.
 - 1. Certificate of compliance.
 - 2. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
 - 3. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.
- D. Product Certificates: For each type of central battery equipment.
- E. Harmonic Analysis Study and Report: Comply with IEEE 399 and NETA Acceptance Testing Specification; identify the effects of nonlinear loads and their associated harmonic contributions on the voltages and currents throughout the electrical system. Analyze **designated** operating scenarios, including recommendations for input filtering of central battery equipment to limit TDD and THD(V) to specified levels.
- F. Source quality-control reports.
- H. Field quality-control reports.
- I. Sample Warranty: For special warranty.

1.6 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For central battery equipment to include in emergency, operation, and maintenance manuals.
 - 1. In addition to items specified in Section 01 78 23 "Operation and Maintenance Data," include the following:
 - a. Manufacturer's written instructions for testing central battery equipment.
 - b. Manufacturer's written instructions for testing, adjusting, and reprogramming microprocessor control modules.
 - c. Manufacturer's written instructions for selecting and setting field-adjustable controls and status and alarm points.

1.7 QUALITY ASSURANCE

- A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by the manufacturer.
- B. Testing Agency Qualifications: Member company of NETA or an NRTL.
 - 1. Testing Agency's Field Supervisor: Certified by NETA to supervise on-site testing.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Deliver equipment in fully enclosed vehicles.
- B. Store equipment in spaces having environments controlled within manufacturers' written instructions for ambient temperature and humidity conditions for non-operating equipment.

1.9 FIELD CONDITIONS

- A. Environmental Limitations: Rate equipment for continuous operation under the following conditions unless otherwise indicated:
 - 1. Ambient Temperature: Less than 0 deg F (minus 18 deg C) or exceeding 104 deg F (40 deg C), with an average value exceeding 95 deg F (35 deg C) over a 24-hour period.
 - 2. Ambient Storage Temperature: Not less than minus 4 deg F (minus 20 deg C) and not exceeding 140 deg F (60 deg C).
 - 3. Humidity: More than 95 percent (condensing).
 - 4. Altitude: Exceeding 3300 feet (1000 m).
- B. Interruption of Existing Electrical Distribution Systems: Do not interrupt electrical distribution systems within facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary electrical service according to requirements indicated:
 - 1. Notify **Owner** no fewer than five days in advance of proposed interruption of electrical systems.
 - 2. Indicate method of providing temporary electrical service.
 - 3. Do not proceed with interruption of electrical systems without **Owner's** written permission.
 - 4. Comply with NFPA 70E.
- C. Dimensions of larger central battery equipment, especially units with multiple battery enclosures and other devices, or various options, can vary in size between manufacturers. Retain "Product Selection for Restricted Space" Paragraph below if installation space for battery equipment is limited; indicate maximum dimensions on Drawings.
- D. Product Selection for Restricted Space: Drawings indicate maximum dimensions for central battery equipment, including clearances between central battery equipment and adjacent

surfaces and other items.

1.10 COORDINATION

- A. Coordinate sizes and locations of concrete bases. Cast anchor-bolt inserts into bases.

1.11 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace central battery equipment that fails in materials or workmanship within specified warranty period. Special warranty, applying to batteries only, applies to materials only, on a prorated basis, for period specified.
1. Warranty Period: Include the following warranty periods, from date of Substantial Completion:
 - a. Central Battery Equipment (excluding Batteries): **One** year.
 - b. Standard VRLA Batteries:
 - 1) Full Warranty: **One** year.
 - 2) Pro Rata: **Nine** years.
 - c. Premium VRLA Batteries:
 - 1) Full Warranty: **One** year.
 - 2) Pro Rata: **19** years.
 - d. NiCd, Wet-Cell Batteries:
 - 1) Full Warranty: **Five** years.
 - 2) Pro Rata: **15** years.

PART 2 PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Seismic Performance: Central battery equipment shall withstand the effects of earthquake motions determined according to ASCE/ SEI 7. The designated central battery equipment shall be tested and certified by an NRTL as meeting ICC-ES AC 156 test procedure requirements.
1. The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified **and the unit will be fully operational after the seismic event.**"

2.2 INTERRUPTIBLE (SLOW-TRANSFER) CENTRAL BATTERY EQUIPMENT

- A. Manufacturers: Subject to compliance with requirements, **provide products by one of the following**:
- B. **Basis-of-Design Product**: Subject to compliance with requirements, provide **product indicated on Drawings** or comparable product by one of the following:
1. Chloride Systems.
 2. Controlled Power Company.
 3. Cooper Industries, Inc.
 4. Crucial Power Products.
 5. Dual-Lite.
 6. Emergi-Lite; Thomas & Betts Corporation.
 7. Lightalarms; Thomas & Betts Corporation.
 8. LightGuard, A Philips Group Brand.
 9. Lithonia Lighting; Acuity Brands Lighting, Inc.
 10. Myers Power Products, Inc.
- C. General Requirements for Interruptible (Slow-Transfer) Central Battery Equipment:

1. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
 2. NRTL Compliance: Fabricate and label central battery equipment to comply with UL 924.
 3. Comply with NFPA 70, and NFPA 101.
 4. Source Limitations: Obtain central battery equipment, including batteries, overcurrent protective devices, components, and accessories, from single source from single manufacturer.
- D. Performance Requirements:
1. Slow-Transfer Central Battery Equipment: Passive-standby (off-line) system. Automatically sense loss of normal alternating-current (ac) supply and use an electromechanical transfer switch to transfer loads. Transfer in one second or less from normal supply to battery-inverter supply.
 2. Automatic Operation:
 - a. Normal Conditions: Supply the load with ac power flowing from normal ac power input terminals, bypassing inverter, with battery connected in parallel via rectifier/charger output.
 - b. Abnormal Supply Conditions: If normal ac supply deviates from specified voltage, transfer switch operates and battery supplies constant, regulated ac power through the inverter to the load, with a momentary loss of power to the load.
 - c. If normal power fails, transfer switch operates and battery supplies constant, regulated ac power through the inverter to the load, with a momentary loss of power to the load.
 - d. If a fault occurs in a system when being supplied by inverter and current flows in excess of the overload rating of inverter, inverter automatically protects itself against damage from overloads and short circuits by shutting down.
 - e. When normal ac power is restored at input supply terminals of unit, controls automatically retransfer the load back to the normal ac supply, with a momentary loss of power to the load. Rectifier/ charger then recharges battery.
 - f. If normal power failure is prolonged (more than 90 minutes), integral low-voltage battery protective circuit disconnects battery and prevents battery from damage due to deep discharge.
 - g. If battery becomes discharged, and when normal ac supply is again available, rectifier/ charger recharges battery. When the battery is fully charged, rectifier/ charger automatically shifts to float-charge mode.
 - h. If the battery is disconnected, and normal ac power is available, central battery equipment continues to supply power to the load with no degradation of its regulation of voltage and frequency of output bus.
- E. Unit Operating Requirements:
1. Input AC Voltage Tolerance: Plus 10 and minus **15** percent of central battery equipment input voltage rating.
 2. Input Frequency Tolerance: Plus or minus **5** percent of central battery equipment frequency rating.
 3. Synchronizing Slew Rate: **1** Hz per second, maximum.
 4. Minimum Off-Line Efficiency: **99** percent at 60 Hz, full load.
 5. Minimum Displacement Primary-Side Power Factor: **98** percent under any load or operating condition.
 6. Ambient Temperature Rating (Other Than Batteries): Not less than **68 deg F (20 deg C)** and not exceeding **86 deg F (30 deg C)**.
 7. Ambient Storage Temperature Rating (Other Than Batteries): Not less than **minus 4 deg F (minus 20 deg C)** and not exceeding **158 deg F (70 deg C)**.
 8. Ambient Temperature Rating (Batteries): Not less than **32 deg F (0 deg C)** and not exceeding **104 deg F (40 deg C)**.

9. Ambient Storage Temperature Rating (Batteries): Not less than **0 deg F (minus 18 deg C)** and not exceeding **104 deg F (40 deg C.)**
 10. Humidity Rating: Less than 95 percent (noncondensing).
 11. Altitude Rating: Not exceeding **3300 feet (1005 m)**.
 12. Off-Line Overload Capability: **1.1** times the base load current for 60 seconds; minimum of 1.8 times the base load current for three seconds.
- F. Inverter and Controls Logic: Microprocessor based, isolated from all power circuits; provides complete self-diagnostics, periodic automatic testing and reporting; with alarms.
- G. Controls and Indication:
1. Status Indication: Door-mounted, labeled LED indicators or digital screen displaying the following conditions:
 - a. Normal power available.
 - b. Status of system.
 - c. Battery charging status.
 - d. On battery power.
 - e. System fault.
 - f. External fault.
 2. Remote Signal Interfaces:
 - a. Remote Indication Interface: A minimum of **one** programmable (Form C) dry-circuit relay output(s) (120-V ac, 2 A) for remote indication of the following:
 - 1) Fault or status indication.
 - 2) On bypass.
 - 3) Low battery.
 - b. Communications Interface: Factory-installed hardware and software to enable a remote PC to program central battery equipment and monitor and display status and alarms.
 - 1) Compliance with ASHRAE 135: Controllers shall support serial MS/ TP and Ethernet IP communications and shall be able to communicate directly via BAS RS-485 serial networks and Ethernet 10Base-T networks as a native device.
- H. Self-Protection and Reliability Features:
1. Input transient protection by means of surge suppressors to provide protection against damage from supply voltage surges as defined in IEEE C62.45, Category B and C.
 2. Integral, programmable, self-diagnostic and self-test circuitry; with alarms and logging.
 3. Battery deep-discharge and self-discharge protection; with alarms.
 4. Battery self-test circuitry; with alarms and logging.
- I. Integral Input Disconnecting Means and OCPD: Thermal-magnetic circuit breaker, complying with UL 489.
1. Integrated Equipment Minimum Short-Circuit Current (Withstand) Rating: **22 kA**.
- J. Inverter:
1. Description: Solid-state, high-frequency, PWM type, with the following operational features:
 - a. Automatically regulate output voltage to within plus or minus **3** percent, for all load ranges and for maximum 25 percent step-load changes; regulation may increase to **8** percent for 100 percent step-load changes.
 - b. Automatically regulate output frequency to within plus or minus **1** Hz, from no load to full load, at unity power factor, over the operating range of battery voltage.
 - c. Output Voltage Waveform: Sine wave with maximum **3** percent TDD throughout battery operating-voltage range, for 100 percent linear load.
 - d. Load Power Factor: **0.5** lead to **0.5** lag.
 - e. Inverter Overload Capability: **115** percent for 10 minutes; 150 percent surge for

10 seconds.

- K. Rectifier/ Battery Charger:
 - 1. Description: Solid state, variable rate, temperature compensated; automatically maintains batteries in fully charged condition when normal power is available.
 - 2. Maximum Battery Recharge Time from Fully Discharged State: **24** hours.
 - 3. Low-voltage disconnect circuit reduces battery discharge during extended power outages, monitors battery voltage, and disconnects inverter when battery voltage drops to no less than 85.7 percent of nominal voltage.
- L. Batteries:
 - 1. Description: **Standard VRLA** batteries.
 - a. Capable of sustaining full-capacity output of inverter unit for minimum of **90 minutes**.
 - 2. Battery Disconnect and OCPD: Manufacturer's standard.
- M. Maintenance Bypass Systems:
 - 1. Maintenance Bypass Mode: Internal; manual operation only; bypasses central battery equipment power circuits (inverter and transfer switch); requires local operator selection at central battery equipment. Transfer and retransfer shall be **break-before-make, with temporary disrupting power to the load**.
 - 2. Bypass Overload Capability: **1.5** times the base load current.
- N. Integral Output Disconnecting Means and OCPD:
 - 1. Multiple-Output OCPDs: Thermal-magnetic circuit breakers, complying with UL 489; voltage rating matching unit output voltage rating; 20 A, single pole.

2.3 ENCLOSURES

- A. Central Battery Equipment Enclosures: NEMA 250, to comply with environmental conditions at installed location.
 - 1. Dry and Clean Indoor Locations: **Type 1** steel cabinets with access to components through hinged doors with flush tumbler lock and latch.
 - 2. Finish: **Manufacturer's standard baked-enamel finish over corrosion-resistant prime treatment**.

2.4 SOURCE QUALITY CONTROL

- A. Testing Agency: **Engage** a qualified testing agency to evaluate central battery equipment fabricator's quality-control and testing methods.
- B. Testing: Test and inspect central battery equipment according to UL 924.
- C. Factory Tests: Test and inspect assembled central battery equipment according to UL 924. Affix standards organization's label. Include the following:
 - 1. Functional test and demonstration of all functions, controls, indicators, sensors, and protective devices.
 - 2. Full-load test.
 - 3. Transient-load response test.
 - 4. Overload test.
 - 5. Power failure test.
- D. Central battery equipment will be considered defective if it does not pass tests and inspections.

- E. Prepare test and inspection reports.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Receive, inspect, handle, and store central battery equipment according to NECA 411.
- B. Examine areas, surfaces, and substrates to receive central battery equipment, with Installer present, for compliance with requirements for installation tolerances, structural support, ventilation, temperature, humidity, and other conditions affecting performance of the Work.
 - 1. Verify that manufacturer's written instructions for environmental conditions have been permanently established in spaces where equipment will be installed before installation begins.
- C. Examine equipment before installation. Reject equipment that is wet, moisture damaged, or mold damaged.
- D. Examine roughing-in for electrical connections to verify actual locations of connections before installation.
- E. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 HARMONIC ANALYSIS STUDY

- A. Perform a harmonic analysis study to identify the effects of nonlinear loads and their associated harmonic contributions on the voltages and currents throughout the electrical system. Analyze **designated** operating scenarios, including recommendations for central battery equipment input filtering to limit TDD and THD(V) to specified levels.
- B. Prepare a harmonic analysis study and report complying with IEEE 399 and with NETA Acceptance Testing Specification.

3.3 INSTALLATION

- A. Coordinate layout and installation of central battery equipment with other construction including conduit, piping, equipment, and adjacent surfaces. Maintain required workspace clearances and required clearances for equipment access doors and panels.
- C. Install central battery equipment and accessories according to NECA 411.
- D. Wall-Mounted Central Battery Equipment: Install central battery equipment on walls with tops at uniform height and with disconnect operating handles not higher than **79 inches (2000 mm)** above finished floor unless otherwise indicated, and by bolting units to wall or mounting on lightweight structural-steel channels bolted to wall. For units not on walls, provide freestanding racks complying with Section 26 05 29 "Hangers and Supports for Electrical Systems."
- F. Suspended-Mounted Central Battery Equipment: Suspend central battery equipment from structural ceiling components using hangers, clamps, and associated fittings, designed for types and sizes of units to be supported. Provide support devices complying with Section 260529 "Hangers and Supports for Electrical Systems."
- H. Floor-Mounted Central Battery Equipment: Install central battery equipment on **4-inch (100-mm)** nominal-thickness concrete base. Comply with requirements for concrete base.

1. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on **18-inch (450-mm)** centers around the full perimeter of concrete base.
 2. For supported equipment, install epoxy-coated anchor bolts that extend through concrete base and anchor into structural concrete floor.
 3. Place and secure anchorage devices. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
 4. Install anchor bolts to elevations required for proper attachment to supported equipment.
- I. Seismic Bracing: Comply with requirements specified in Section 26 05 48 "Vibration and Seismic Controls for Electrical Systems."
- J. Temporary Lifting Provisions: Remove temporary lifting eyes, channels, and brackets and temporary blocking of moving parts from enclosures and components.
- K. Comply with NECA 1.
- L. Wiring Method: Install cables in raceways and cable trays except within consoles, cabinets, desks, and counters. Conceal raceway and cables except in unfinished spaces.
1. Install plenum cable in environmental air spaces, including plenum ceilings.
 2. Comply with requirements for cable trays specified in Section 26 05 36 "Cable Trays for Electrical Systems."
 3. Comply with requirements for raceways and boxes specified in Section 26 05 33 "Raceways and Boxes for Electrical Systems."
- M. Wiring Method: Conceal conductors and cables in accessible ceilings, walls, and floors where possible.
- N. Wiring within Enclosures: Bundle, lace, and train conductors to terminal points with no excess and without exceeding manufacturer's limitations on bending radii. Install lacing bars and distribution spools.

3.4 CONNECTIONS

- A. Connections: Interconnect system components. Make connections to supply and load circuits according to manufacturer's wiring diagrams unless otherwise indicated.
- B. Ground equipment according to Section 26 05 26 "Grounding and Bonding for Electrical Systems."
1. Separately Derived Systems: Make grounding connections to grounding electrodes and bonding connections to metallic piping systems as indicated; comply with NFPA 70.
- C. Connect wiring according to Section 26 05 19 "Low-Voltage Electrical Power Conductors and Cables."

3.5 CONTROL WIRING INSTALLATION

- A. Install wiring between central battery equipment and remote devices. Comply with requirements in Section 26 05 23 "Control-Voltage Electrical Power Cables."
- B. Bundle, train, and support wiring in enclosures.

3.6 IDENTIFICATION

- A. Identify central battery equipment, components, and control wiring. Comply with requirements for identification specified in Section 26 05 53 "Identification for Electrical Systems."
 - 1. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs.
 - 2. Label central battery equipment with engraved nameplates.
 - 3. Label each separate cabinet, for multi-cabinet units.
 - 4. Label each enclosure-mounted control and pilot device.
- B. Operating Instructions: Frame printed operating instructions for central battery equipment, including control sequences and emergency procedures. Fabricate frame of finished metal, and cover instructions with clear acrylic plastic. Mount on front of central battery equipment units.

3.7 FIELD QUALITY CONTROL

- A. Testing Agency: **Engage** a qualified testing agency to perform tests and inspections.
- B. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect components, assemblies, and equipment installations, including connections.
- C. Perform tests and inspections.
- D. Acceptance Testing Preparation:
 - 1. Inspect and Test Each Component:
 - a. Inspect wiring, components, connections, and equipment installations. Test and adjust components and equipment.
 - b. Test insulation resistance for all external branch circuit, feeder, control, and alarm wiring connected to central battery equipment element and component.
 - c. Test continuity of each circuit.
- E. Tests and Inspections:
 - 1. Inspect central battery equipment, wiring, components, connections, and equipment installation.
 - 2. Test insulation resistance for all external branch circuit, feeder, control, and alarm wiring connected to central battery equipment element and component.
 - 3. Test continuity of each circuit.
 - 4. Verify that input voltages and frequencies at central battery equipment locations are within voltage and frequency limits specified in Part 2. If outside this range, notify **Owner** before closing input OCPDs.
 - 5. Perform each visual and mechanical inspection and electrical test stated in manufacturer's written instructions and in NETA Acceptance Testing Specification, including specifically those for batteries, battery chargers, and UPS, regardless of the type of central battery equipment provided. Certify compliance with test parameters.
 - 6. Perform a load-duration test at rated voltage and rated output current to verify the correct functional operation of the unit under full-load stable operating conditions for the minimum time limits required by UL 924. Monitor and record ambient temperature and temperatures within the unit.
 - 7. Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest.
 - 8. Perform the following infrared (thermographic) scan tests and inspections and prepare reports:
 - a. Initial Infrared Scanning: After Substantial Completion, but not more than 60 days after Final Acceptance, perform an infrared scan of central battery equipment. Remove front panels so joints and connections are accessible to portable scanner.

- b. Follow-up Infrared Scanning: Perform an additional follow-up infrared scan of central battery equipment 11 months after date of Substantial Completion.
 - c. Instruments and Equipment: Use an infrared scanning device designed to measure temperature or to detect significant deviations from normal values. Provide calibration record for device.
- 9. Test and adjust controls, remote monitoring, and safety. Replace damaged and malfunctioning controls and equipment.
- F. Central battery equipment will be considered defective if it does not pass tests and inspections.
- G. Prepare test and inspection reports, including a certified report that identifies central battery equipment and describes all test results. Include notation of deficiencies detected, remedial action taken, and observations made after remedial action.

3.8 STARTUP SERVICE

- A. **Perform** startup service.
 - 1. Complete installation and startup checks according to manufacturer's written instructions.

3.9 ADJUSTING

- A. Program microprocessors for required operational sequences, status indications, alarms, event recording, and display features. Clear events memory after final acceptance testing and prior to Substantial Completion.
- B. Set field-adjustable switches, auxiliary relays, and other adjustable parts.
- C. Adjust the trip settings of thermal-magnetic circuit breakers with adjustable, instantaneous-trip elements; install fuses if not factory installed.
- D. Set the automatic system test parameters.

3.10 PROTECTION

- A. Temporary Heating: Apply temporary heat to maintain temperature according to manufacturer's written instructions until controllers are ready to be energized and placed into service.
- B. Replace central battery equipment whose interiors have been exposed to water or other liquids prior to Substantial Completion.

3.11 DEMONSTRATION

- A. **Train]** Owner's maintenance personnel to adjust, operate, and maintain central battery equipment, and to use and reprogram microprocessor-based control, monitoring, and display functions.

END OF SECTION 26 33 23

SECTION 26 51 00 - INTERIOR LIGHTING

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of this Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section Includes:
 - 1. Interior lighting systems, including luminaires, LED's, and emergency lighting equipment.
- B. Related Sections:
 - 1. Section 26 05 00: Common Work Results for Electrical.
 - 2. Section 26 05 19: Low-Voltage Electrical Power Conductors and Cables.
 - 3. Section 26 05 26: Grounding and Bonding for Electrical Systems.
 - 4. Section 26 05 33: Raceway and Boxes for Electrical Systems.
- C. Reference Standards:
 - 1. California Electrical Code (CEC) based on NFPA 70 (NEC). California Code of Regulations, Title 24, Part 3.
 - 2. California Energy Code. California Code of Regulations, Title 24, Part 6.
 - 3. National Electrical Manufacturers Association (NEMA).
 - a. 50 Enclosures for Electrical Equipment.
 - b. 67 Panelboards.
 - c. 489 Molded Case Circuit Breakers and Circuit Breaker enclosures.
 - 4. Underwriters Laboratories, Inc. (UL).
 - a. 50 Enclosures for Electrical Equipment.
 - b. 67 Panelboards.
 - c. 489 Molded Case Circuit Breakers and Circuit Breaker enclosures.
 - 5. Aluminum Association Inc. (AA).
 - 6. Illuminating Engineering Society of North America (IESNA or IES).

1.3 SUBMITTALS

- A. Submit in accordance with Section 26 05 00: Common Work Results for Electrical.
- B. Shop Drawings:
 - 1. Sufficient information, clearly presented, shall be included to determine compliance with drawings and specifications.
 - 2. Include electrical ratings, dimensions, mounting, details, materials, terminations, wiring and connection diagrams, photometric data, ballasts, luminaires, lamps, and controls.

1.4 DEFINITIONS

- A. Lighting terminology used herein is defined in IES.
- B. Exception: The term "driver" is used herein to cover both drivers and power supplies, where applicable.
- C. Clarification: The term "LED light source(s)" is used herein per IES to cover LED

package(s), module(s), and array(s).

PART 2 PRODUCTS

2.1 MATERIALS AND EQUIPMENT

- A. Materials and equipment shall be in accordance with CEC, UL, ANSI, and as shown on the drawings and specified.

2.2 LIGHTING FIXTURES (LUMINAIRES)

- A. Shall be in accordance with CEC, UL 1598 and shall be as shown on drawings and as specified. All luminaires shall have been certified to the California Energy Commission by its manufacturer to comply with the efficiency standards as per California Code of Regulations Title 24, Part 6, Section 111 referencing the Appliance Efficiency Regulations in Title 20. Post certification with building permit.
- B. Sheet Metal:
1. Shall be formed to prevent warping and sagging. Housing, trim, and lens frame shall be true, straight (unless intentionally curved) and parallel to each other as designed.
 2. Wireways and fittings shall be free of burrs and sharp edges and shall accommodate internal and branch circuit wiring without damage to the wiring.
 3. When installed, any exposed fixture housing surface, trim frame, door frame and lens frame shall be free of light leaks; lens doors shall close in a light tight manner:
 - a. Hinged door closure frames shall operate smoothly without binding when the fixture is in the installed position, and latches shall function easily by finger action without the use of tools.
- C. Recessed fixtures shall be of the type approved for the ceiling and insulation conditions and appropriate for the installation location. Insulation must be held back from the fixture to provide manufacturers' recommended clearances for proper operation. Thermal tripping shall be the installer's responsibility to correct. Where installed in fire rated ceilings, coordinate installation of fire rated enclosures around the ceiling penetrations. Fixtures shall contain the proper through wiring capacity for that which is shown on the plans.
- D. Recessed fixtures shall be provided with the appropriate trims and hardware compatible with the ceiling type shown. Plaster frames are required where plaster or gypsum board ceilings are encountered.
- E. Fixtures with louvers or light transmitting panels shall have hinges, latches, and safety catches to facilitate safe, convenient cleaning and relamping.
- F. Mechanical Safety: Lighting fixture closures (lens doors, trim frame, hinged housings, etc.) shall be retained in a secure manner by captive screws, chains, captive hinges, or fasteners such that they cannot be accidentally dislodged during normal operation or routine maintenance.
- G. Metal Finishes:
1. The manufacturer shall apply standard finish (unless otherwise specified) over a corrosion resistant primer, after cleaning to free the metal surfaces of rust, grease, dirt, and other deposits. Edges of pre-finished sheet metal exposed during forming, stamping, or shearing processes shall be finished in a similar corrosion resistant manner to match the adjacent surface(s). Fixture finish shall be free of stains or evidence of rusting, blistering, or flaking.
 2. Interior light reflecting finishes shall be white with not less than 85 percent

- reflectance's, except where otherwise specified on the drawing.
- 3. Exterior finishes shall be as shown on the drawings.
- H. Provide all lighting fixtures with a specific means for grounding metallic wireways and housings to an equipment grounding conductor.
- I. Light Transmitting Components for Fixtures:
 - 1. Shall be 100 percent virgin acrylic plastic or water white, annealed, crystal glass.
 - 2. Flat lens panels shall have not less than 1/8 inch of average thickness. The average thickness shall be determined by adding the maximum thickness to the minimum unpenetrated thickness and dividing the sum by 2.
 - 3. Unless otherwise specified, lenses, diffusers and louvers shall be retained firmly in a metal frame by clips or clamping ring in such a manner as to allow expansion and contraction of the lens without distortion or cracking.
- J. Recessed compact LED fixtures shall be manufactured specifically for LED lamps with drivers integral to the fixture. Assemblies designed to retrofit fixtures are prohibited except when described in this fashion.

2.3 LED LUMINAIRE REQUIREMENTS

- A. General Requirements:
 - 1. Luminaire shall have an external label per ANSI C136.15.
 - 2. Luminaire shall have an internal label per ANSI C136.22.
 - 3. Luminaires shall start and operate in -20°C to +40°C ambient.
 - 4. LED light source(s) and driver(s) shall be RoHS compliant.

2.4 EMERGENCY FIXTURE POWER SUPPLY

- A. Self-contained battery-operated power supply for operating specified fixture for a minimum output of 90 minutes.
- B. The power supply shall be installed within the luminaire ballast compartment or wireway. Provide with test switch and charge indicator installed integral to the luminaire. The test switch and charge indicator may be installed in a remote ceiling mounted flush J-box for recessed downlights which cannot accept integral components.
- C. Performance: Emergency operation lumen output for specified fixtures shall be a minimum of 600 lumens.

2.5 LED DRIVER

- A. Driver:
 - 1. Rated case temperature shall be suitable for operation in the luminaire operating in the ambient temperatures as indicated.
 - 2. Shall accept the voltage or voltage range indicated and shall operate normally for input voltage fluctuations of plus or minus 10 percent. Consistent with NEMA SSL 1.
 - 3. Shall have a minimum Power Factor (PF) of 0.90 at full input power and across specified voltage range.
- B. Electromagnetic interference:
 - 1. Shall have a maximum Total Harmonic Distortion (THD) of 20% at full input power and across specified voltage range.
 - 2. Shall comply with FCC 47 CFR part 15 non-consumer RFI/ EMI standards.

- C. The following shall be in accordance with corresponding sections of ANSI C136.37:
1. Wiring and grounding.
 2. All internal components shall be assembled and pre-wired using modular electrical connections.
 3. Mounting provisions.
 4. Terminal blocks for incoming AC lines.
 5. Latching and hinging.
 6. Ingress protection.

2.6 LAMPS

- A. Led Light Source:
1. Minimum Color Rendering Index (CRI): 60.
 2. Correlated Color Temperature (CCT):
 - a. CCT shall be as listed in Table 1 below:

Table 1. Allowable CCT

Manufacturer-Rated Nominal CCT (K)	Allowable LM-79 Chromaticity Values Measured CCT (K)
2700	2580 to 2870
3000	2870 to 3220
3500	3220 to 3710
4000	3710 to 4260
4500	4260 to 4746
5000	4745 to 5311
5700	5310 to 6020
6500	6020 to 7040

PART 3 EXECUTION

3.1 INSTALLATION

- A. Installation and furnishing of lighting fixtures shall be in accordance with the CEC, manufacturer's instructions and as shown on the drawings or specified. Fixtures damaged in transit and storage prior to completion shall be replaced at Contractor's expense.
- B. Align, mount and level the lighting fixtures uniformly.
- C. Avoid interference with and provide clearance for equipment. Where the indicated locations for the lighting fixtures conflict with the locations for equipment, change the locations for the lighting fixtures by the minimum distances necessary as approved by the Architect. The Architectural reflected ceiling plan will take precedence over electrical plans.
- D. For suspended lighting fixtures, the mounting heights shall provide the clearances between the bottoms of the fixtures and the finished floors as shown on the drawings.
- E. Lighting Fixture Supports:

1. Contractor shall provide support for all of the fixtures independent of suspended ceilings. Supports may be anchored to channels of the ceiling construction, to the structural slab or to structural members within a partition, or above a suspended ceiling.
 2. Shall maintain the fixture positions after cleaning and re-lamping.
 3. Shall support the lighting fixtures without causing the ceiling or partition to deflect.
 4. Hardware for recessed fluorescent fixtures:
 5. Fixtures shall be supported as detailed on drawings and as required by DSA standards.
 6. Installation: Fixtures shall be securely mounted on ceilings and walls with appropriate fastening devices. "Drop-in" type T-bar fixtures shall be secured with #12 gauge safety "earthquake wires" as described by California Code of Regulations Title 24 Part 2, Chapter 47. "Tek Screws" will be required for fastening to the T-bar system in addition to safety wire. Surface mounted fluorescent fixtures shall be solidly screwed or clipped into framing above drywall with 4-#10 sheet metal screws into each fixture. Provide blocking for screw supports behind all surface mounted lighting fixtures weighing more than 15 lbs.
 7. Surface mounted lighting fixtures:
 - a. Fixtures shall be bolted against the ceiling independent of the outlet box at four points spaced near the corners of each unit. The bolts shall be minimum 1/4-20 bolt, secured to structural ceiling. Non-turning studs may be attached to the building structure by 12 gauge safety hangers.
 8. Fixtures mounted in open construction shall be secured directly to the building structure with approved bolting and clamping devices.
 9. Single or double pendent mounted lighting fixtures:
 - a. Each stem shall be supported by an approved outlet box, mounted swivel joint and canopy which holds the stem captive and provides spring load (or approved equivalent) dampening of fixture oscillations. Outlet box shall be supported vertically from the building structure and be allowed to swing to a 45 degree angle.
 10. Outlet boxes for support of lighting fixtures (where permitted) shall be secured directly to the building structure with approved devices or supported vertically in a hung ceiling from the building structure with a nine gauge wire hanger and be secured by an approved device to a main ceiling runner or cross runner to prevent any horizontal movement relative to the ceiling.
- F. Coordinate between the electrical and ceiling trades to ascertain that approved lighting fixtures are furnished in the proper sizes and installed with the proper devices (hangers, clips, trim frames, flanges), to match the ceiling system being installed.
- G. Bond lighting fixtures and metal accessories to the grounding system as specified in Section 26 05 26: Grounding and Bonding for Electrical Systems.
- H. Provide unswitched leg of interior lighting branch circuit to integral emergency battery pack light fixtures, exit signs and night lights as applicable per lighting plans.
- I. Wallmount fixtures in walkway areas shall not project more than 4 inches from wall when projection occurs lower than 80 inches.

END OF SECTION 26 51 00

SECTION 26 56 00 EXTERIOR LIGHTING

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of this Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This section specifies the furnishing, installation, and connection of exterior luminaires, controls, poles and supports.
- B. Related Sections:
 - 1. Section 26 05 00: Common Work Results for Electrical.
 - 2. Section 26 05 19: Low-Voltage Electrical Power Conductors and Cables.
 - 3. Section 26 05 26: Grounding and Bonding for Electrical Systems.
 - 4. Section 26 05 33: Raceway and Boxes for Electrical Systems.
 - 5. Section 26 51 00: Interior Lighting.
- C. Reference Standards:
 - 1. American Society for Testing and Materials (ASTM).
 - 2. American Concrete Institute (ACI).
 - 3. American National Standards Institute (ANSI).
 - 4. Aluminum Association Inc. (AA).
 - 5. Illuminating Engineering Society of North America (IESNA).
 - 6. National Electrical Manufacturers Association (NEMA).
 - 7. National Fire Protection Association (NFPA).
 - 8. Underwriters Laboratories, Inc. (UL).

1.3 SUBMITTALS

- A. Submit in accordance with Section 26 05 00: Common Work Results for Electrical.
- B. Shop Drawings:
 - 1. Sufficient information, clearly presented, shall be included to determine compliance with drawings and specifications.
 - 2. Include electrical ratings, dimensions, mounting, details, materials, required clearances, terminations, wiring and connection diagrams, photometric data, ballasts, poles, luminaires, effective projected area (EPA), lamps and controls.

PART 2 PRODUCTS

2.1 MATERIALS AND EQUIPMENT

- A. Materials and equipment shall be in accordance with CEC, UL, ANSI, as shown on the drawings and as specified.

2.2 LUMINAIRES

- A. UL 1598 and ANSI C136.17. Luminaries shall be weatherproof, heavy duty, outdoor types designed for efficient light utilization, adequate dissipation of lamp and ballast heat and safe

cleaning and relamping.

- B. Light emitting diode (LED)-based solid state lighting (SSL) products shall be factory tested in accordance to the International Engineering Society (IES) LM-79 recommendations and meet ANSI C78.377-2008 standards.
- C. LED light sources shall be factory tested in accordance to IES LM-80 recommendations.
- D. LED-based SSL product shall incorporate an external heat sink, integral to the luminaire.
- E. IESNA HB-9 and RP-8 light distribution pattern types shall be as indicated on the drawings.
- F. Lenses shall be frame-mounted heat-resistant, borosilicate glass, prismatic refractors. Attach the frame to the luminaire housing by hinges or chain.
- G. Pre-wire internal components to terminal strips at the factory.
- H. Bracket mounted luminaires shall have leveling provisions and clamp type adjustable slip-fitters with locking screws.
- I. Materials shall be rustproof. Latches and fittings shall be non-ferrous metal.
- J. LED-based SSL luminaires shall be manufactured specifically for LED lamps with drivers integral to the luminaire housing.

2.3 LED-BASED SOLID STATE DRIVERS

- A. Shall be listed by either U.L. or equal listing agency and comply with IEEE C.62.41-1991, Class A operation.
- B. Provide a minimum power factor of 0.9.
- C. Minimum operating temperature appropriate for outdoor environments.
- D. Shall operate at a frequency greater than or equal to 120Hz.

PART 3 EXECUTION

3.1 INSTALLATION

- A. Install lighting in accordance with the CEC, as shown on the drawings, and in accordance with manufacturer's recommendations.

3.2 GROUNDING

- A. Ground noncurrent-carrying parts of equipment including metal poles, luminaires, mounting arms, brackets, and metallic enclosures as specified in Section 26 05 26: Grounding and Bonding for Electrical Systems. Where copper grounding conductor is connected to a metal other than copper, provide specially treated or alloyed connectors suitable and listed for this purpose.

END OF SECTION 26 56 00

SECTION 27 00 00 - BASIC MATERIALS AND METHODS

PART 1 – GENERAL

1.01 RELATED WORK

- A. The entire drawing and specification package apply to the work specified in the telecommunications sections of the specifications and shall be complied with in every respect. The Contract Documents are comprised of the drawings and specifications. The Contractor shall examine these Contract Documents, and coordinate required work indicated in each.

1.02 SCOPE OF WORK

- A. The work covered by the specifications includes furnishing materials, labor, transportation, tools, permits, fees, utilities, and incidentals necessary for the complete installation of work required in the Contract Drawings.
- B. It is the intent of the Contract Documents to provide an extension of the existing installed systems interfaced with new systems, complete in every respect.
- C. The Contractor shall be responsible for coordination and proper relation of his work to the building structure and to the work of all trades. The Contractor shall visit the premises and thoroughly familiarize himself with the existing site conditions, details of the work and the working conditions, and verify dimensions in the field. The Contractor shall advise the Engineer of any discrepancy prior to bidding. The submission of bids shall be deemed evidence of the Contractor's site visit; coordination of existing conditions and include consideration for existing conditions.
- D. Provide line-by-line specification review for each Division 27 section annotated to certify compliance or deviation.

1.03 DRAWINGS AND SPECIFICATIONS

- A. The drawings and these specifications are complementary to each other, and what is required by one shall be as binding as if required by both.
- B. If variations or departures from the drawings are deemed necessary by the Contractor, details of such departures and the reasons therefore shall be submitted to the Engineer for review. No departures shall be made without prior written acceptance of the Engineer.
- C. Should the drawings or specifications disagree in themselves or with their counterpart, the better quality or greater quantity of work or materials shall be estimated upon, and unless otherwise directed by the Engineer in writing, shall be performed or furnished. In case the specifications should not fully agree with the Schedules, the latter shall govern. Figures indicated on drawings govern scale measurements and large scale details govern small scale drawings.
- D. Items specifically mentioned in the specifications but not shown on the drawings and/or items shown on the drawings but not specifically mentioned in the specifications shall be installed by the Contractor under the appropriate section of work as if they were both specified and shown.

1.04 CODES AND STANDARDS

- A. All work shall comply with the applicable articles of the National Electrical Code, the National Electrical Safety Code, the National Fire Codes (published by National Fire Protection Association), and City Codes and Ordinances, as well as any other authorities that may have lawful jurisdiction pertaining to the work specified. None of the terms or provisions of this specification shall be construed as waiving any of the rules, regulations, or requirements of these authorities.

- B. Contractor is responsible for knowledge and application of current versions of all applicable standards and codes. In cases where listed standards and codes have been updated, Contractor shall adhere to the most recent revisions, including all relevant changes or addenda at the time of installation.

- C. ANSI/TIA:
 - 1. ANSI/TIA-526-7-A (July 2015) Measurement of Optical Power Loss of Installed Single-Mode Fiber Cable Plant
 - 2. TIA-526.2-A (July 2015) Effective Transmitter Output Power Coupled into Single-Mode Fiber Optic Cable - Adoption of IEC 61280-1-1 ed. 2 Part 1-1: Test Procedures for General Communication Subsystems – Transmitter Output Optical Power Measurement for Single-Mode Optical Fiber Cable
 - 3. ANSI/TIA-4994 (March 2015) Standard for Sustainable Information Communications Technology
 - 4. ANSI/TIA-526-14-C (April 2015) Optical Power Loss Measurements of Installed Multimode Fiber Cable Plant
 - 5. ANSI/TIA-568.0-D (September 2015) Generic B (supersedes TIA-568-C.0 and TIA-568-C-1)
 - 6. ANSI/TIA-568.1-D (September 2015) Commercial Building Telecommunications Infrastructure Standard (supersedes ANSI/TIA-C.1)ANSI/TIA-568.2-D (September 2018) Balanced Twisted-Pair Telecommunications Cabling and Components Standard
 - 7. ANSI/TIA-568.3-D (June 2016) Optical Fiber Cabling Components Standard
 - 8. ANSI/TIA-568.4-D (August 2020) Broadband Coaxial Cabling Components Standard
 - 9. ANSI/TIA-569-E (May 2019) Telecommunications Pathways and Spaces
 - 10. ANSI/TIA-598-D (July 2014) Optical Fiber Cable Color Coding
 - 11. ANSI/TIA-570-C (August 2012) Residential Telecommunications Infrastructure Standard
 - 12. ANSI/TIA-606-C (June 2017) Administration Standard for Telecommunications Infrastructure
 - 13. ANSI/TIA-607-D (July 2019) Generic Telecommunications Bonding and Grounding (Earthing) for Customer Premises
 - 14. ANSI/TIA-758-B (March 2012) Customer-Owned Outside Plant Telecommunication Infrastructure Standard
 - 15. ANSI/TIA-862-B (February 2016) Structured Cabling Infrastructure Standard for Intelligent Building Systems
 - 16. ANSI/TIA-942-B (July 2017) Telecommunications Infrastructure Standard for Data Centers
 - 17. ANSI/TIA-1005-A (May 2012) Telecommunications Infrastructure Standard for Industrial Premises
 - 18. ANSI/TIA-1005-A-1 (January 2015) Telecommunications Infrastructure Standard for Industrial Premises, Addendum 1- M12-8 X-Coding Connector - Addendum to TIA-1005-A
 - 19. ANSI/TIA-1183 (August 2012) Measurement Methods and Test Fixtures for Balun-Less Measurements of Balanced Components and Systems
 - 20. ANSI/TIA-1183-1 (January 2016) Measurement Methods and Test Fixtures for Balun-Less Measurements of Balanced Components and Systems, Extending Frequency Capabilities to 2 GHz - Addendum to TIA-1183
 - 21. TIA-1152 (November 2016) Requirements for Field Test Instruments and

- Measurements for Balanced Twisted-Pair Cabling
22. TIA-1179-A (September 2017) Healthcare Facility Telecommunications Infrastructure Standard
 23. ANSI/TIA-4966 (May 2014) Telecommunications Infrastructure Standard for Educational Facilities
 24. TIA-455-104-B (February 2016) FOTP 104- Fiber Optic Cable Cyclic Flexing Test (supersedes TIA-455-104-A)
 25. TIA/EIA-455-25-D (February 2016) FOTP-25 Impact Testing of Optical Fiber Cables
 26. TIA-604-18 (November 2015) FOCIS 18 Fiber Optic Connector Intermateability Standard – Type MPO-16
 27. TIA-604-5-E (November 2015) FOCIS 5 Fiber Optic Connector Intermateability Standard-Type MPO
 28. TIA-5017 (March 2016) Telecommunications Physical Network Security Standard
 29. TIA-TSB-155-A (Reaffirmed 10-6-2014) Guidelines for the Assessment and Mitigation of Installed Category 6 Cabling to Support 10GBASE-T
 30. TSB-184 (July 2009) Guidelines for Supporting Power Delivery Over Balanced Twisted-Pair Cabling
 31. TSB-4979 (August 2013) Practical Considerations for Implementation of Multimode Launch Conditions in the Field
 32. TSB-190 (June 2011) Guidelines on Shared Pathways and Shared Sheaths
 33. TIA-TSB-162-A (November 2013) Telecommunications Cabling Guidelines for Wireless Access Points
 34. TSB-5018 (July 2016) Structured Cabling Infrastructure Guidelines to support Distributed Antenna Systems
 35. TIA-492AAAE (June 2016) Detail Specification for 50- μ m Core Diameter/125- μ m Cladding Diameter Class 1a Graded-Index Multimode Optical Fibers with Laser-Optimized Bandwidth Characteristics Specified for Wavelength Division Multiplexing
 36. TIA-492AAAB-A (November 2009) Detail specification for 50- μ m core diameter/125- μ m cladding diameter class 1a graded-index multimode optical fibers
 37. TIA-455-243 (March 2010) FOTP-243 Polarization-mode Dispersion Measurement for Installed Single-mode Optical Fibers by Wavelength-scanning OTDR and States-of-Polarization Analysis
 38. TSB-172-A (February 2013) Higher Data Rate Multimode Fiber Transmission Techniques

D. ISO/IEC:

1. ISO/IEC TR 11801-99-01 Information technology – Generic cabling for customer premises: Guidance for balanced cabling in support of at least 40 GBit/s data transmission: Parts 1 and 2
2. ISO/IEC TR 29106 AMD 1 Information technology -- Generic cabling -- Introduction to the MICE environmental classification
3. ISO/IEC 24764 AMD 1 Information technology – Generic cabling for data centers
4. ISO/IEC 11801 AMD 1 AMD 2 Information technology – Generic cabling for customer premises
5. ISO/IEC 15018 AMD 1 Information technology – Generic cabling for homes
6. ISO/IEC 24702 AMD 1 Information technology – Generic cabling – Industrial premises
7. ISO/IEC 14763-1 AMD 1 Information technology – Implementation and operation of customer premises cabling – Part 1: Administration
8. ISO/IEC 14763-2 Information technology – Implementation and operation of customer premises cabling – Part 2: Planning and installation
9. ISO/IEC 14763-2-1 Information technology – Implementation and operation of customer premises cabling – Part 2-1: Planning and installation – Identifiers within administration systems
10. ISO/IEC 14763-3 Ed 2.0 Information technology -- Implementation and operation of customer premises cabling -- Part 3: Testing of optical fiber cabling

11. ISO/IEC TR 24704 Information technology – Customer premises cabling for wireless access points
 12. ISO/IEC TR 24750 Information technology – Assessment and mitigation of installed balanced cabling channels in order to support 10GBASE-T
 13. ISO/IEC TR 29125 IT Telecommunications cabling requirements for remote powering of terminal equipment
- E. BICSI – Building Industry Consultative Services International – Published Standards
1. ANSI/BICSI 001-2009, Information Transport Systems Design Standard for K-12 Educational Institutions
 2. ANSI/BICSI 002-2014, Data Center Design and Implementation Best Practices
 3. ANSI/BICSI-003-2014 Building Information Modeling (BIM) Practices for Information Technology Systems
 4. BICSI 004-2012, Information Technology Division Systems Design and Implementation Best Practices for Healthcare Institutions and Facilities
 5. ANSI/BICSI 005-2016, Electronic Safety and Security (ESS) System Design and Implementation Best Practices
 6. BICSI 006-2015 Distributed Antenna System (DAS) Design and Implementation Best Practices
 7. ANSI/NECA/BICSI 568-2006, Standard for Installing Commercial Building Telecommunications Cabling
 8. NECA/BICSI 607-2011, Standard for Telecommunications Bonding and Grounding Planning and Installation Methods for Commercial Buildings
 9. BICSI – Building Industry Consultative Services International – Manuals
 10. Telecommunications Distribution Methods Manual, 14th Edition (2020)
 11. Information Transport Systems Installation Methods Manual (ITSIMM), 6th Edition
 12. Outside Plant Design Reference Manual, 5th Edition
 13. BICSI's ICT Terminology Handbook, Version 1.0
 14. Telecommunications Project Management Manual (TPMM), 1st edition
 15. Telecommunications Project Management Reference Document (TPMRD), 2nd Edition
 16. BICSI's Special ICT Design Considerations, Version 1.0
 17. Essentials of Bonding and Grounding, Version 1.0
- F. National Electric Codes
1. National Electrical Safety Code (NESC) (IEEE C2-2012)
 2. NFPA 70-2020, National Electrical Code® (NEC®)
 3. ANSI/IEEE C2-207, National Electrical Safety Code®
 4. National Electrical Code (NEC) (NFPA 70)
 5. NFPA 72 National Fire Alarm and Signaling Code
- G. ASHRAE
1. ASHRAE Standard 90.4P, Energy Standard for Data Centers and Telecommunications Buildings
- H. OSHA Standards and Regulations – all applicable
- I. Local Codes and Standards – all applicable
- J. Anywhere cabling standards conflict with one another or with electrical or safety codes, Contractor shall defer to the NEC and any applicable local codes or ordinances, or default to the most stringent requirements listed by either.
- K. Knowledge and execution of applicable standards and codes is the sole responsibility of the Contractor.

- L. Any violations of applicable standards or codes committed by the Contractor shall be remedied at the Contractor's expense.
- M. In any instance where these Specifications call for materials for construction of a better quality or larger size than required by the codes, the provisions of these Specifications shall take precedence. The codes shall govern in case of direct conflict between the Codes and the Drawings.

1.05 EXISTING UTILITIES

- A. The Contract Documents reflect the general location and routing for all telecommunications services known to exist on this project.

1.06 BUILDING CONSTRUCTION AND LAYOUT OF WORK

- A. General: It shall be the responsibility of the Contractor to consult the Engineering Drawings and Details so as to thoroughly familiarize himself with the type and quality of construction to be provided on this project.
- B. The drawings are diagrammatic in nature and do not show every connection in detail or every line or conduit in its exact location. These details are subject to the requirements of all codes and ordinances as well as all structural and architectural conditions. The Contractor shall carefully investigate structural and finish conditions and shall coordinate the separate trades in order to avoid interference between the various phases of work. Work shall be laid out so that it will be concealed in furred chases unless specifically noted or indicated to be exposed. Work shall be installed to avoid crippling of structural members; therefore, inserts to accommodate conduit hangers shall be set before concrete is poured, and proper openings through floors, walls, beams, etc. shall be provided as hereinafter specified or as otherwise indicated or required before concrete is poured. All work shall be run parallel or perpendicular to the lines of the building unless otherwise noted.
- C. The approximate location of equipment items is indicated on the drawings. Exact locations are to be determined by coordination of dimensions from approved equipment submittals and site-verified field measurements and will in all cases be subject to the approval of the Engineer. The Engineer reserves the right to make any reasonable changes in the indicated locations prior to installation for no additional cost.
- D. In areas of existing special ceiling construction the removal and restoration must be carefully planned such that the existing condition of the ceilings is maintained. It may be necessary for the Contractor to procure a Subcontractor familiar with this work to achieve this requirement.

PART 2 – PRODUCTS

2.01 GENERAL MATERIALS AND EQUIPMENT REQUIREMENTS

- A. Materials, in general, shall conform to the National Electrical Code requirements and shall be listed, inspected, and approved by the Underwriters Laboratories and shall bear the UL label where labeling service is available. The label or listing of the Underwriters Laboratories, Inc. will be accepted as evidence that the materials or equipment conform to the applicable standards of that agency. In lieu of this listing, the Contractor may submit a statement from a nationally recognized, adequately equipped testing agency, indicating that the items have been tested in accordance with required procedures, and that the materials and equipment comply with all Contract requirements.

2.02 STANDARD PRODUCTS

- A. Materials and equipment shall be the standard catalog products of manufacturers regularly engaged in the manufacture of products conforming to these specifications, and shall essentially duplicate materials and equipment that have been in satisfactory use at least two (2) years prior to bid opening. Where custom or special items are required, these shall be fully described using drawings, material lists, etc., which fully describe in detail the item proposed for use on this project.

2.03 MANUFACTURER'S INSTRUCTIONS

- A. The Contractor is responsible for furnishing the proper telecommunications equipment and/or material and for seeing it is installed as intended by the manufacturer. The Contractor shall, wherever necessary, request advice and supervisory assistance from equipment manufacturers as required for the proper installation, operation, or start-up. The Contractor shall notify the Engineer in writing of any conflict between the Contract Documents and the manufacturer's recommendations and shall obtain from the Engineer instructions/direction before proceeding with the work. The Contractor shall pay for all costs resulting from deficiencies created by installation not in accordance with the manufacturer's recommendations or the instructions of the Engineer.

2.04 RUST PREVENTION

- A. Metallic materials shall be protected against corrosion. Exposed metallic parts of equipment exposed to the elements shall be given a rust inhibiting treatment and standard finish by the manufacturer. Components such as boxes, bodies, fittings, guards, and miscellaneous parts shall be protected in accordance with the ASTM A123 or A153, except where other equivalent protective treatment is specifically approved in writing.

2.05 STORAGE AT SITE

- A. The Contractor shall not receive material or equipment at the job site until ready for installation or until there is suitable space provided to properly protect equipment from rust, weather, humidity, dust, or physical damage.

2.06 CONDITION OF MATERIALS

- A. All materials required for the installation of the telecommunications systems shall be new and unused. Any material or equipment damaged in transit from the factory, during delivery to premises, while in storage on premises, while being erected and installed, or while being tested, until time of final acceptance, shall be replaced by this Contractor without extra cost to Owner.

2.07 NAMEPLATES

- A. Factory assembled components and equipment shall be provided with embossed nameplates, securely attached to the equipment with rivets or screws. Nameplates will have information required to specifically identify the equipment in the future such as the manufacturer's name, address, catalog number, serial number, etc. All data on nameplates shall be legible at the time of final inspection.

PART 3 – EXECUTION

3.01 ACCEPTABLE MANUFACTURERS

- A. The specifications contain the names of manufacturers which are considered acceptable based on the quality of the product.
- B. Where acceptable manufacturers are listed, only products of those manufacturers may be provided. Additionally, the product must meet all the detailed requirements of the specifications.
- C. If no manufacturer's name is mentioned, the Contractor shall provide equipment and material which meet the specifications.
- D. The drawings represent the manufacturer's equipment scheduled. The listing of acceptable manufacturers in the specifications is not intended to imply that equipment of these other manufacturers will fit in the space provided or have the same electrical, structural or other requirements as the equipment scheduled. The Contractor must ensure that the equipment provided will meet all project requirements prior to submitting data on that equipment.

3.02 SPACE AND EQUIPMENT ARRANGEMENT

- A. Equipment and components shall be installed in a manner to permit access to parts requiring service. Telecommunications equipment shall be installed in such a manner as to allow removal for service without disassembly of adjacent equipment.
- B. Large equipment or apparatus which is to be installed in the building, and which is too large to permit access through stairways, doorways, or shafts shall be brought to the job and placed in the space before the enclosing structure is completed. Following placement in the space, such apparatus shall be thoroughly protected from damage.
- C. Equipment shall have working clearances as required by applicable codes and standards.

3.03 SUBMITTAL AND REVIEW OF MATERIALS

- A. After the Contract is awarded, but prior to proceeding with the Work, the Contractor shall obtain, check, certify, and submit complete Shop Drawings and Brochures from Manufacturers, Suppliers, Vendors, etc., for all materials and equipment specified herein. Submit Shop Drawings and Brochures in sufficient time so as not to impede the progress of work. Three weeks will be required for the processing of Shop Drawings and Brochures in the Engineer's office, exclusive of transmittal time. This time shall be considered by the Contractor when scheduling submittal data. After the Contract is awarded, the Contractor will advise the Engineer in writing of the schedule for submission of shop drawings and product data and the persons authorized to sign submittal data on behalf of the Company.
- B. The Engineer's review of Shop Drawings and Brochures shall not relieve the Contractor of the responsibility for dimensions, errors that may be contained therein, or deviations from Contract Document requirements. It shall be clearly understood that the Engineer's noting some errors but overlooking others does not grant the Contractor permission to proceed in error. Regardless of any information contained in the Shop Drawings, the requirements of the Contract Documents shall govern and are not waived or superseded in any way by the submittal data review.
- C. Before submission of Shop Drawings and Brochures, the Contractor shall certify that each Shop Drawing and each item of material or equipment complies with the Contract Documents for this Project. Such certification shall be made by the Owner, a Partner, a Corporate Officer of the Contractor, or by a person duly authorized to sign for the Contractor.

Unless so certified, Shop Drawings and/or Brochures will be returned for resubmittal. Certifications shall be in the form of rubber stamp impressions or typed letter which states:

I hereby certify that this Shop Drawing and/or brochure and the equipment and material shown on this Shop Drawing and/or Brochure complies in all aspects (except as noted*) with the requirements of the Contract Documents for this Project. I further certify that all data shown herein as to performance, dimensions, construction, materials, and other pertinent items are true and correct.

Name of Contractor _____

Signed _____

Position _____

Date _____

*Refer to exception requirements herein.

- D. Each Shop Drawing shall indicate in the lower right hand corner and each Brochure shall indicate on the front cover the following: Title of the Sheet or Brochure; name and location of the building; names of the Engineer, Contractor, Manufacturer, Supplier, Vendor, etc., the date of submittal; and the date of each correction and revision. So far as is practical, each Shop Drawing and/or Brochure shall bear a cross-reference note to the sheet number or numbers of the Contract Drawings and Specifications showing the same work. Shop Drawings and Brochures shall be prepared as follows:

1. Shop Drawings: Drawings shall be newly prepared and not reproduced from the Contract Documents, drawn to a scale that can be easily read and shall contain sufficient plans, elevations, sections, and isometrics to describe clearly the items in question. Drawings shall be prepared by a draftsman skilled in this type of work. All equipment layouts and similar Shop Drawings shall be drawn to at least 1/4-inch = 1'-0" scale.
2. All Shop Drawings shall indicate the equipment actually purchased. The elevation, location, support points, load imposed on the structure at support and anchor points, shall be indicated. All beam penetrations and slab penetrations shall be indicated and sized and shall be coordinated. All Design Drawing space allocations shall be maintained, such as ceiling height, chase walls, equipment room size, etc., unless proper written authorization is required from the Engineer to change them. All associated equipment shall be coordinated and clearly shown on the Shop Drawings.
3. Brochures: Brochures submitted to the Engineer shall be published by the Manufacturers and shall contain complete and detailed engineering and dimensional information to show that the equipment will fit into the allotted space.
4. Brochures submitted shall contain only information which is relevant to the particular equipment or materials to be furnished. Do not submit catalogs that describe several different items other than those items to be used unless all irrelevant information is marked out or relevant information is clearly marked.

- E. The submittal format shall follow the Specifications format with a submittal required for each required section. The submittal shall be contained in a three-ring hard back binder. Copies of each submittal shall be three-hole punched and arranged (or folded if required) for the Engineer's filing convenience. Provide one copy of updated TABLE OF CONTENTS and

progressive-tabbed index sheets also for the Engineer's filing convenience.

- F. Submittal data for each section must be complete. Partial submittals will not be reviewed. To the greatest extent possible all sections shall be submitted with the first submission. No more than three additional submissions will be allowed to complete the submittal package.
- G. Unless a greater number is indicated within Division One of these specifications, submit six (6) copies of all Brochures for review. Submit one (1) reproducible and one (1) blueprint of shop drawings for review. Comments will be made on the reproducible to facilitate copying.
- H. Any submittal that is disapproved must be resubmitted within two (2) weeks following notification of such disapproval. If no satisfactory material is submitted within the two-week period, the Engineer reserves the right to require the Contractor to furnish items exactly as described in the Contract Documents.
- I. No allowances will be made for submittals which are not made in a timely fashion or which are turned down because they do not meet the specifications. Should delivery problems arise due to the above, affecting the completion time of the project, the Contractor will furnish and install acceptable alternates until the proper materials arrive and then replace the alternate materials with the approved materials, all at no cost to the Owner. If the Contractor is not able to furnish an acceptable alternate until the proper materials arrive, he will assume all costs for furnishing and installing all alternates as directed by the Engineer and/or will pay a suitable penalty for the inconvenience experienced by the Owner. This penalty will be set by the Owner based on the particular circumstances.

3.04 SUPERVISION

- A. A competent certified foreman or superintendent, approved by the Engineer, shall be maintained at the project site to receive instructions and to act for the Contractor. Once this superintendent has been approved, no change shall be made without approval of the Owner or his authorized representative. The Owner and his authorized representative shall have the right to observe the work at any time. The Contractor shall have a representative present when his work is being observed, and he shall give assistance as required.

3.05 CUTTING AND PATCHING

- A. Where it is necessary to cut through walls, floors, or ceilings to permit installation of work under this section of the Contract, or to repair any defects that may appear, up to the expiration of guarantee period, such cutting shall be done under the supervision of the Engineer. The Contractor shall not be permitted to cut or modify any structural members without the written permission of the Engineer.
- B. Patching of all openings and repairing of any damage to the work of other trades occasioned by cutting operations, or occasioned by the failure of any part of work installed under this Contract, shall be performed by the trade whose work is involved, and shall be paid for by the Contractor.
- C. Openings cut through exterior walls or roofs shall be provided with suitable covers to protect the property or materials involved. Openings cut through walls below grade shall be properly protected to prevent entrance of water or other foreign elements. Openings cut between fire zones or plenums shall be sealed to maintain the fire integrity of the wall or floor. Conduits and cable tray through plenum wall shall be sealed using materials complying with UL 1479, NEC 300-21, and NEC 800-3(C), and shall be UL classified.

3.06 HOISTING, SCAFFOLDING, AND TRANSPORTATION

- A. Provide hoisting and scaffolding facilities as required to set materials and equipment in place.

3.07 CLEANING

- A. The Contractor shall at all times keep the premises free from accumulations of waste material or rubbish. Debris shall be removed from the site and from any street or alley adjacent to the site.
- B. At completion of the project, the Contractor shall remove all tools, scaffolding, and surplus materials. Contractor shall leave the area "broom clean". Before final acceptance, vacuum all panels, cabinets, racks and other equipment enclosures. Wipe clean all fixture lenses and reflectors, all panelboard and switchboard interior and exterior surfaces, being careful to remove all stray paint, construction materials, dust, and particles. Touch-up all marred surfaces to restore existing conditions to those provided by the manufacturer.

3.08 CONDUIT SLEEVES

- A. Where conduits pass through walls or floors not on fill, galvanized sheet metal sleeves shall be provided and shall be sealed to prevent air and noise transmission. In walls, they shall be flush with each finished surface. In pipe chases, they shall extend 1-1/2 inches above floor slab and be cemented in a water tight manner. Size of these sleeves shall be at least 1/2 inch greater than outside diameter of the conduit.
- B. For conduits passing through outside walls, provide and install galvanized steel sleeves having an inside diameter at least 4 inches greater than the outside diameter of contained conduit. Where these occur in walls having a waterproof coating applied, the sleeves shall have welded flanges to build into waterproofing. When conduits are installed, the annular space between pipe and sleeve shall be effectively sealed, using shredded lead hammered in place or an approved mastic sealer.
- C. Pipe and duct sleeves, pitch pockets, and flashings compatible with the roofing installation shall be provided for roof penetrations.

3.09 GROUNDING

- A. Ground buses shall be provided in each Telecommunications room by Division 16 Contractor unless noted on Contract Drawings.
- B. Telecommunications grounding system shall be a single point grounding from the building entrance electrical ground to each Telecommunications room. This Grounding system shall be provided by Division 16 Contractor unless notes on Contract Drawings.
- C. All Conduit systems, cabinets' racks, cable trays, protector blocks, SCTP patch panels and/or miscellaneous equipment, etc. shall be grounded by being connected to the common telecommunications grounding system. The conductors shall be a # 6awg solid with a green jacket

3.10 RECEDENCE OF WORK

- 1. This Contract includes many different systems furnished and installed by different trades. All trades shall coordinate their work with that of all other trades so that it may be installed in the most direct and workmanlike manner without hindering or handicapping other trades.

3.11 RECORD DRAWINGS

- A. The Contractor shall keep a set of Drawings on the job, noting daily all changes made in these Drawings in connection with the final installation, including exact dimensioned locations of all new and uncovered existing active and inactive utilities outside the building, and shall turn over a clean, neatly marked set of mylar reproducible Drawings showing "as-installed" work to the Engineer for delivery to the Owner. All underground utilities, services, and systems shall be accurately located by the Contractor and dimensioned on the "as-installed" Drawings.

3.12 OPERATING AND MAINTENANCE MANUAL

- A. The Contractor shall furnish indexed operating and maintenance manuals with complete technical data for each system, piece of equipment, and material installed under this Contract.
- B. Two (2) copies of the manual, bound in hardback binders or an approved equivalent, shall be provided. One copy shall be completed and delivered to the Engineer prior to the time that system and equipment tests are performed. The second copy shall be delivered prior to final acceptance.
 - 1. Provide one (1) operation and Maintenance manual for each building. Provide one (1) as-built floor plan and one CD for each building.
- C. The manual shall include the following information
 - 1. Manufacturer's installation instructions.
 - 2. Manufacturer's local representative and/or distributor's name and address.
 - 3. Manufacturer's operating and maintenance instructions.
 - 4. Manufacturer's internal wiring diagrams.
 - 5. Contractor's installation wiring diagrams.
 - 6. Replacement part number listings and descriptions.
 - 7. Framed operating instructions, when required, in individual Specification sections.
 - 8. Warranties and guarantees.
 - 9. Provide an approved submittal at the front of each section.
- D. The manuals shall be identified on the cover as "Operating and Maintenance Manual" with additional cover display of the name and location of project, the Owner, the Engineers, the General Contractor, and the Subcontractors installing equipment represented in the brochure.
- E. The manual shall have a Table of Contents and shall be grouped in sections according to the sections of Division 27. Each section shall have a copy of the pages of the Specifications covered within the section. Sections shall be organized as follows:
 - 1. Each section in the manual shall identify the grouping of all literature required for the system or equipment included.
 - 2. The contents of each section shall be arranged in the following sequence: First, the approved engineering submittals with complete performance and technical data; second, the manufacturer's installation brochure; third, the manufacturer's operating and maintenance brochure; fourth, the manufacturer's installation wiring diagram; fifth, the Contractor's field wiring diagram, if different; and sixth, the manufacturer's brochure listing replacement part numbers and description.
 - 3. Provide a final section entitled, "Warranties and Guarantees", for all equipment, etc.

3.13 EXISTING FACILITIES

1. The Contractor shall be responsible for loss or damage to the existing facilities and shall be responsible for repairing or replacing such loss or damage. The Contractor shall send proper notices and receive written permission from the Owner to enter existing areas. Before beginning work in existing areas, the Contractor shall make necessary arrangements and perform other services required for the care, protection, and in-service maintenance of all electrical, communication, plumbing, heating, air condition, and ventilating services for new and existing facilities. The Contractor shall erect temporary barricades with necessary safety devices to protect personnel from injury, removing all such temporary protection upon completion of the work.
2. The Contractor shall provide temporary or new services to existing facilities as required to maintain their proper operation when normal services are disrupted as a result of the work being accomplished under this project.
3. Where existing construction is removed to provide working and extension access to existing utilities, the Contractor shall remove doors, piping, conduit, outlet boxes, wiring, light fixtures, air condition ductwork, and equipment, etc. to provide this access and shall reinstall same upon completion of work.
4. Where partitions, walls, floors, or ceilings of existing construction are indicated to be removed, the Contractor shall remove and reinstall in locations approved by the Engineer all devices required for the operation of the electrical systems installed in the existing construction. This is to include, but is not limited to, temperature control system devices, electrical switches, relays, fixtures, piping, conduit, etc.

3.14 DEMOLITION AND RELOCATION

1. The Contractor shall modify, remove, and relocate all materials and items so indicated on the drawings or required by the installation of new facilities. All removals and/or dismantling shall be conducted in a manner as to produce maximum salvage. Salvage materials shall remain as directed by the Owner. Materials and items scheduled for relocation and which are damaged during dismantling or reassembly operations shall be repaired and restored to the approval of the Owner. The Contractor may substitute new materials and items of like design and quality in lieu of materials and items to be relocated, if approved by the Owner.
2. All items scheduled for relocation and/or reuse shall be inspected by the Contractor and the Owner or his authorized representative. A written report of the condition of each item shall be made and provided to the Engineer. Where items scheduled for relocation and/or reuse are considered unsuitable for reuse, the Contractor shall so notify the Engineer and await reinstallation instructions before proceeding with removal. Items damaged in reinstallation shall be repaired or replaced by the Contractor as directed by the Owner at not additional cost to the Owner or the Engineer.
3. All items which are to be relocated shall be carefully removed in reverse to original assembly or placement and protected until relocated. The Contractor shall clean, repair, and provide all new materials, fittings, and appurtenances required to complete the relocation and to restore the items to good operative order. All relocations shall be performed by workmen skilled in the work and in accordance with standard practice of the trades involved.
4. Service lines and wiring to items to be removed, salvaged, or relocated shall be removed to points as indicated on the drawings, specified, or acceptable to the Owner. Service lines and wiring not scheduled for reuse shall be removed to the points at which reuse is to be continued or service is to remain. Such services shall be sealed, capped, or otherwise tied off or connections into the existing facilities in such a manner as to result in minimum interruption of services to adjacent occupied areas. Services to existing areas or facilities which must remain in operation during the construction period shall not be interrupted.

without prior specific written approval of the Engineer.

3.15 OUTAGES

1. Outages of services as required by the project will be permitted, but only at a time approved by the Owner. The Contractor shall notify the Owner in writing two (2) weeks in advance of the requested outage in order to schedule required outages. No outages shall be taken unless written approval has first been received from the Owner. The time allowed for outages will not be during normal working hours unless otherwise approved by the Owner. All costs of outages, including overtime charges, shall be included in the Contract amount.

END OF SECTION

SECTION 27 10 00 –

CATEGORY 6A STRUCTURED CABLING SYSTEM (SCS)

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 RELATED WORK

- A. 26 05 00 – Grounding and Bonding
- B. 26 05 29 – Electrical Hangers and Supports
- C. 26 05 33 – Raceway and Boxes

1.3 DESCRIPTION

- A. Summary of Work:
 - 1. Provide a complete and tested Category CAT6A cable distribution system for data interconnections (Local Area Network). The data distribution system shall include fully terminated unshielded twisted pair cables, raceways, conduit, UTP termination devices, data communications outlets, patch panels, patch cables, network racks, and other incidental and miscellaneous premises wiring system hardware as required for a complete and usable system. The installation shall comply with all applicable codes and standards in effect at the job site and as indicated in the Drawings and Specifications.
 - 2. Provide and install (1) 12-strand single-mode fiber-optic cable from the MDF to New IDF Room.
 - 3. Provide and install building entrance terminals as required.

1.4 QUALITY ASSURANCE

- A. Acceptable manufacturers:
 - 1. The equipment/products described herein and furnished per these specifications shall be the product of one manufacturer. All references to model numbers and other detailed descriptive data are intended to establish standards of design performance, and quality, as required
 - 2. The approved manufacturers shall provide a complete Category 6A solution with a 25-year performance warranty.
 - 3. Acceptable product connectivity and cable shall be CommScope. Only the manufacturers listed in this paragraph will be accepted.
 - 4. All products shall be Category 6A compliant. NO EXCEPTIONS.
- B. Installer Qualifications:
 - 1. The Data Cable System Installer shall be licensed and shall meet all applicable regulations of the State of California and Department of Labor insofar as they apply to this type of system. The proposer shall be a firm normally employed in the low voltage and data cabling industry and shall provide a reference list of ten (10) similar size, Category 6A, projects and contact names confirming successful Category 6A premises wiring system installations.
 - 2. The SCS Installer shall be a certified Leviton and in good standing in the Partner Program, local area, integrator and must be able to provide the manufacturer's maximum available warranty on the entire SCS. The contractor's certification must have been obtained and held within 75 miles of the project's location.

3. The installing contractor must have a full-time employed RCDD (Registered Communications Distribution Designer) on staff. Current RCDD certification shall be provided in the product submittals.
 4. All individuals installing the SCS must be employees of the certified installer and at least 25% of the installing staff shall have undergone a training class given by the manufacturer. Current certification indicating the successful completion of the training course shall be available upon request at the project and submitted in the contractor's product submittals.
 5. The proposing contractor and the installing contractor must be the same company. No subcontractor to the proposing SCS contractor will be allowed for any portion of the SCS scope of work.
- C. Pre-Construction Meeting:
1. The successful Contractor shall attend a mandatory pre-construction meeting with the project's consultant and individuals deemed necessary by the Owner's representative prior to the start of the work. No SCS work shall begin prior to this meeting.
- D. Acceptance:
1. The Owner's representative reserves the right to reject all, or a portion of the work performed, either on technical or aesthetic grounds.
- E. Warranty:
1. The selected system installer shall be a Leviton, certified contractor and hold current certification. Contractor shall provide an end-to-end performance warranty of not less than twenty (25) years on all products installed. The proposer shall provide current certification documentation. The performance warranty shall be issued by the manufacturer and shall warrant that ALL Category 6A cable links have been tested bi-directionally (end to end) using a Level 2 tester, per TSB-67, and that all test results conform to the most current TIA/EIA-568-C and/or TSB-67 Link values.
 2. The warranty will also cover multimode fiber optic cabling. Performance testing shall be conducted in accordance with ANSI/EIA/TIA-526-14 Standard, method B.
 3. The warranty will stipulate that all products used in this installation meet the prescribed mechanical and transmission specifications for such products as described in ISO/IEC 11801, ANSI/TIA/EIA-568-A, or EN 50173. Quality and workmanship evaluation shall be solely by the Owner/Designer and designated representatives.

1.5 REGULATORY REQUIREMENTS

- A. Standards: All work shall be performed in accordance with the latest revisions of the following standards and codes:
1. Latest Local Codes and Amendments
 2. 2014 National Electrical Code
- B. Other References:
1. TIA/EIA-568-C Commercial Building Telecommunications Wiring Standard
 2. EIA/TIA-569 Commercial Building Standard for Telecommunication Pathways and Spaces.
 3. TIA/EIA-606 The Administration Standard for the Telecommunications Infrastructure of Commercial Buildings.

- | | | |
|-----|---------------------|--|
| 4. | TIA/EIA-607 | Commercial Building Grounding and Bonding Requirements for Telecommunications. |
| 5. | EIA/TIA 455-A | Standard Test Procedure for Fiber Optic Fibers, Cables, Transducers, Sensors, Connecting and Terminating Devices and Other Fiber Optic Components. |
| 6. | TIA/EIA TSB 67 | Transmission Performance Specification for Field Testing of Unshielded Twisted-Pair Cabling Systems. |
| 7. | TIA/EIA TSB 72 | Centralized Optical Fiber Cabling Guidelines |
| 8. | ISO/IEC 11801 | Generic Cabling Standard |
| 9. | EN 50173 | Generic Cabling Standards for Customer Premises |
| 10. | ANSI/EIA/TIA 526-14 | Optical Power Loss Measurements of Installed single mode Fiber Cable Plan. |

- C. Governing Codes and Conflicts: If the requirements of these specifications or the Project Drawings exceed those of the governing codes and regulations, then the requirements of these specifications and the Drawings shall govern. However, nothing in the Drawings or Specifications shall be construed to permit work not conforming to all governing codes, regulations, and manufacturer installation requirements.

1.6 ABBREVIATIONS

- A. The following abbreviations are used in this document:
- | | |
|-----|---------------------------------|
| DC | Direct Current |
| IDF | Intermediate Distribution Frame |
| MDF | Main Distribution Frame |
| UTP | Unshielded Twisted Pair |

1.7 SUBMITTALS

- A. Project Initiation:
1. Within fourteen (14) days of Notice to Proceed, the data network system installer shall furnish the following in a single consolidated submittal:
 - a. Permits: The Contractor shall obtain all required permits and provide copies to the Owner/Architect/Engineer.
 - b. Product Literature: Complete manufacturer's product literature for all cable, patch panels, cross-connect blocks, cable supports, cable labels, outlet devices, and other products to be used in the installation. In addition, whenever substitutions for recommended products are made, samples (when requested by the Owner/Designer) and the manufacturer's supporting documentation demonstrating compatibility with other related products shall be included. The submittal shall have some type of distinguishing marker or pointer to indicated what specific product is to be provided
 - c. Construction Schedule: A time-scaled Construction Schedule, using PERT/CPM, indicating general project deadlines and specific dates relating to the installation of the cable distribution system.
 - d. Testing: Proposed Contractor Category 6A UTP cable test result forms, fiber optic cable test result forms and a list of instrumentation to be used for systems testing.
 - e. Specification Compliance: A letter shall be provided stating, by section and subsection, that the SCS installer complies with the ENTIRE specification section. If the installer intends to deviate from any portion of the specifications, a detailed explanation of reason in which the installer would like to deviate shall be provided in addition to the specification compliance letter. NO DEVIATIONS SHALL BE ACCEPTABLE UNTIL THEY HAVE BEEN ACCEPTED BY THE PROJECT'S TECHNOLOGY

CONSULTANT.

- f. Certifications: The contractor shall submit all of the following certifications, and the certifications must contain dates which are valid from the date of proposal and not expire any sooner than 12 months after substantial completion of the project.
- 1) BICSI RCDD Certification: This certification must be held by an on-staff, full-time employee of the SCS installer. The holder must be staffed out of the office that is located within 75 miles of the projected.
 - 2) Proposed Manufacturer's Strategic Partner Certification: This certification has been obtained by the SCS installer's office that is located within 75 miles of the project and shall be a company certification, not and individual certification.
 - 3) Proposed Manufacturer's Installer Certification: This certification must be held by at least 25% of the, on-site, staff and be made available at the site if requested by the owner, architect, and/or project's technology consultant.
 - 4) Fiber Optic Technician Certification: This certification must be held by the on-staff/on-site individual that is supervising the fiber optic installation and performing the fiber optic terminations and testing.

B. Shop Drawings:

1. Submit the following items, for Owner review and approval, within twenty-eight (28) days of notice to proceed:
 - a. Proposed circuit routing and circuit grouping plan prepared by a BICSI certified RCDD (Registered Communications Distribution Designer). The RCDD certification must be current. Identifiable, separate routing shall be shown for both the station cabling and the MDF-to-IDF tie cabling.
 - b. In addition to the cable routing, the submitted drawings shall indicate the following, even if the following is expected to be provided by the project's electrical or general contractor:
 - 1) Location of wall penetrations (all penetrations shall be sleeved and contain protective bushings at both ends)
 - 2) Location of sleeved wall pass-thru
 - 3) Size of sleeve at each location installed
 - 4) Quantity of cable passing through each sleeve
 - 5) Location of drops in each room (quantity or labeling of drops are not required in the submittal plans. Labeling shall be provided in the closeout plans and quantities shall be as per the contract documents, addendums, and issued changes. Each drop shall be labeled for the type of outlet that it is)
 - 6) Conduit routing, size, quantity, and stub-up locations for all floor mounted outlets.
 - c. Drawing Compliance: A letter shall be provided stating that the SCS installer complies with the ENTIRE project drawing, including all general, keyed, and notes to contractor. If the installer intends to deviate from any portion of the specifications, a detailed explanation of reason in which the installer would like to deviate shall be provided in addition to the specification compliance letter. NO DEVIATIONS SHALL BE ACCEPTABLE UNTIL THEY HAVE BEEN ACCEPTED BY THE PROJECT'S TECHNOLOGY CONSULTANT.

C. Close-out Procedures:

1. Two (2) copies of the following documents shall be delivered to the building owner's representative at the time of system acceptance. The close out submittals shall include:
 - a. Inspection and Test Reports: During the course of the Project, the Contractor shall maintain an adequate inspection system to ensure that the materials supplied, and the work performed, conform to contract requirements. The Contractor shall provide written documentation that indicates that materials acceptance testing was conducted as specified. The Contractor shall also provide documentation, which indicates that all cable termination testing was completed and that all irregularities were corrected prior to job completion.
 - b. Provide complete test reports for all cabling and devices that comprise system as outlined in this document.
 - c. Include the Name, address, and telephone of the authorized factory representative with a 24-hour emergency service number.
 - d. The manual shall also include Manufacturer's data sheets and installation manuals/instructions for all equipment installed, a list of recommended spare parts.
 - e. Generic or typical owner's instruction and operation manual shall not be acceptable to fulfill this requirement.
 - f. An up-to-date record ("as built") set of approved shop drawing prints that have been revised to show each and every change made to the structure cabling system from the original approved shop drawings. Drawings shall consist of a scaled plan of each building showing the placement of each individual item of the technical cabling system equipment as well as raceway size and routing, junction boxes, and conductor size, quantity, and color in each raceway.
 - g. As-built Drawings shall include cable pathways, camera locations with correct labeling and MDF/IDF locations. The as-built drawings shall be prepared using AutoCad/Revit 2023 or later. Provide the Owner with electronic versions of the As-Built on (2) 8GB thumb drives.
 - h. All drawings must reflect point to point wiring, device address and programmed characteristics as verified in the presence of the engineer and/or the end user unless device addressing is electronically generated, and automatically graphically self-documented by the system.
 - i. A copy of the manufacturer's warranty on the installed system.
 - j. Any keys to cabinets and/or equipment and special maintenance tools required to repair, maintain, or service the system.
 - k. Operating and Maintenance Instructions for all devices within the system. These instructions shall reflect any changes made during the course of construction, and shall be provided to the Owner, for their use, in a three-ring binder labeled with the project name and description. (4 copies)
 - l. Upon completion of the work and at a time designated by the Architect or owner, provide formal training sessions for the Owner's operating personnel to include location, operation, and maintenance of all included systems and equipment. Minimum amount of training time shall be at least 4 hours.
 - m. One (1) 30" x 42" laminated floor plan sheets illustrating technology drops and cable designation. Contractor shall provide one complete floor plan sheet for each telecommunications room (MDF or IDF)

PART 2 - PRODUCTS

2.1 GENERAL

- A. Installation: The cabling shall be installed per requirements of the manufacturer and the

CATEGORY 6A STRUCTURED CABLING SYSTEM (SCS)

Project Documents utilizing materials meeting all applicable TIA/EIA standards. The Contractor is responsible for providing all incidental and/or miscellaneous hardware not explicitly specified below as required for a complete and operational system.

- B. Materials: Materials shall be as listed or shall be approved equivalent products of other manufacturers meeting the intent and quality level of the TIA/EIA specifications. All approved equivalent products will be published by addendum ten days prior to proposal for Architect/Engineer to review.
- C. Testing: All installed cabling shall be tested 100% good after installation by the Contractor. All final test results shall be delivered to owner at completion of project. Refer to closeout requirements listed under section 1.5.
- D. Ratings: All products shall be new and brought to the job site in the original manufacturer's packaging. Electrical components (including innerduct) shall bear the Underwriter's Laboratories label. All communications cable shall bear flammability testing ratings as follows:
 - CM Communications Cable
 - CMP Plenum Rated Communications Cable
 - CMR Riser-Rated Communications Cable
- E. Initial Cable Inspection: The Contractor shall inspect all cable prior to installation to verify that it is identified properly on the reel identification label, that it is of the proper gauge, containing the correct number of pairs, etc. Note any buckling of the jacket that would indicate possible problems. Damaged cable or any other components failing to meet specifications shall not be used in the installation.
- F. Cable Lubricants: Lubricants specifically designed for installing communications cable may be used to reduce pulling tension as necessary when pulling cable into conduit.
 - 1. Approved Products
 - a. Twisted-pair cable: CommScope
- G. Fire Wall Sealant: Any penetration through firewalls (including those in sleeves) will be resealed with an Underwriter Laboratories (UL) approved sealant.
 - 1. Approved Products
 - a. 3M or
 - b. Pre-approved equal
- H. All Category 6A cables and data drops on the entire project provided shall be colored for:
 - 1. RED INFRASTRUCTURE/UPS
 - 2. VIOLET ACCESS POINT
 - 3. YELLOW PRINTER
 - 4. GREEN CAMERA
 - 5. BLUE EVERYTHING THAT IS NOT (1) OR (2)
 - 6. WHITE SECURITY/IP CAMERAS
 - 7. GRAY VOIP
 - 8. BLACK AUDIO/VISUAL

2.2 DATA CLOSET (MDF/IDF) CATEGORY 6A TERMINATION HARDWARE

- A. Equipment Racks/Cabinets:

Provide and install equipment racks and/or cabinets in locations indicated on the attached drawings for the following areas.

For all IDF and MDF locations:

Contractor shall provide and install new or equal floor mounted rack systems. Refer to floor plan and enlarged MDF/IDF room layouts for number or racks to provide at each location.

1. Approved Products
 - a. Floor mounted racks – New or equal floor mounted rack by Chatsworth.

B. Distribution Rack/Cabinet Grounding

All Racks and/or Cabinets shall be grounded using stranded #6 AWG insulated copper conductor. Connect to service entrance grounding electrode. Provide all required bonding materials and hardware and bond to building grounding electrode subsystem at building electrical service entrance.

1. Approved Products –Grounding Compression Lugs
NSi #L6N-14
2. Approved Products – Wall Mount Bus Bar (one per MDF/IDF location) Hoffman #DGTB412

C. Fiber Optic Patch Panels

The enclosures used shall provide termination panels for SC type connectors and be of sufficient size and capacity to terminate 110% of the fiber count of the inside of outside fiber optic cables. Patch panels must be 19" rack mountable. Provide all termination accessories, fiber patch cords, enclosures, and test for a complete fiber optic distribution system.

1. Approved Products (for MDF/IDF locations):
 - a. CommScope 2U Fiber Shelf 760231480 | SD-2U-FX
 - b. CommScope 4U Fiber Shelf 760231464 | SD-4U
 - c. CommScope 12 Fiber Inserts SC Single-Mode 760027714 | PNL-BK-012-SFA-SC02-BL
 - d. CommScope Wall Mounted Single Sided Single Door Fiber Enclosure 760147496-WBE-EMT-BK-2P-PNL
 - e. Provide cable grommets AMP #559496-2, or equivalent cable grommet.

D. Category 6A Patch Panels: The Category 6A data station cable shall be terminated on Category 6A RJ45 patch panels with circuit board construction, T568B terminations. Patch panels shall be 19-inch rack mountable. Workstation patch panels shall terminate all workstation communications outlets. Furnish units that adhere to the performance requirements TIA/EIA-568A standards.

1. Approved Products:
 - a. CommScope Category 6A Patch Panels 24 Port 760162800 | UNP-6A-DM-1U-24
 - b. CommScope Category 6A Patch Panels 48 Port 760162818 | UNP-6A-DM-2U-48
 - c. (provide cable support bars at the back of all patch panels to provide additional support at rear of rack and panels)

E. Cable Management Panels

Provide cable management panels as required for vertical cable management. Provide vertical wire management on ends and in between all racks on entire project. All vertical

cable managers on the entire project shall be 10" wide management. Horizontal not to be used.

1. Approved Products

Vertical – Hoffman, Front and Rear, # DV10DF8 with covers on front and back.

Provide Velcro straps for cable dressing in MDF/IDF rooms.

F. Rack/Cabinet Electrical:

1. A power distribution strip shall be installed vertically at the back of each data rack and/or cabinet.

Approved Products

- a. Chatsworth P1-1D0A5 120V 20A
- b. Provide a PDU offset bracket for each PDU installed.

Provide the following electrical UPS equipment at each location indicated.

At MDF room: (Provide quantity of two (2) each of the following at the MDF)

Smart-UPS 3000VA USB & Serial RM 2U 120V with UPS Network Management Cart with Environmental Monitoring
APC Product Number: SMX1500RM2UNC (black chassis)

3-year extended warranty
APC Product Number: WBEXTWAR3YR-SP-04

At IDF Room: (Provide quantity of one (1) each of the following at each IDF)

Smart-UPS 3000VA USB & Serial RM 2U 120V with UPS Network Management Cart with Environmental Monitoring
APC Product Number: SMX1500RM2UNC (black chassis)

3-year extended warranty
APC Product Number: WBEXTWAR3YR-SP-04

G. Network Rack Patch Cables: Cabling Contractor shall provide district with (1) – 6' Category 6A patch cable for each data drops on entire project. These cables will provide connectivity from the front of the network patch panels to the network equipment provided by district upon move-in. The patch cables are to be terminated properly with RJ-45 connections on each end with the proper pin-out assignments per project configuration.

1. Approved Products: CommScope 6' Category 6A Patch Cable

- | | | |
|----|--------|----------------|
| a. | RED | UC1AAA2-07F006 |
| b. | ORANGE | UC1AAA2-06F006 |
| c. | YELLOW | UC1AAA2-09F006 |
| d. | GREEN | UC1AAA2-0MF006 |
| e. | BLUE | UC1AAA2-0ZF006 |
| f. | VIOLET | UC1AAA2-0LF006 |
| g. | WHITE | UC1AAA2-08F006 |
| h. | GRAY | UC1AAA2-0CF006 |
| | BLACK | UC1AAA2-01F006 |

2.3 CABLE ROUTING/PATHWAY

A. Cable Tray: Metal cable tray shall be provided to affix to the top of all floor mount racks. Cable tray shall be used to brace racks to walls and to route cable from walls to racks in communication closets.

1. Approved Products:
 - a. CommScope 760085647 | CR-SLR-10L12W (black)
 - b. And all applicable installation accessories and those listed below:
 1. Cable Runway Elevation Kit (CPI) - #10506-706 (black) –one per rack
 2. 3" Channel Rack-to-Runway Mounting Plate CommScope 760084053 | CRR2RRMK (black) one per rack
 3. Cable Runway Radius Drop: CommScope 760083956 | CRDK-12W (black).
 4. Ladder Rack 90° Horizontal E-Bend Section: CommScope 760085530 | CR90FCB-12W (black). Provide as required.
 5. Wall Angle Support Kit: CommScope 760084160 | CR12-C24WR SK (black). Provide as required per ladder tray and wall junction.
 6. End Cap Kit: CommScope 760084012 | CRPECK (black). Provide as required per exposed end of ladder tray
 7. Junction Splice Kit: CommScope 760084046 | CRTJSK (black). Provide as required per junction.
 8. And all applicable installation accessories.
- B. Cable Support System: All low voltage cabling shall be installed and supported using a modular cable support system at 48" intervals unless installed in conduit. Do not exceed manufacture recommendation for the quantity of cables supported in an individual support.
- C. All cable bundles shall be grouped together using plenum rated Velcro for the entire run above and below the ceilings.
- D. Innerduct shall be bright orange and shall be labeled fiber optic cables from fiber patch panel to conduit or plenum entrances. Innerduct installed in plenum rated ceilings shall be plenum rated.
 1. Approved products
 - a. Carlon
 - b. Dura-line

2.4 FIBER OPTIC PRODUCTS

- A. Fiber Optic Cable shall be UL listed type OFNP (unless noted otherwise):
 1. Single-mode fibers, each with a color-coded PVC tight buffer (unless noted otherwise) shall have a maximum attenuation of 0.65 dB/km / 0.65 dB/km / 0.5 dB/km.
 - a. Approved Products:
 - i. 24-strand Single-mode, OSP, Armored, Gel-Free cable, shall connect the NOC with the MDF as specified on Technology Site Plans. Corning Product #024E88-33131-A3
 2. Multi-mode fibers, each with a color-coded PVC tight buffer (unless noted otherwise) shall have a maximum attenuation of 2.8 dB/km / 1 dB/km.
 - a. Approved Products:
 - i. 12-strand Single-mode, with plenum rated armored jacket shall connect each IDF with the MDF as specified on Technology Riser Plans. Corning Product #012T88-33190-A3
 3. Provide (4) CommScope 3-meter patch cords for each backbone fiber installed on the entire project. Coordinate the required connector type, on the equipment end,

with the owner prior to procuring the products.

4. All non-armored fiber optic cable shall be installed in 1" innerduct throughout the entire run. Innerduct to be rated for the space in which it is installed in.
5. No fusion or mechanical splices will be allowed at any point in the fiber optic runs.

B. Connectors

Optical Fiber Connectors shall be SC type connectors.

1. Approved Products:

Corning LC Single-Mode #

2.5 STATION WIRING

- A. Wire: The data and voice wire provided for all outlets shall be (Category 6A) Plenum-Rated unshielded twisted pair, four-pair, 24 AWG solid copper conductor, meeting the intent and quality level of the TIA/EIA-568-A Commercial Building Wiring Standard. Refer to floor plan and data outlet legend for number of active data ports to specified faceplates.

1. Approved Products: For all voice and data connections: CommScope

- | | | |
|----|--------|----------------------------|
| a. | RED | |
| b. | ORANGE | |
| c. | YELLOW | UN874050004/10 CS44P YLW |
| d. | GREEN | UN874035904/10 CS44P GRN |
| e. | BLUE | UN874035104/10 CS44P BLU |
| f. | VIOLET | UN874041604/10 CS44P VLT |
| g. | WHITE | |
| h. | GRAY | |
| i. | BLACK | |

- B. Testing: The Category 6A four-pair UTP cable must be UL Performance Level tested. Each 1000-foot spool must be individually tested with test results affixed to the spool. All cable must be provided on new 1000-foot spools. NO "SHORTS" WILL BE ALLOWED. IF SHORTS ARE DISCOVERED, THE CONTRACTOR WILL BE REQUIRED TO UNINSTALL ALL CABLE ON THE ENTIRE PROJECT AND INSTALL NEW CABLE AT NO ADDITIONAL COST TO THE OWNER.
- C. Rating: Cable installed in conduit shall be non-plenum rated. Cable not installed in conduit shall be plenum rated if installed in plenum ceiling space, non plenum rated otherwise.
- D. Provide 10 feet service loop at all headend locations properly supported above ceiling. Provide 3' service loop at each workstation outlet properly supported above ceiling. All workstation service loops shall be made in figure eight configurations, no exceptions.
- E. All cable shall be bundled with Velcro from patch panel to outlet. Velcro shall be rated for plenum space.

2.6 STATION HARDWARE

- A. Flush Mount Jacks: Flush mount jacks shall be high quality Category 6A RJ45 modular jacks with circuit board construction and IDC style or 110-style wire, T568B terminations. Jacks shall meet EIA/TIA TSB40 recommendations for Category 6A connecting

hardware.

1. Approved Products – Data and Voice Jacks:
 - a. RED
 - b. ORANGE
 - c. GREEN 760241179 | UNJ10G-GR
 - d. BLUE 760241176 | UNJ10G-BL
 - e. VIOLET 760241180 | UNJ10G-BL
 - f. WHITE 760248228 | UNJ10G-262
 - g. YELLOW 760241178 | UNJ10G-YL
 - h. GRAY
 - i. BLACK
 2. All blank inserts shall be Gray.
- B. Faceplates: Faceplates shall be a 4-port, flush mounted, **stainless steel**, CommScope Uniprise solution, for RJ45 outlets at all locations.
Approved Products:
1. 4-Port Single Gang, CommScope # 760072207 | M14SP-L
 2. Provide wall mounted handset faceplates where applicable for wall mounted phone. Refer to floor plan for locations. CommScope # 760100891 | M10WL4SP
 3. Provide Mounting Straps (where applicable)
- C. Workstation Patch Cables: Cabling Contractor shall provide district with (1) – 3 Meter Category 6A patch cable for each data drops on entire project. Each cable will be terminated properly with RJ45 connections on each end with appropriate pin-out assignments per project configuration.
- D. Approved Products: CommScope Uniprise, 3 Meter Cat 6A Patch Cable
1. RED
 2. ORANGE
 3. YELLOW UC1AAA2-09F006
 4. GREEN UC1AAA2-0MF006
 5. BLUE UC1AAA2-0ZF006
 6. VIOLET UC1AAA2-0LF006
 7. WHITE UC1AAA2-08F006
 8. GRAY
 9. BLACK

PART 3 - EXECUTION

3.1 GENERAL

- A. Fire Wall Penetrations: The contractor shall avoid penetration of fire-rated walls and floors wherever possible. Where penetrations are necessary, they shall be sleeved with metallic conduit and resealed with an Underwriter Laboratories (UL) approved sealant. Contractor shall also seal all floor, ceiling and wall penetrations in fire or smoke barriers and in the wiring closet.
- B. Allowable Cable Bend Radius and Pull Tension: In general, communications cable cannot tolerate sharp bends or excessive pull tension during installation. Refer to the cable manufacturers allowable bend radius and pull tension data for the maximum allowable limits.
- C. Cable Lubricants: After installation, exposed cable and other surfaces must be cleaned free of lubricant residue.

- D. Pull Strings: Provide pull strings in all new conduits, including all conduits with cable installed as part of this contract. Pull test is not to exceed 200 pounds. Data and video cables can be pulled together with pull strings.
- E. Conduit Fill: Conduit fill shall not exceed 40%.
- F. Damage:
 - 1. The Contractor shall replace or rework cables showing evidence of improper handling including stretches, kinks, short radius bends, over-tightened bindings, loosely twisted and over-twisted pairs at terminals and cable sheath removed too far (over 1-1/2 inches).
 - 2. The Contractor shall replace any damaged ceiling tiles that are broken during cable installation.
- G. Clean Up:
All clean up activity related to work performed will be the responsibility of the Contractor and must be completed daily before leaving the facility.

3.2 DOCUMENTATION

A. Labels

The Contractor will label all outlets using permanent/legible typed or machine engraved labels approved by the Owner (no handwritten labels permitted). Label patch panels in the wiring closet to match those on the corresponding data outlets. The font shall be at least on-eighth inch (1/8") in height, block. All labels shall correspond to as-builts and to final test reports.

The following nomenclature should be used when labeling data/voice jacks:

All cables being served by MDF closet shall begin with 'M' all IDF served cables shall begin with I# (# designated IDF closet number).

Next identification letter shall refer to patch panel that is serving outlet (A, B, C...)

Next identification shall note what # data port on patch panel (1 thru 48).

Example:

Outlet from 23rd port of the third patch panel from top of rack located at IDF-2

I2-C23

Outlet from the 5th port of the second patch panel from the top of rack located at MDF

M-B5

B. Floor Plan

A floor plan clearly labeled with all outlet jack numbers shall be included in the as-built plans.

- C. Contractor shall label wiring on both ends of cable at workstation and headend locations with machine labels, no exceptions.

3.3 EQUIPMENT RACK CONFIGURATION

- A. Equipment Racks: Equipment racks shall be assembled and mounted in locations shown on the Drawings and as detailed. Each rack shall be securely mounted to the floor and braced to the wall with cable tray in accordance with the manufacturer's instructions and recommendations. Racks shall be mounted such that the side rails are plumb with vertical cable management panels. Racks to be located such that future expansion can occur without relocating existing racks. Racks shall be grounded in accordance with NEC requirements.
- B. Wire Management Components: Horizontal cable management panels shall be installed directly above and below each patch panel, also 1 per patch panel should be left at site to accommodate the switch gear when they are installed. Vertical cable management panels shall be installed on each side of the rack. In instances where more than one rack is installed in a single location, vertical cable management shall be installed between the racks and on either side.
- C. Cable Placement: Cable installation in the Wiring Closet must conform to the Project Drawings. All cabling shall be routed so as to avoid interference with any other service or system, operation, or maintenance location. Avoid crossing area horizontally just above or below any riser conduit. Lay and dress cables to allow other cables to enter the conduit/riser without difficulty at a later time by maintaining a working distance from these openings.
- D. Cable Routing: Cable shall be routed as close as possible to the ceiling, floor, or corners to ensure that adequate wall or backboard space is available for current and future equipment. All cable runs within the Wiring Closet shall be horizontal or vertical within the constraints of minimum cable bending radii. Minimum bend radius shall be observed. Cables shall not be tie-wrapped to electrical conduit or other equipment.
- E. Installation: All incoming cables shall be routed on the cable tray and neatly dressed down to the patch panels.
- F. Hardware: Provide rack and jack panel hardware as required for all data station wiring.

3.4 STATION WIRING INSTALLATION

- A. General:
 - 1. Cabling between wiring closet and workstation locations shall be made as individual home runs. No intermediate punch down blocks or splices may be installed or utilized between the wiring closet and the communications outlet at the workstation location.
 - 2. All cable must be handled with care during installation so as not to change performance specifications. Factory twists of each individual pair must be maintained up to the connection points at both ends of the cable. There shall never be more than one and one-half inches of unsheathed enhanced Category 6A UTP cable at either the wiring closet or the workstation termination locations.
- B. Exposed Cable:
 - 1. All cabling shall be installed inside walls or ceiling spaces whenever possible. Exposed station cable will only be run where indicated on the Drawings.
 - 2. Additional exposed cable runs will require Owner approval and will only be allowed when no other options exist.
- C. Placement: All cabling and associated hardware shall be placed so as to make efficient use of available space. All cabling and associated hardware shall be placed so as not to impair the Owner's efficient use of their full capacity.

- D. Cable Routes:
1. All cabling placed in ceiling areas must be in conduit, cable tray or J-Hooks. Cable supports shall be permanently anchored to building structure or substrates. Provide attachment hardware and anchors designed for the structure to which attached and that are suitably sized to carry the weight of the cables to be supported. Do not route cable through webbing of structural steel. Cabling must be supported in dedicated supports intended to support cabling as described in this section.
 2. Attaching cable to pipes or other mechanical items is not permitted. Use J-Hooks for up to 15 cables (Chatsworth hooks with appropriate brackets). All runs of sixteen (16) or more cables, provide cable rings on 36-inch maximum centers to hang cable. Communications cable shall be rerouted so as to provide a minimum of 18 inches spacing from light fixtures, sources of heat, power feeder conduits and EMI sources. Cabling shall not be attached to ceiling. Grid support wires. Cable runs shall be parallel or perpendicular to building structure. Multiple cables to be bundled together every 6 feet.

3.5 STATION HARDWARE

- A. Flush Mount Jacks: Flush mount jacks shall be mounted in a faceplate with backbox.
- B. Placement: Where possible, the communications outlet shall be located so that its centerline is 18 inches above floor level or 12 inches above permanent bench surfaces. Outlets shall not be mounted on temporary, movable, or removable surfaces, doors, or access hatches.
- C. RJ-45 Jack Pin Assignments:
1. Pin connections for data station cable outlets and patch panels shall match EIA/TIA 568 modular jack wiring recommendation T568B.
 2. Pin connections at data jack panels shall match pin connections at outlets (straight through wiring).

3.6 CABLE TESTING REQUIREMENTS

- A. Notification: The Owner and Engineer shall be notified one week prior to any testing so that the testing may be witnessed.
- B. Inspection: Before requesting a final inspection, the Contractor shall perform a series of end-to-end installation performance tests. The Contractor shall submit for approval a proposal describing the test procedures, test result forms and timetable for all copper and fiber optic cabling.
- C. Procedures: Trained personnel shall perform all testing. Acceptance of the test procedures discussed below is predicated on the Contractor's use of the recommended products and adherence to the inspection requirements and practices set forth. Acceptance of the completed installation will be evaluated in the context of each of these factors.
- D. Errors: When errors are found, the source of each shall be determined, corrected and the cable retested. All defective components shall be replaced and retested. Re-test results must be provided on Owner approved forms and witnessed by Owner.
- E. Twisted Pair Cable Testing:
1. At a minimum, the Contractor shall test all station drop cable pairs from Data Closet termination patch panels to outlet device RJ45 jacks. Category 6A products shall be tested for compliance to ANSI/TIA/EIA 568A and ISO/IES

- 11801 for a Category 6A rated installation. Test equipment used shall meet TIA/EIA TSB-67, Level II accuracy. Further, the contractor shall have a copy of TSB-67 in their possession and be familiar with its contents.
2. Each wire/pair shall be tested at both ends for the following:
 - a. Wire map (pin to pin connectivity)
 - b. Length (in feet)
 - c. Attenuation
 - d. Near end cross talk (NEXT)
 - e. Power Sum
 3. Test equipment shall provide an electronic and printed record of these tests.
 4. Test results for each Category 6A four-pair UTP cable must be submitted with identification to match labels on all patch panel ports and RJ45 jacks and must match as-builts associated with that cable.

F. Fiber Optic Cable Testing

1. Testing device for fiber optic cables shall be a high quality OTDR (Optical Time-Domain Reflectometer) equipped with a printer. The printed data shall show, in addition to any summary information, the complete test trace and all relevant scale settings. The OTDR must have the capability to take measurements from bare fiber strands as well as SC connector terminations.
2. All fiber optic cable shall be tested on the reel before installation to ensure that it meets the specifications outlined herein.
3. After installation the Contractor shall test each fiber strand in accordance the EIA 455-171 Method D procedures (bi-directional testing) at both 850nm and 1300nm for multimode or 1310nm and 1550nm for singlemode. A form shall be completed for each cable showing data recorded for each strand including length, total segment (end-to-end) loss (dB) and connector losses (dB) at each end. In addition, the printed data strip for each strand shall be attached to the form. Patch cables shall also be tested.
4. Acceptable fiber optic connector loss shall not exceed .75dB per mated pair. The Contractor is responsible for obtaining minimum loss in fiber connections and polishing per manufacturer specifications.
5. Singlemode:
 - a. Singlemode fibers shall have a maximum attenuation of 1.0 dB/km at 1310 nm and 1.0 dB/km at 1550 nm.
6. Multimode:
 - a. 50/125um micron multimode fibers shall have a maximum attenuation of 3.5 dB/km at 850 nm and 1.5 dB/km at 1300 nm. Minimum bandwidth shall be 2000 MHz/km at 850 nm and 500 MHz/km at 1300 nm.
7. **OTDR shots shall be provided for each strand of fiber optics completely installed and terminated.**

3.7 INSPECTION

- A. Conformance to the installation practices covered above are to be verified when completed. In some cases, the Owner/Designer may inspect before acceptance.
1. Written Test Report:
 - a. Complete test results, including actual values associated with tests.
 - b. Show all certifications for telecommunications wiring systems.

- c. Include cable maps showing each cable route and keyed to cable labels. Provide owner with complete floor plans identifying outlet location and cable routing drawing in AutoCad format. Provide electronic copy of drawings to owner in AutoCad version 14 or greater.
 - d. Documentation of outlet, cable, and rack labeling system.
- B. After performing all tests, tabulate results and bind together in format acceptable to Owner. Installer shall provide written certification in the test report that telecommunications cable is properly installed, and test results certify system to all specified standards.

END OF SECTION 27 10 00

SECTION 27 15 00

VOICE and DATA NETWORK SYSTEM

PART 1- GENERAL

1.01 SCOPE

- A. The Contractor shall furnish all labor, materials, appliances, tools, equipment, facilities transportation and services necessary for and incidental to performing all operations in connection with furnishing, delivery and installation of the work of this Section, complete as shown on the applicable Contract Drawings and/or specified herein.
 - 1. This specification document provides the requirements for the installation, programming, and configuration of a voice and data network distribution system. This system shall include, but not be limited to:
 - a) Main Distribution Frame (MDF)
 - b) Intermediate Distribution Frames (IDF)
 - c) Fiber optic cable
 - d) Copper cable
 - e) Cable terminations
 - f) Workstation outlets
 - g) Telephone outlets
 - h) Acceptance testing
 - i) Documentation and labeling
 - j) Associated peripheral devices
- B. Any material and/or equipment necessary for the proper operation of the system, which is not specified or described herein, shall be deemed part of this Specification.
 - 1. Exception: Active electronics (i.e. switches, routers etc.) shall be provided by the Owner/District.
- C. The voice and data network system specified herein shall be interfaced with the site telephone system.
 - 1. Contractor shall coordinate with the Owner/District or his representative to ascertain the requirements of the telephone interface.

1.02 QUALIFICATIONS

- A. Equipment
 - 1. This specification is based on the equipment of manufacturer(s) who have been approved by the Owner/District. The Manufacturer(s) herein named shall be considered as meeting the requirements of this specification.
 - 2. The equipment manufacturer shall be a United States manufacturer, who has been regularly engaged in the manufacture of data network systems for at least thirty (30) years.
 - 3. **Equipment provided for this project shall be the product of Panduit or General Cable as approved equal.**
 - 4. All equipment shall conform to applicable codes and ordinances.
 - 5. All equipment shall bear the label of a Nationally Recognized Testing Laboratory (NRTL) such as Intertek Testing Services NA, Inc. (ITSNA - formerly ETL) or Underwriters Laboratories Inc. (UL) and be listed by their re-examination service.
- B. System Supplier/Installer

1.03 RELATED SPECIFICATIONS

- A. The conditions of the General Contract (General, Supplementary, and other Conditions) and the Division 1 - General Requirements specifications are hereby made a part of this Section.

1. Basic Electrical Materials and Methods
2. Wiring Methods
3. Building Wire and Cable
4. Raceways and Boxes
5. Cabinets and Enclosures
6. Telephone System

B. RELATED WORK BY OTHERS

1. Reference Part 3, sub-section 3.01 of this specification.

1.04 APPLICABLE CODES & STANDARDS

- A. Current Building Standards Administrative Code, Part 1, Title 24, California Code of Regulations
- B. Current California Building Code (CBC) Part 2, Title 24, California Code of Regulations (International Building Code, Volumes 1, 2 & 3 with 2022 California Amendments)
- C. Current California Electrical Code (CEC) Part 3, Title 24, California Code of Regulations (2020 National Electrical Code with 2022 California Amendments)
- D. Current California Fire Code (CFC) Part 9, Title 24, California Code of Regulations (2021 International Fire Code with 2022 California Amendments)
- E. ADA - Americans with Disabilities Act
- F. CAC – California Administrative Code, Title 24
- G. EIA/TIA (Electronics Industries Alliance/Telecommunication Industry Association) 568 Commercial Building Wiring Standard

1.05 SUBSTITUTIONS

- A. The data network distribution system shall be Panduit or General Cable **AS PER OWNER/DISTRICT STANDARDS.**

1.06 SUBMITTALS

- A. Within thirty-five (35) calendar days after the date of the award of the contract, the Contractor shall submit to the Architect for review, two (2) copies of a complete Submittal Package. The Submittal Package shall consist of the following sections, with each section separated with index tabs.

1. Title Page
 - a) Project Title
 - b) Project address
 - c) Architect's name and address
 - d) Contractor's name and address

2. Index of Submittal Contents

- a) Each Section of the Submittal Package shall be numbered chronologically and shall be summarized in the Index.

3. Certifications

- a) Index of Certification Section Contents
- b) Valid State of California Contractors License
- c) Manufacturer's Certifications
 - 1) Authorized Distributor
 - 2) Factory Trained Technician

4. Project List

- a) A substantial list (minimum of 10) of completed projects equal in scope to that specified herein.
 - 1) Contact information shall be made available upon request.

5. Product Data

- a) Index of Equipment Data Sheets
- b) Manufacturer's Data Sheets at a minimum for the following:
 - 1) Main Distribution Frame MDF
 - 2) Intermediate Data Frame IDF
 - 3) Fiber Optic enclosures and adapters
 - 4) Copper patch panels
 - 5) Fiber Optic cable
 - 6) Copper cable
 - 7) Fiber Optic cable terminations
 - 8) Voice and Data outlets and faceplates
 - 9) Applicable Listings and Approvals

PART 2- PRODUCTS

2.01 GENERAL REQUIREMENTS

- A. All components of the computer data network system shall be products of a single manufacturer or manufacturer partnered system in order to provide one single product component and cabling system performance warranty direct from a single point of contact to the Owner/District. The factory warranties must include a product component warranty and a system performance warranty. The factory warranty period shall not be less than 20 years.
 - 1. The equipment model numbers specified herein are that of the Panduit/General Cable.
- B. Section Includes
 - 1. Voice and Data Network System for school applications and shall at a minimum consist of the following:
 - a) Main Distribution Frame (MDF)
 - b) Intermediate Distribution Frame (IDF)
 - c) Fiber Optic Cable Distribution
 - d) Copper Cable Distribution
 - e) Workstation outlets
 - f) Telephone outlets

2.02 SYSTEM COMPONENTS

A. Main Distribution Frame – MDF

1. Chatsworth Products – Model No. 50120-703

2. 4 Post Floor standing rack – provide quantity as required for system hardware and electronics. Refer to drawings for additional requirements.
3. UL Listed and EIA compliant 19" equipment rack
4. Dimensions – 7' H. x 19" W. x 29" D.
 - a) Racking Height – 45 RU space
 - b) Useable Depth – 29"
5. Load Capacity – 2000 lbs
6. Accessory components shall be provided within the MDF rack are as follows:
 - a) Double Sided Vertical Management – Suitable for amount of cable being terminated.
 - 1) **Chatsworth Products – Model No. 30096-703**
 - (a) Provide a quantity of (2) per rack
 - b) Cable Runway – Provide quantities as required for a complete system installation and termination. Refer to drawings for additional requirements.
 - 1) Chatsworth 18" Runway – Model No. **10250-x18**
 - 2) Provide all required accessories including wall angle support brackets, splice kits, Junction Kits, J Bolts, end caps, etc. for a complete system.
 - 3) Black finish.
 - c) Rack mount power strip
 - 1) **Chatsworth Products – Model No. 12848-706**
 - (a) Provide a quantity of (1) minimum per rack installed.
 - d) Fiber Optic Enclosure
 - 1) **Panduit - Model No. FRME1 Series**
 - (a) Provide model to accommodate number of fiber adaptor plates required for project plus 20% spare capacity.
 - e) Fiber Optic Adapter Panels
 - 1) **Panduit - Model No. FAP6WBUDLCZ**
 - (a) Pre-loaded with six (6) OS1/OS2 duplex LC single-mode adapters.
 - (b) Provide a quantity of one (1) for each 12 strands fiber optic cable originating in the MDF as indicated on plans
 - f) Blank Fiber Optic Panel Adapter
 - 1) **Panduit - Model No. FAPB**
 - (a) Provide a quantity as required to fill up fiber optic enclosures.
 - g) Copper Patch Panels
 - 1) 24 port Shielded Modular (Unloaded) Patch Panel
 - (a) **Panduit- Model No. CP24WSBLY**
 - 2) 48 port Shielded Modular (Unloaded) Patch Panel
 - (a) **Panduit- Model No. CP48WSBLY**
 - 3) Panduit copper jacks for the above patch panels:
 - Blue - Panduit-Model No. CJ6x88TGBU
 - Green – Panduit Model No. CJ6x88TGGR
 - White – Panduit Model No. CJ6x88TGIW
 - Yellow – Panduit Model No. CJ6x88TGYL

- 4) Colors are assigned according to the type of jack on the plans:
 - Blue for standard data jacks
 - Green for Wireless Access Point jacks
 - White for Telephone jacks
 - Yellow for Security Camera jacks
- 5) Provide quantities of 48 and 24port patch panels as required to equal the number of local jacks served from the MDF as indicated on plans and a minimum of 20% spare capacity.
- 6) Provide 1 ft. CAT 6A patch cables by **Panduit Model No. UTP-6A** for each terminated jack in each IDF and the MDF plus 10% excess. No other patch cables are to be provided.

B. Intermediate Distribution Frame – IDF

1. **Middle Atlantic – Model No. DWR-24-32 (or size as required to accommodate data network equipment).**

2. Wall mount pivot rotating system rack
3. UL Listed and EIA compliant 24" equipment rack
4. Complete with Plexi Glass Front Door #WR-PFD-xx
5. Dimensions 49" H. x 42" W. x 32.3" D.
 - a) Useable Height – 42"
 - b) Useable Depth – 30"
6. Accessory components that can be provided with the IDF rack are as follows:

a) Rack mount power strip

1) **Chatsworth Products – Model No. 12816-707**

- (a) Provide a quantity of (1) minimum per rack installed.

b) Rack mount fan

1) **Middle Atlantic – Model No. MW-4QT-FC**

- (a) Provide a quantity of one (4) minimum

c) Fiber Optic Enclosure

1) **Panduit - Model No. FRME Series**

- (a) Provide model to accommodate number of fiber adaptor plates required for project plus 20% spare capacity.

d) Fiber Optic Adapter Panels

1) **Panduit - Model No. FAP6WBUDLCZ**

- (a) Pre-loaded with six (6) OS1/OS2 duplex LC single-mode adapters
- (b) Provide a quantity of one (1) for each 12 strands fiber optic cable originating in the MDF as indicated on plans

e) Blank Fiber Optic Panel Adapter

1) **Panduit - Model No. FAPB**

- (a) Provide a quantity as required to fill up fiber optic enclosures.

f) Copper Patch Panels

- 1) 24 port Shielded Modular (Unloaded) Patch Panel
(a) Panduit- Model No. CP24WSBLY
- 2) 48 port Shielded Modular (Unloaded) Patch Panel
(a) Panduit- Model No. CP48WSBLY
- 3) Panduit copper jacks for the above patch panels:
 - Blue - Panduit-Model No. CJx688TGBU
 - Green – Panduit Model No. CJx688TGGR
 - White – Panduit Model No. CJx688TGIW
 - Yellow – Panduit Model No. CJx688TGYL
- 4) Colors are assigned according to the type of jack on the plans:
 - Blue for standard data jacks
 - Green for Wireless Access Point jacks
 - White for Telephone jacks
 - Yellow for Security Camera jacks
- 5) Provide quantities of 48 and 24port patch panels as required to equal the number of local jacks served from the MDF as indicated on plans and a minimum of 20% spare capacity.

C. Fiber Optic Cable

1. **Panduit – Model No. FSLR9-12 (riser) and FSLP9-12 (plenum)**

- a) 900 µm Tight Buffer
- b) Twelve (12) strand single-mode indoor/outdoor
- c) Provide Riser or Plenum to meet project installation requirements.
- d) Yellow color.

2. Install (1) 12-strand single-mode from MDF to each IDF.

D. Fiber Optic Connectors

1. **Panduit – Model No. FSC2SCBU**

- a) OS1/OS2 LC type single-mode fiber connector
- b) Provide a quantity of two (2) per fiber strand

E. Copper Cable

1. **Panduit – Model No. PUP6XCO4xUG (plenum) or PUR6XCO4xUG (riser)**

- a) Cable(s) serving workstation outlets
- b) One (1) - four (4) pair #23 AWG. UTP (Unshielded Twisted Pair), per jack as indicated on plans
- c) EIA/TIA Category 6A compliant
- d) For use in above ground, non-plenum rated applications
 - 1) Cables shall not have a radius bend greater than 75%.
 - 2) Cables shall be laid at least 2 feet from any fluorescent ballast (in places where this is not possible, the architect shall be notified, and the architect will provide the final disposition.
 - (a) Where cables are bundled, then they shall be tied at least every 2 feet.
 - (b) Cables from each classroom or administrative area will be pulled and punched down based upon the attached drawing.
 - (c) No cable will be run through exposed room areas without the direct approval of the architect.
 - (d) When laying cable above a ceiling area, it is to be suspended above the ceiling and tied for anchorage.

- e) Colors are assigned according to the type of jack on the plans:
 - Blue for standard data jacks
 - Green for Wireless Access Point jacks
 - White for Telephone jacks
 - Yellow for Security Camera jacks

F. Voice and Data Outlets

1. All data jacks shall be Panduit "Minicom" Series
2. Category 6A, RJ45, jack
 - a) **Panduit – Model No. CJX688TGxx**
 - 1) Snap-in type
 - 2) Colors are assigned according to the type of jack on the plans:
 - ☐ Blue for standard data jacks
 - ☐ Green for Wireless Access Point jacks
 - ☐ White for Telephone jacks
 - ☐ Yellow for Security Camera jacks
3. Coverplate
 - a) 2 snap-in ports with designation ID kit
 - 1) **Panduit – Model No. CFPL2IW**
 - (a) Finish - verify with Architect
 - b) 4 snap-in ports with designation ID kit
 - 1) **Panduit – Model No. CFPL4IW**
 - (a) Finish - verify with Architect
 - c) 6 snap-in ports with designation ID kit
 - 1) **Panduit – Model No. CFPL6IW**
 - (a) Finish - verify with Architect
 - d) Blank snap-ins
 - 1) **Panduit – Model No. CMBIW-X**
 - (a) Finish - verify with Architect

PART 3– EXECUTION

3.01 DIVISION OF WORK

- A. While all work included under this specification is the complete responsibility of the contractor, the division of actual work listed following shall occur.
 1. All conduits with pull cords, all electrical pull boxes, ground rods, all outlet boxes, terminal cabinets, backboards, etc., which form part of the rough-in work shall be provided and installed completely by the Division 26 Contractor. Coordinate as necessary for proper installation.
 2. The balance of the system, including installation of initiating devices, notification appliances and equipment, making all connections, etc., shall be performed by the System Supplier/Installer.
 3. All 120VAC power conductors and conduits associated with power circuits to all low voltage system equipment locations shall be provided and installed by the Division 26 Contractor.

4. An insulated stranded copper ground wire shall be provided from each equipment rack to the building grounding system, in compliance with CEC Article 250, by the Division 16 Contractor.
5. Labeling of pullboxes and terminal cabinets shall be provided and installed by the Division 26 Contractor.

3.02 INSTALLATION

- A. All work shall be completed in strict accordance with all applicable codes and ordinances, by a qualified Manufacturer's Authorized Distributor.
- B. Horizontal cable routing will be through the use of overhead hangers, raceways, conduits and/or cable trays, and/or wall conduits.
- C. Data and fiber optic cables termination shall be terminated on patch panel.
 1. The number of pairs, equipment ports, and/or workstations to be terminated by the Contractor will be specified in the attached construction documents.
 2. The MDF/IDF will provide cable to serve work areas located throughout the building(s) as follows:
 - a) Cabling consisting of active 4-pair "Category 6A" UTP cable (23 AWG ARMM) to be wired to each designated voice and data outlet identified in the documentation. The cable will be installed and terminated at each end by the Contractor.
 - b) Discrete and individually designated data cable plates and cables.
 3. Voice and/or Data Stations. Each four-pair 23 AWG voice and/or data cable will terminate on standard RJ-45 (8 position, 8 conductor) outlets at work locations and on the MDF/IDF racks as described above. Terminations will be allocated to the MDF/IDF termination areas and use colored designation strips. Designation strips will be marked with architectural area designation as indicated on the plans.
 - a) Workstation wiring. Standard wiring configuration for all work locations that includes the following:
 - 1) Combination voice/data RJ-45 outlet sets, consisting of 1 voice and 1 data outlet, and two data cables, shall be located in a single 4-plex wall box location, for each workstation or equivalent.
 - 2) Data RJ-45 outlet set, consisting of 2 data outlets, and two data cables, shall be located in a single 4-plex wall box location, for each workstation or equivalent.
 - 3) Coordinate actual locations as furniture layouts are finalized by the site.
 - 4) Surface mounted conduit systems shall provide voice, data, and/or video outlets as indicated on drawings.
 - 5) Each voice or data outlet is to be wired from the IDF/MDF as indicated with individual 4-pair Unshielded Twisted Pair (UTP) "Category 6A" cable; each voice/data outlet, two individual or one dual 4-pair UTP "Category 6A" cables.
 - 6) The EIA/TIA 568B wiring standard shall be adhered to for all data outlets unless otherwise directed (verify with school).
 - 7) Whenever possible, wiring distribution will be designed but not located until such time as furniture locations have been finalized.

- 8) Fiber-optic Cabling. As directed by construction documentation, a fiber-optic cabling network shall be installed connecting all IDF LAN hub locations to the MDF. The fiber-optic network shall consist of:
 - (a) One (1) Twelve (12) single-mode fibers, ISO (International Standards Organization) and FDDI (Fiber Distributed Data Interface) standard, 9/125 micron core diameter; single-mode fiber-optic cable.
 - (b) Connectors - LC type ceramic connectors shall be installed.
 - (c) Patch Panels. Appropriate manufacturer-approved patch panels.
4. Wall Space:
 - a) All walls shall be equipped with 3/4" treated plywood backboards to ensure that sufficient space is available to mount termination hardware and related equipment.
 - b) A minimum of one 42" wall-mounted rack or a lockable metal cabinet (as specified) shall be required for LAN and related equipment in each closet.
 - c) Power and grounding shall be provided to meet equipment manufacturer's specifications.
5. Horizontal wire and cable distribution. The District has implemented a variety of distribution methods for bringing wiring to the work location.
 - a) Conduit of indicated size and routing shall be installed.
6. Telephone closet terminations. Within each telephone closet all voice/data wiring and cabling will be terminated on 110 Terminal Blocks.
 - a) Analog phone terminations shall be terminated using EIA/TIA standards USOC.
- D. Documentation and labeling. All cables, outlets and terminations shall be labeled and designated in accordance with District standard construction documents.
- E. Cable/Wire
 1. All cable/wire for the data network system shall be new.
 2. System cable/wire and equipment installation shall be in accordance with good engineering practices as established by the Electronics Industries Alliance (EIA) and the California Electrical Code (CEC). Wiring shall meet all applicable electrical codes. All cable/wire shall test free from all grounds and shorts.
 3. All #23AWG connections throughout the system shall be made by spring tension clip "punch block", Siemon type 66 terminals or equal. Conductors #20AWG and larger shall be terminated on barrier screw terminals.
 4. All communication system cable/wire shall be labeled at all points of termination. All labeling shall be based on the room numbers as provided by the Owner or his representative.
 5. Protection and dressing of cables:
 - a) Cables mounted on backboards and within equipment racks, etc., shall be grouped and securely attached to the backboard or enclosure in horizontal and vertical bundles in a neat workmanlike manner using Thomas & Betts "Ty-Rap", Panduit cable mounts and Allen-Tel cable management or equal. Edge protection material ("cat-track") shall be installed on edges of holes, lips of ducts or any other point where cables or harnesses cross metallic edge.

6. Shielding:

- a) Cable shielding shall be connected to common ground at point of lowest audio level and shall be free from ground at any other point. Cable shields shall be terminated in same manner as conductors.

7. Underground cables

- a) Any cable/wire pulled through manholes or pull boxes located below grade shall be continuous with no splices. The cable/wire shall be intact with no cuts in the protective outer jacket.
- b) Provide 15% spare pair capacity for multi-pair cabling to each building.

8. Installation of the patch panels begin at top of the cabinet, 1U of space below the fiber patch panel. When installing multiple patch panels in a cabinet, leave 1U of space in between patch panels for network equipment.

F. Cable/Wire Terminations

- 1. All splices in above ground junction boxes shall be made on terminal strips.

3.03 SYSTEM START-UP

- A. All start-up programming and system commissioning shall be performed by a manufacturer's trained and certified technician.

3.04 SYSTEM VERIFICATION

- A. Subsequent to system start-up the system installer shall, at a minimum, verify that the following features are functioning properly.
 - 1. Two way talk-back
 - 2. All call paging
 - 3. Emergency call-in, if applicable
 - 4. Call switches, if applicable
 - 5. Verification of call station identifications with room numbers provided by the Owner or his representative.

3.05 ACCEPTANCE TESTING

- 1. The system installer shall, in the presence of the Inspector of Record (IOR), perform 100% testing as noted in System Verification above.

3.06 DOCUMENTATION

- A. Provide the following directly to the Supervisor of Technology Service.
 - 1. Provide a printed copy of all field programming for all components in system.
 - 2. Provide one copy of all diagnostic software with copy of field program for each unit.
 - 3. Provide one copy of all service manuals, parts list, and internal wiring diagrams of each component of system.
 - 4. Provide one copy of all field wiring runs, location and end designation of system.

3.07 MANUFACTURER'S FIELD SERVICES

- A. The contractor shall, at the owner's request, make available a service contract offering continuing factory authorized service of this system after the initial warranty period.

- B. The system manufacturer shall maintain engineering and service departments capable of rendering advice regarding installation and final adjustment of the system.

3.08 IN SERVICE TRAINING

- A. Provide complete "in service" instructions of system operation to school personnel. Assist in programming of telephone system.
- B. The Contractor shall instruct personnel designated by the Owner in the proper use, basic care and maintenance of the system beyond the warranty period.
- C. The contractor shall provide a minimum of eight hours of in-service training with this system. These sessions shall be broken into segments, which will facilitate the training of individuals in the operation of this system. Operators Manuals and Users Guides shall be provided at the time of this training.

3.09 GUARANTEE AND WARRANTY

- A. Guarantee all parts, labor, and workmanship furnished under this contract for the minimum period of twelve months from the date of substantial completion, or first formal use by the Owner, whichever is last to occur. During the warranty period, report to the site and repair or replace any defective materials or workmanship without cost to the Owner. Non-emergency Warranty service shall be rendered within 24 hours after request by the Owner. Emergency service shall be provided within 8 hours of request by owner. Equivalent replacement equipment shall be temporarily provided when immediate on-site repairs cannot be made. Where warranties on individual pieces of equipment exceed twelve months, the guarantee period shall be extended to the warranty period of the particular items.
- B. After completion of the work the Contractor shall submit a Certificate of Warranty, stating commence and expiration dates and conditions of the warranty, for signature of both participating parties. Incremental warranties for completed portions of the work may be negotiated at the discretion of the Owner, if delays occur beyond the control of the Contractor.
 - 1. Panduit PAN-NET Performabce Guarantee
 - a) All Panduit Pan-Net non-consumable products have a 20-year warranty.

3.10 EQUIPMENT MANUFACTURER'S REPRESENTATIVE

- A. All work described herein to be done by the manufacturer's authorized representative shall be provided by a documented factory authorized representative of the basic line of equipment to be utilized.
- B. As further qualification for bidding and participating in the work under this specification the manufacturer's representative shall hold a valid C-10 Contractor's License issued by the Contractor's State License Board of California. The manufacturer's representative shall have completed at least ten (10) projects of equal scope, giving satisfactory performance and have been in the business of furnishing and installing sound systems of this type for at least five (5) years. The manufacturer's representative shall be capable of being bonded to assure the owner of performance and satisfactory service during the guarantee period.
- C. The manufacturer's representative shall provide a letter with submittals from the manufacturer of all major equipment stating that the manufacturer's representative is an authorized distributor. This letter shall also state the manufacturer guarantees service performance for the life of the equipment, and that there will always be an authorized distributor assigned to service the area in which the system has been installed.
- D. The contractor shall furnish a letter from the manufacturer of the equipment, which certifies that the equipment has been installed according to factory intended practices, that all the components used in the system are compatible and that all new portions of the systems are operating satisfactorily. Further, the contractor shall furnish a written unconditional guarantee, guaranteeing all parts and all labor for a period of one (1) year after final acceptance of the project by the owner.

END OF SECTION

SECTION 27 32 43

ASSISTIVE LISTENING DEVICES

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes: Equipment for amplifying, transmitting and receiving sound signals for the hard of hearing, using FM signal technology. Provide (1) complete portable system as shown on signal floor plans.
- B. Assistive-listening systems shall be provided in accordance with CBC Section 11B-219 and shall comply with CBC Section 11B-706.
- C. Per CBC Section 11B-219.3, the minimum number of receivers to be provided shall be equal to 4% of the total number of seats, but in no case less than two. 25% minimum of receivers provided, but no fewer than two, shall be hearing-aid compatible in accordance with CBC Section 11B-706.3.
- D. If the system provided is limited to specific areas or seats, then such areas or seats shall be within a 50-foot viewing distance of, and have a complete view of, the stage or playing areas. CBC Section 11B-219.4.
- E. Per April 2020 DSA Code Appeal Interpretation, school facilities may use the following alternative provision; For each school, provide 2 portable assistive listening systems, each with a transmitter and a minimum of 2 receivers for use in classrooms without audio amplification. The assistive listening receivers and transmitter shall be stored in the school site administration office until requested. In addition, provide an assistive listening system for assembly areas such as multi-purpose rooms, cafeterias, lecture halls or other assembly area. If the room has no fixed seating, calculate the number of seats using 7 SF per occupant. Provide 4% of assistive listening receivers for total number of seats in each assembly area, but no less than 2. The assistive listening receivers should be stored in or near the assembly area.

1.2 SUBMITTALS

- A. General: Submit in accordance with Section 013300.
- B. Product Data: For each specific piece of equipment.
- C. Shop Drawings: Detail equipment assemblies and indicate dimensions, weights, required clearances, method of field assembly, components, and location of each field connection.
- D. Closeout Submittals: Submit following in accordance with Section 017700.
 - 1. Operation and Maintenance Data: For equipment.

1.3 QUALITY ASSURANCE

- A. Installer Qualifications: Experienced installer who is authorized representative of equipment manufacturer for both installation and maintenance of equipment required for this Section.
- B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in CEC, Article 100, by testing agency acceptable to authorities having jurisdiction.
- C. Comply with CEC.
- D. Comply with UL 50.

1.4 WARRANTY

- A. Warrant products in system to be free of defects in operation for: Lifetime PLUS Limited Warranty. Warranty for cords, antennas, power supply, and accessories is 90 days.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable Manufacturers:
 - 1. Williams Sound, Eden Prairie, MN.
 - 2. Telex.
 - 3. Phonic Ear.

2.2 ACCEPTABLE PRODUCTS

- A. Transmitters:
 - 1. FM ADA KIT 37 (portable system)
 - 2. FM 557 PRO (rack mounted in sound system rack)
- B. Receivers:
 - 1. PPA R37
- C. Accessories:
 - 1. Neckloop
 - a. NKL 001
 - 2. Headphones
 - a. HED 027
 - 3. Microphone
 - a. MIC 090
 - b. MIC 049 (table conference microphone)
 - 4. Batteries
 - a. BAT 026-2
 - 5. Carry Cases
 - a. CCS 029 DW
 - 6. Rack Mount Kits (if required)
 - a. RPK 005
 - 7. Antennas
 - a. ANT 005
 - 8. Chargers
 - a. BAT KT6

2.3 COMPONENT PERFORMANCE CRITERIA

- A1. Stationary Transmitter with Network Control (FM 557 PRO):
 - 1. Dimensions: 8.45" W x 8.25" D x 1.72"H (21.5 cm x 21 cm x 4.4 cm)
 - 2. Mounting: One EIA rack space high; ½ rack space chassis wide.
 - 3. Power Input: 100-240 VAC, 60 Hz.
 - 4. Power Output: 24 VAC, 750 mA, 18W.
 - 5. Operating Temperature: +32° F to +104° F (0° C to 40° C)
 - 6. Operating Frequencies: 72.1 – 75.9 MHz, 17 wide band channels (selectable)
 - 7. Frequency Accuracy: ±2 ppm stability, 0-50° C.
 - 8. Deviation: +/- 75 kHz maximum.
 - 9. Pre-Emphasis: 75 µsec
 - 10. RF Field Strength: Max 80 mV/m at 3 m.

11. Nominal Range: Up to 1000 feet (using ANT 005 coaxial antenna).
12. Frequency Response: 31 Hz – 16 kHz ± 3 dB ("Music" Audio Preset)
13. Signal to Noise Ratio: ≥ 74 dB Transmitted RF
14. Total Harmonic Distortion: Less than 0.25% @ 1 kHz (RF output)
15. Common Mode Rejection: > 57 dB @ 1 kHz, Mic or Line
16. Audio Inputs: (1x) Combination 3-pin XLR, 1/4" TRS jack for Mic or Line Level Analog Audio. Balanced or Unbalanced Line Level, or Microphone with Selectable Phantom Power; (1x) XLR for Digital Audio, AES3/EBU, supported sample rates 44.1 kHz and 48 kHz; (1x) RCA for Digital Audio, S/PDIF, supported sample rates 44.1 kHz and 48 kHz.
17. Audio Input Gain Adjust: In menu, adjustable to 0 to -50 dB, in 1dB steps
18. Phantom power: 14.4 VDC applied through 2.2 k Ω resistors to analog combo jack: Pin 2 and Pin 3 on XLR jack, or tip and ring on 1/4" TRS jack.
19. Audio Level Indicators: 10-LED array that reads -18 to +9 dB at 3 dB intervals. 7 Green, 2 Amber, and 1 red LED. Green LEDs indicate normal operating audio level peaks, Amber LEDs indicate close to overload peaks, Red LED indicates overload peaks.
20. Audio Level Warning Lights: Mic 55dBV, -15dBV, +20dBV; Line -25dBV, +16dBV, +20dBV.
21. Headphone Output: 1/4" TRS stereo jack, mono signal, 15.7 mW, maximum in 33 Ω (level adjustable in menu 0 to -40 dB in 2 dB steps)
22. Line Output: RCA jack (black), -10 dBV (.32 VRMS). Output impedance 100 Ω .
23. Ethernet: RJ-45 on back of unit supports Cat5e cable lengths up to 328 ft (100 m). 10/100 Base-T IEEE 802.3 compliant, unique MAC address, Cat5e **shielded** cable must be used to meet FCC requirements.
24. Approvals: FCC, RoHS2, WEEE, Industry Canada
25. Warranty: Lifetime PLUS Limited Warranty

B1. Receiver (PPA R37) provide minimum 4% of total number of seats:

1. Dimensions: 4.1" x 2.85" x 1.38" (104 x 72 x 35mm)
2. Weight: 4.6oz (130g) with batteries; 2.6oz (73g) without batteries
3. Color: Black
4. Battery Type: 2 x AANiMH
5. Battery Life: Two (2) AA non-rechargeable alkaline batteries (BAT 001), approx. 50 hrs; or (2) AA rechargeable NiMH batteries (BAT 026), 1500 mAh, approx. 32 hrs
6. Current Consumption: 52mA nominal
7. Temperature Range: – 0 to 50C
8. Channels: 17, accessed via seek button in battery compartment
9. Operating Freq.: 72.1, 72.2, 72.3, 72.4, 72.5, 72.6, 72.7, 72.8, 72.9, 74.7, 75.3, 75.4, 75.5, 75.6, 75.7, 75.8, 75.9 MHz*
10. Intermediate Freq.: 75 kHz
11. FM Deviation: 75 kHz
12. De-Emphasis: 75 μ S
13. LED Indicator: Power: Green; Low Battery: Flashes Green
14. AFC Range: ± 120 kHz
15. Sensitivity: 2 μ V at 12 dB Sinad with squelch defeated, capable of providing level of 110 dB minimum and 118 dB maximum with a dynamic range on the volume control of 50 dB.
16. Input Overload: 100 mV
17. Frequency Response: 200 – 15 kHz
18. Modulation: FM, +/- 75 kHz peak deviation
19. Signal-to-Noise Ratio: 65 dB min @ 100 μ V, 18 dB minimum for internally generated noise.
20. Receive Antenna: Integral with earphone/headphone cord
21. Audio Output: 35 mW peak into 16 Ω
22. Output Connector: 3.5 mm stereo/mono jack
23. Earphone: Earbud-type with foam cushion, 3.5 mm plug, 32 Ω
24. Auto Shut-off Enters sleep mode after approx 6 mins of no RF signal
25. Approvals: FCC, IC, RoHS, WEEE
26. Warranty: Lifetime PLUS Limited Warranty
27. Compatible with hearing-aid.
28. Peak clipping shall not exceed 18 dB of clipping relative to the peaks of speech.

C. Accessories:

1. Headphones
 - a. Deluxe Folding: Model HED 021

2. Neckloop
 - a. 18in cord, 3.5mm plug: Model NKL 001
3. Batteries
 - a. AA NiMH: Model BAT 026-2
4. Carry Cases
 - a. Large 35-slot Case: Model CCS 029 DW
5. Rack Mounts (if required)
 - a. Single Rack Mount Kit for Half Rack Space Products: Model RPK 005
6. Antennas
 - a. Remote Coaxial Antenna for 72-76 MHz PPA Transmitters: Model ANT 005
7. Chargers
 - a. BAT KT6

PART 3 EXECUTION

3.1 INSTALLATION

- A. Install equipment to comply with manufacturer's recommendations.
- B. Wiring within Enclosures: Bundle, lace, and train conductors to terminal points with typical service loops, no excess. Use lacing bars in cabinets.

3.2 GROUNDING

- A. Ground cable shields and equipment to eliminate shock hazard and to minimize ground loops, common-mode returns, noise pickup, cross talk, and other impairments.

3.3 FIELD QUALITY CONTROL

- A. Operational Test: Perform tests that confirm proper operation of system and proper coverage in area where equipment will be used.

3.4 DEMONSTRATION

- A. Demonstration and Instruction of Owner's Personnel: Provide in accordance with Section 01800. Engage factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain equipment as specified.

END OF SECTION

SECTION 27 61 00 – LOCAL SOUND AND VIDEO SYSTEMS

CONDITIONS OF THE CONTRACT AND DIVISION 1, as applicable, apply to this Section.

PART 1 – GENERAL

1.1 RELATED WORK

- A. 26 05 00 – Grounding and Bonding
- B. 26 05 29 – Electrical Hangers and Supports
- C. 26 05 33 – Raceway and Boxes

1.2 GENERAL REQUIREMENTS

- A. Provide all equipment specified and all miscellaneous parts and materials, including cabling, devices, patch cables and connectors required for proper, complete, and fully functional Local Sound and Video Distribution Systems.
- B. All applicable equipment shall bear the UL label.
- C. Governing Codes and Conflicts: If the requirements of these specifications or the Project Drawings exceed those of the governing codes and regulations, then the requirements of these specifications and the Drawings shall govern. However, nothing in the Drawings or Specifications shall be construed to permit work not conforming to all governing codes, regulations, and manufacturer installation requirements.
- D. Locate equipment to accommodate millwork, fixtures, marker boards and other room equipment at no additional cost to the owner.
- E. Plenum rated cable may be used as an option at the contractor's discretion. Wherever cabling is run exposed, conduit shall be used to cover and protect wiring.
- F. Integrate the local sound reinforcement system with connectivity to the following systems:
 - 1. Local Area and Campus Wide Network. Data drop by Technology cabling contractor for the purpose of connectivity of the Local Sound Systems with the Building Network.
 - 2. Provide all required modules and relays for Fire Alarm override of Local Sound Systems. Fire alarm module and cabling by Fire Alarm Contractor.
- G. Should there be any discrepancy between these Specifications and the Construction Drawings, the greater quantity and / or quality of devices and design intent shall take precedent.
- H. **REFERENCE CONSTRUCTION DRAWINGS FOR FLOORPLAN INFORMATION.**

1.3 CONTRACTOR QUALIFICATIONS

- A. The installing contractor shall be the authorized representative of the local sound distribution system to sell, install, and service the proposed manufacturer's equipment. The installing contractor shall have represented the manufacturer's product for at least four (4) years.
- B. The installing contractor shall provide 24 hour, 365 days per year emergency service with factory trained, state licensed service technicians.

- C. The installing contractor must have a permanent office within a 75 mile radius of the project site and be an approved dealer/integrator, of the proposed system, in the nearest major metropolitan area.
- D. The installing contractor shall have been actively engaged in the business of selling, installing, and servicing systems in the surrounding area for at least ten (10) years.
- E. The Contractor's installation team shall have at least one member possessing a NICET Level II, CTS-I or C-EST certification; additionally, at least one audio DSP programmer certified in HiQnet Audio Architect, Symetrix, Biamp Tisera, QSC or Dante.
- F. Contractor shall have been in the commercial AVL (Audio, Video, Lighting) installation industry for at least five years. Contractor shall have installed at least five systems of this type and comparable scale in educational facilities within the State of California. Contractor shall provide a list of successfully completed projects including completion dates within the past two years from the bid date of this project.
- G. Should the local sound systems include Crestron, Extron or AMX hardware which requires programming, the Contractor shall provide one person on the installation team as a Certified Crestron Programmer, Certified Extron Programmer or AMX Certified Expert (ACE) Programmer to program, upload and debug the third party control systems. Provide valid certification credentials in the submittal documentation.
- H. Should the local sound systems include managed network devices, the Contractor shall provide one person on the installation team with valid certification in one of the following: Harman HCNA/P, CompTIA Network+, Cisco CCNA or Cisco CCNP. Provide valid certification credentials in the submittal documentation.
- I. All individuals installing the local sound distribution system must be employees of the proposing/installing entity and at least 25% of the installing staff shall have undergone a training class covering the installation and programming of local sound distribution systems. Current certification indicating the successful completion of the training course shall be available upon request at the project and submitted in the contractor's product submittals.
- J. The entity providing pricing to furnish and install the system specified within this specification section and the physical installing entity of this system shall be one in the same. Absolutely no subcontracting on any portion of this system, by the system's proposing entity, will be allowed.
- K. Acceptable manufacturers:
 - 1. Reference Part 2 of this specifications for manufactures as specified. No other manufacturers will be accepted without submitting a formal request within no less than ten (10) day prior to the proposal date and if not officially approved via pre-proposal addendum.

1.4 SUBMITTALS

- A. Product Data:
 - 1. Within fourteen (14) days of Notice to Proceed, the system installer shall furnish the following in a single consolidated submittal:
 - a. Permits: The Contractor shall obtain all required permits and provide copies to the Owner/Architect/Engineer.
 - b. Product Literature: Complete manufacturer's product literature for all cable, termination components, cable supports, cable labels, field devices, and other products to be used in the installation. In addition,

whenever substitutions for recommended products are made, samples (when requested by the Owner/Designer) and the manufacturer's supporting documentation demonstrating compatibility with other related products shall be included. The submittal shall have some type of distinguishing marker or pointer to indicated what specific product is to be provided

- c. Construction Schedule: A time-scaled Construction Schedule, using PERT/CPM, indicating general project deadlines and specific dates relating to the installation of the cable distribution system.
- d. Testing: Proposed Contractor system test result forms and a list of instrumentation to be used for systems testing.
- e. Specification Compliance: **A letter shall be provided stating, by section and subsection, that the system installer complies with the ENTIRE specification section.** If the installer intends to deviate from any portion of the specifications, a detailed explanation of reason in which the installer would like to deviate shall be provided in addition to the specification compliance letter. NO DEVIATIONS SHALL BE ACCEPTABLE UNTIL THEY HAVE BEEN ACCEPTED BY THE PROJECT'S TECHNOLOGY CONSULTANT.
- f. Certifications: The contractor shall submit all of the following certifications and the certifications must contain dates which are valid from the date of proposal and not expire any sooner than 12 months after substantial completion of the project.
 - 1) Manufacturer's Authorized Dealer/Installer Certification as they apply to any portion of this specification: This certification must be held by the proposing/installing contractor and state that the proposing/installing contractor is and authorized dealer/installer of the system specified within the project specifications. The certification must have been obtained by the office that is within a 75 mile radius of the project's location.
 - 2) Installer Certification: This certification must be held by at least 25% of the, on-site, staff and be made available at the site if requested by the owner, architect, and/or project's technology consultant.
 - 3) Licenses: This includes all licenses required by the state in which the work is being performed, the federal government, local authorities having jurisdiction, and any organization in that governs the specific system

B. Shop Drawings:

- 1. Submit the following items, for Owner review and approval, within twenty-eight (28) days of notice to proceed:
 - a. Proposed circuit routing and circuit grouping plan prepared by a system registered designer. The designer's certification must be current. Identifiable, separate routing shall be shown for both the station cabling and any backbone trunk cabling.
 - b. In addition to the cable routing, the submitted drawings shall indicate the following, even if the following is expected to be provided by the project's electrical or general contractor:
 - 1) Location of all control equipment and remote power sources
 - 2) Locations of all field devices and outlets
 - 3) Location of wall penetrations (all penetrations shall be sleeved and contain protective bushings at both ends)
 - 4) Location of sleeved wall pass-thru
 - 5) Size of sleeve at each location installed

- 6) Quantity of cable passing through each sleeve
 - 7) Location of drops in each room (quantity or labeling of drops are not required in the submittal plans. Labeling shall be provided in the closeout plans and quantities shall be as per the contract documents, addendums, and issued changes. Each drop shall be labeled for the type of outlet that it is)
 - 8) Conduit routing, size, quantity, and stub-up locations for all floor mounted outlets.
- c. Drawing Compliance: A letter shall be provided stating that the system installer complies with the ENTIRE project drawing, including all general, keyed, and notes to contractor. If the installer intends to deviate from any portion of the specifications, a detailed explanation of reason in which the installer would like to deviate shall be provided in addition to the specification compliance letter. NO DEVIATIONS SHALL BE ACCEPTABLE UNTIL THEY HAVE BEEN APPROVED BY THE PROJECT'S TECHNOLOGY CONSULTANT.

C. Close-out Procedures:

1. Four (4) copies of the following documents shall be delivered to the Architect/Engineer at the time of system acceptance. One (1) final copy of the same documents shall be delivered directly to the project's Technology Consultant upon final closeout of the project. The closeout submittals shall include:
 - a. Inspection and Test Reports: During the course of the Project, the Contractor shall maintain an adequate inspection system to ensure that the materials supplied and the work performed, conform to contract requirements. The Contractor shall provide written documentation that indicates that materials acceptance testing was conducted as specified. The Contractor shall also provide documentation, which indicates that all cable termination testing was completed and that all irregularities were corrected prior to job completion.
 - b. Provide complete test reports for all cabling and devices that comprise system as outlined in this document.
 - c. Include the Name, address and telephone of the authorized factory representative with a 24-hour emergency service number.
 - d. The manual shall also include Manufacturer's data sheets and installation manuals/instructions for all equipment installed and a list of recommended spare parts.
 - e. Generic or typical owner's instruction and operation manual shall not be acceptable to fulfill this requirement.
 - f. An up-to-date record ("as-built") set of approved shop drawing prints that have been revised to show each and every change made to the structure cabling system from the original approved shop drawings. Drawings shall consist of a scaled plan of each building showing the placement of each individual item of the technical cabling system equipment as well as raceway size and routing, junction boxes, and conductor size, quantity, and color in each raceway.
 - g. As-built Drawings shall include cable pathways, device locations with correct labeling, control equipment locations, remote power supply locations, cross connect locations, lightning protection locations, and MDF/IDF locations. The as-built drawings shall be prepared using AutoCad 2013 or later. Provide the Owner with electronic versions of the as-builts on 2 qty. 8MB thumb drives and (1) 11x17 hard copy per binder.
 - h. All drawings must reflect point to point wiring, device address and programmed characteristics as verified in the presence of the engineer

- and/or the end user unless device addressing is electronically generated, and automatically graphically self-documented by the system.
- i. A copy of the manufacturer's warranty on the installed system.
 - j. Any keys to cabinets and/or equipment and special maintenance tools required to repair, maintain, or service the system.
 - k. Operating and Maintenance Instructions for all devices within the system. These instructions shall reflect any changes made during the course of construction, and shall be provided to the Owner, for their use, in a three-ring binder labeled with the project name and description. (4 copies)
 - l. Upon completion of the work and at a time designated by the Architect or owner, provide formal training sessions for the Owner's operating personnel to include location, operation, and maintenance of all included systems and equipment. Minimum amount of training time shall be at least 8 hours and shall be broken up into two (2) hour sessions. Provide copies
 - m. One (1) 21" x 30" laminated floor plan sheets illustrating technology drops and cable designation. Contractor shall provide one complete floor plan sheet for each telecommunications room (MDF or IDF)

PART 2 – PRODUCTS

All Extron equipment listed shall be acquired through Extron Electronics. Refer to Master Quote #10427415 – Sales Representative Steve Whittle, 714-491-1500

2.1 Gym/Health Classroom – Multi-Purpose Room

A. AUDIO/VIDEO MATRIX SWITCHING SYSTEM

- Extron 12 x 8 digital audio processor.
 - 1. Extron DMP 128 AT.
 - Hybrid inputs support analog or Dante input source.
- Extron Amplifier & Speakers
 - 1. Extron XPA 2002-70V amplifier.
 - 2. Extron SF26CT Ceiling Speakers. See Tech. drawings for quantity and locations.
 - a. Microphones shall connect via Dante to DSP.
 - b. Audio shall be programmed for multi zone distribution: Gymnasium audio only, Health Classroom D107 audio only, and combined.
 - c. Audio levels shall be controlled from touch panel.
- Shure Wireless Microphone System
 - 1. Shure ULXD4 – Provide (2) wireless microphones.
 - a. Microphones shall connect via Dante to DSP.
- Liberty AV
 - 1. Liberty XLR audio 2-gang plate, with (2) male XLR and (2) female XLR cables and connectors. Located in gymnasium D114
- Extron 8 x 2 matrix switcher, 60-1812-03.
 - Rooms can be used at the same time with different sources.
 - (1) HDMI TX wall plate input in gymnasium D114 - Extron DTP T HWP 4K 231 D, 60-1421-13.
 - (1) HDMI TX wall plate input in health classroom D107 - Extron DTP T HWP 4K 231 D, 60-1421-13.
 - (1) HDMI RX HDMI and control receiver, 60-1631-53. Located at projector.

- (1) Long plenum rated HDMI cable, connect from health classroom display to Extron switcher.
- Built in control processor
 - LAN port for remote access and support via school network. Connect to AV network switch (Ubiquiti US-8).
- Control
 - Qty. 1. - 7" Extron wall mount touch panel. Located in health classroom D107.
 - Touch panel shall be PoE.
 - Provide (1) 8-port PoE network switch, Ubiquiti US-8.
- Video Projector System
 1. NEC projector – PA803U with lens (NP43ZL). Contractor shall integrate projector control/power with switcher and controlled via Extron touch panel. AV contractor shall coordinate with electrical contractor for power.
- Electric Projection Screen
 1. Draper - Acumen model (155101). Contractor shall integrate screen control with switcher and controlled via Extron touch panel. AV contractor shall coordinate with electrical contractor for power.

AUDIO	60-1512-10	1	DMP 128 Plus C AT	12x8 ProDSP Digital Matrix Processor with AEC and Dante
AUDIO	PLD4.2	1	QSC- PLD	Multi-Channel System Processing Amp
AUDIO	60-1310-03	5	SF 26CT	SoundField XD 6.5" Two-Way Ceiling Speaker with 8" Composite Back Can and 70/100 V Transformer
AUDIO	60-1517-13	1	AXI 22 AT D	2 Input, 2 Output Dante Audio Interface - Decorator-Style Wallplate, White
AUDIO	70-1103-03	1	WPD 102 XLRM	Pass-Through Wallplate with Two XLR Connectors - Decorator-Style; White
VIDEO	60-1812-03	1	DTP2 CrossPoint 82 IPCP MA 70	Control Processor and Mono Amplifier
VIDEO	60-1421-13	2	DTP HDMI 4K 231 Tx	Long Distance HDMI Twisted Pair Transmitter
VIDEO	60-1331-13	1	DTP HDMI 4K 211 Rx	Long Distance HDMI Twisted Pair
CONTROL	60-1563-03	1	TLP Pro 725M	7" Wall Mount TouchLink® Pro Touchpanel - White
CONTROL	70-1137-02	1	RM 5	Rack Mount Kit for TLP Pro 525M and TLP Pro 725M
CONTROL	70-1140-23	1	SMK 2	Surface Mount Kit for TLP Pro 725M and TLS 725M - White
CONTROL	60-190-01	2	RSU 129	1U 9.5" Deep Universal Rack Shelf Kit

District Approved Manufactures for A/V Systems:

- Biamp, Middle Atlantic rack equipment and power supplies, Extron, QSC Amplifiers, Chief Mounting Systems, Electro Voice Speakers, Shure Wireless Microphone System.

B. GRAPHICAL USER INTERFACE / TOUCH PANELS

1. Program Extron Audio/Video Matrix System and GUI to allow for control of complete audio and video matrix routing, display On/Off, input selection, audio level control and mute for each audio input, projection screen up / down and other such controls as directed by the Owner. Coordinate with Owner and Consultant for final GUI functionality and layout. Coordinate with Owner for Logo to be displayed on splash screen. Provide a numeric (0-9) password page immediately after the splash page. Provide a simple way for Owner to change and store a new password from the GUI.

C. EQUIPMENT RACK

QTY	PART #	PART DESCRIPTION
1	PTRK-2126	Middle Atlantic Portable Equipment Rack
2	U1V	Middle Atlantic 1RU Shelf
1	IUQFP-4	Middle Atlantic Fan Panel
1	PD-920R	Middle Atlantic Rackmount PDU
1	HTX	Middle Atlantic Security Rack Screws
*	EB*	Middle Atlantic Blank Panels (* = all open RU)
1	PDS-620R	Middle Atlantic Rackmount power sequencer
1	SS	Middle Atlantic Rackmount sliding shelf

E. ASSISTIVE LISTENING SYSTEM

1. 1 qty. LS-54-216 Assisted Listening System
2. 1 qty. LA-124 antenna. Install at locations shown on drawings.
3. Provide enough LR-4200-216 Receivers to meet TAS and ADA standards as required by law.
4. Provide with each additional LR-4200-216 Receiver:
 - a. 1 qty. LA-401 Ear Speaker.
 - b. 1 qty. LA-430 Earphone/Neck Loop Lanyard
5. Provide 1 qty. LA-124 antenna.
 - a. Install in drop-tile ceiling in LARGE EVENT / BOARD ROOM 129.
6. Coordinate with Architect for installation location of each LA-304 Signage Kit.

F. FIRE ALARM OVERRIDE

1. Contractor shall provide all cabling, relays, mounting hardware and any other devices (Fire Alarm System devices by others) to provide a fully functioning Fire Alarm Override system. When Fire Alarm is active, Local Sound System shall be muted. When Fire Alarm ceases, each Local Sound System shall automatically revert to normal operation.

2.8 INSPECTIONS

- A General: Conformance to the installation practices covered above are to be verified when completed. In some cases, the Owner/ Designer may inspect before acceptance.

2.9 SOUND COVERAGE

- A Adjust speaker wattage taps to provide clear, uniform sound coverage throughout all venues through entire volume range of amplifier, provide limiter circuit and controls on amplifier to prevent over-driving speaker system.

PART 3 - EXECUTION

3.1 INSTALLATION

- A Provide and install Sound Reinforcement Systems as required. All rack mounted equipment and their controls shall be labeled with 1/4" lamicaid strips engraved with 1/8" high block letters indicating device operation and level of control function. Verify exact location of equipment racks and remote source control panel with Architect prior to rough-in.
- B Coordinate final connection of power and ground wiring to equipment racks. Power and ground wiring shall terminate inside equipment racks, and be hard wired directly to ground busses to ensure uninterrupted operation.
- C All equipment and enclosures described in this specification shall be permanently attached to the structure and held firmly in place. Supports shall be adequate to support their loads with a safety factor of at least 3X the weight of the equipment or enclosure.
- D The process of equalizing and testing the Audio Sound System may necessitate moving and adjusting certain component parts (ex. loud speakers). This shall be done at no additional cost to the owner.
- E Take precautions as necessary to prevent and guard against electromagnetic and electrostatic noise interference.
- F Exercise care in wiring to avoid damage to the cables and to the equipment. Isolate cables carrying signals at different levels and separate to restrict channel bleed-through the feedback oscillation in any amplifier section. Connect all loud speakers electrically in phase, using the same wire color code for speaker wiring throughout the project. Make all joints and connections with resin core solder or with approved mechanical connectors. Install three conductor individually wired ground 120 VAC stripline in each rack.
- G Keep wiring separated into four groups of conduit for microphone level circuits (level below -20dBm), line level circuits (up to +30dBm), loud speaker circuits (above +30 dBm), and power circuits.
- H Locate wireless microphone system antennas and hearing assist system antennas at or above ceiling or at bar joist height in areas without ceilings. Coordinate exact location with owner. Provide adequate protective guards. Adjust antenna location for best possible reception/transmission in area of coverage.
- I Provide hearing assist transmitter(s) and receivers for each sound reinforcement system. The quantity of hearing assist receivers for each system shall be equal to the minimum required by Law, but in no case less than ten (4) receivers for the area of coverage of each local sound reinforcement system.

3.2 CABLE

A GENERAL

1. Single system cables may be grouped together in a common conduit or cable support of adequate capacity to facilitate the ease of installation and prevent conductor or insulation damage.
 2. Do not group conductors or cables of different systems in one common conduit or cable supports.
 3. Install cables as recommended by the system manufacturer. Conductor quantities specified are minimum required. Conductors to be installed shall be coordinated with the system equipment supplier. Cables installed on exposed surfaces, in inaccessible locations, or underground shall be in conduit.
 4. Cables installed above accessible ceiling spaces, may be installed without conduit. All cables not installed in conduit shall be plenum rated. Install cables that are not available with a plenum rating in conduit.
 5. Cables installed in hollow wall spaces shall be installed in conduit to an accessible location.
 6. Tag each circuit at each end and at each terminal with a separate tag indicating area served.
 7. Color code wire in accordance with IPCEA standards.
 8. Terminate speaker cables in junction box.
 9. All local sound distribution system cable on the entire project shall be grey in color.
- B. Coordinate final connection of power and ground wiring to equipment racks. Power and ground wiring shall terminate inside equipment racks, and be hard wired directly to ground busses to ensure uninterrupted operation.
- C. Take precautions as necessary to prevent and guard against electromagnetic and electrostatic noise interference.
- D. Exercise care in wiring to avoid damage to the cables and to the equipment. Isolate cables carrying signals at different levels and separate to restrict channel bleed-through the feedback oscillation in any amplifier section. Connect all loud speakers electrically in phase, using the same wire color code for speaker wiring throughout the project. Make all joints and connections with resin core solder or with approved mechanical connectors. Install three conductor individually wired ground 120 VAC stripline in each rack.
- E. Keep wiring separated into four groups of conduit for microphone level circuits (level below -20dBm), line level circuits (up to +30dBm), loud speaker circuits (above +30 dBm), and power circuits.
- F. Unless otherwise noted, provide the following cable types (or equivalent) for each application:
1. West Penn 454 #22 AWG twisted pair / shielded for Microphone and Line level signals.
 2. West Penn 227 #12 AWG twisted pair for conventional, full range sound reinforcement speakers.
 3. West Penn 226 #14 AWG twisted pair for 70v sound reinforcement speakers.
 4. West Penn 810 RG-8 coax cable for RF signal lines.
 5. West Penn 4246 CAT6 cable for Local Sound/Video Network.
 6. West Penn 4246F CAT6 F/UTP cable for Digital Video.
 7. West Penn 841 RG-6 75 ohm cable for Assistive Listening system where required.
 8. Crestron DM Cable where required.
 9. Provide plenum rated cable where required.
- G. Cables, wiring, and interconnect terminal strips to be logically, legibly, and indelibly labeled for immediate identification by a direct hot-stamp method or a factory stamped closed sleeve method as approved. Adhesive strip labels are acceptable only if sealed with transparent heat-shrinkable tubing to hold the marker in its position. Provide all

wiring labeling information on schematic diagram in project record drawings. Labeling equal to Brady PM-1M "Porta Mark", T&B heatshrink markers, or approved equal.

3.4 CABLE PATHWAYS

A. Cable Support:

1. All wire not installed inside conduit or a designated cable tray system shall be installed in a dedicated cable support system for the entire run of each cable. Including, but not limited to service loops.
 - a. Approved Cable Support Product:
PANDUIT® Corporation J-MOD™ modular support system (sized appropriately for the number of wires being installed. Reference the manufacturer's specifications for the suggested maximum cables per support size.
2. The approved cable support system shall be attached directly to the building steel at a serviceable height. In the event that the building steel is not 5' of the finished ceiling, the contractor shall provide a dedicated threaded rod extending within 5' of the finished ceiling and mount the J-MOD™ support hook to the treaded rod.
3. J-MOD™ cable support shall be installed at a maximum of 5' on center.
4. All cable installed shall be attached to the J-MOD™ support system with plenum rated Velcro and a plenum rated Velcro tie shall be installed between each J-MOD™ cable support to keep wires neatly bundled throughout the entire run.
5. ABSOLUTELY NO CABLE, NOT INSTALLED IN CONDUIT, WILL BE ALLOWED TO BE ATTACHED DIRECTLY TO THE BUILDING'S STEEL OR SUPPORTED IN ANY OTHER METHOD THAN THAT STATED ABOVE.
6. IT IS THE RESPONSIBILITY OF THE INSTALLING CONTRACTOR TO COORDINATE WITH ALL OTHER TRADES ON THE PROJECT TO INSURE THAT THE PATHWAY OF THIS SYSTEM DOES NOT INTERFERE WITH THE INSTALLATION OF THE OTHER TRADES AND TO PREVENT THE INSTALLED PRODUCT OF OTHER TRADES FROM PUTTING STRAIN ON THE INSTALLED WIRING.
7. Do not route cable through webbing of structural steel.

B. Conduit / Raceway:

1. All wire shall be installed in an approved conduit/raceway system (except where permitted by NEC and the local authority having jurisdiction). Maximum conduit "fill" shall not exceed 40% per NEC.
2. Conduit and raceway system shall be installed as specified under the general electrical section of the specifications, and per NEC.
3. Minimum conduit size shall be 3/4" EMT. Install conduit per engineered shop drawings.
4. Systems utilizing open wiring techniques with low smoke plenum cable shall provide conduit in all inaccessible locations, inside concealed walls, all mechanical/electrical rooms, or other areas where wiring might be exposed or subject to damage.
5. All conduit ends shall have a protective bushing to prevent cable damage. BUSHINGS MUST BE INSTALLED PRIOR TO INSTALLING CABLE. CUTTING BUSHING TO INSTALL AROUND INSTALLED CABLES WILL NOT BE ACCEPTED.

3.5 TESTING AND ACCEPTANCE

A. General

1. After completion of installation and start up procedures, commence a verification and testing sequence leading to final acceptance of the owner.
2. Submit for approval, a sample of the form on which the test will be reported.
 - a. Identify project
 - b. Signatures of participants and observers
 - c. Results
 - d. Description of adjustment or corrections of defective components.
 - e. Date
3. Provide schedule of tests. Estimate dates of significant events.
 - a. All testing shall be performed in the presence of the Owner/Architect/Engineer.
4. Test, calibrate and adjust each device in the system
5. Verify operation of all specified functions.
6. Provide documentation of all tests and verifications as specified.

B. The following tests and adjustments shall be performed by the Contractor. All equipment required supplied by the Contractor. Follow EIA standards RS-160 and RS-219 in performing tests. Record the results of these tests on project record drawings. Submit written results of tests to Architect prior to scheduled equalization and final inspection date.

1. Measure and record impedance of each speaker line terminating at equipment racks at frequency of 250Hz, 500Hz, and 1,000 Hz. with loud speakers connected to their respective lines.
2. Check system to ensure freedom from oscillations or stray RF pickup. Check inputs with no signal and with typical program material driving system to full output. Detect unwanted signals.
3. Tune and set dynamics on all inputs to provide the highest level of gain before feedback while providing intelligibility of all inputs.
4. Contractor shall perform a "rattle test" of all systems: Apply sine wave sweep signal to each loudspeaker system with a two minute sweep from 20Hz to 550Hz, to 10 - 15dB below full system output. Annotate issues discovered during sweep test. Correct issues resulting from the new system equipment and / or rigging hardware.
5. Provide documentation of an RF scan for each local sound system for the wireless microphone systems on all campuses. Provide a coordination report for all wireless microphone frequencies used in each system. Contractor shall ensure that no wireless mic frequency is used in more than one system.
6. Provide (2) copies of all programming for all components on two 8MB thumb drives for each system installed to the owner prior to Substantial Completion. All device code programming is the exclusive property of College of the Mainland.

3.6 INSTRUCTIONS

- #### **A.**
- Provide 8 hours, 2 hours on each of four days, of instruction to the Owner designated user and maintenance personnel on the use and operation of the system. Instructing personnel shall be a competent engineer or technician familiar with the installed system. Instruction times shall be arranged by the Owner.

3.7 ACCEPTANCE BY OWNER

- #### **A.**
- Upon completion of initial tests and delivery of all documents, diagrams, and project record drawings, notify the Architect in writing that the installation has been completed in

accordance with the requirements of the specification and is ready for equalization and inspection by representatives of the Owner.

- B. Acceptance testing will include operation by the Owner of each major system and other components (microphones, consoles, racks, loud speakers, etc.) deemed necessary. Contractor will assist as necessary in this testing.
- C. In the event the need for further adjustments or work becomes evident during acceptance testing, the Contractor will continue his work until the system is acceptable, at no additional cost to the Owner.
- D. Provide 21"x30" laminated copies of As Built schematics affixed to the inside door of each system's rack.

3.8 WARRANTY PROVISIONS

- A. Labor and materials provided under this section shall be warranted for not less than one (1) year after final acceptance of the work by the Owner. Defects occurring in labor or materials within the one year warranty are to be rectified by replacement or repair. This contractor, within the warranty period, is required to answer all service calls and requests for information within a 24 hour period and repair or replace any faulty items within a 72 hour period, without charge, including parts and labor.

END OF SECTION

SECTION 28 05 00 - GENERAL ELECTRONIC SAFETY SYSTEMS REQUIREMENTS

PART 1 – GENERAL

1.1 WORK INCLUDES

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1, apply to this Section.
- B. Furnishing of all required materials, equipment, tools, scaffolding, labor, and transportation necessary for the complete installation of the Electronic Safety Systems as shown on the drawings and as specified herein.
- C. Coordinate wireway, raceway, power, and outlet requirements with the builder and the electrical contractor.
- D. Cable pathways, conduit, boxes and cable support systems shall be complete with bushings, de-burred, cleaned, and secure prior to installation of cable.
- E. The Electronic Safety Systems Contractor shall provide and install prior to cable installation plastic snap in bushings at each box opening, passage through a metal stud, and at the end of all open conduit stubs or sleeves to protect the cabling from damage.
- F. Supply in a timely manner to the electrical contractor special backboxes for installation as required.
- G. It is the intent of the Contract Documents to provide complete installations although every item necessary may not be specifically mentioned or shown.
- H. It is the intent of the Contract Documents to provide an extension of the existing installed systems interfaced with new systems, complete in every respect.
- I. Provide line-by-line specification review for each Division 28 section annotated to certify compliance or deviation.

1.2 WORK TO BE INCLUDED BY THE ELECTRICAL CONTRACTOR IN BASE CONTRACT PROPOSAL

- A. Provide utility services conduit as outlined on drawings as required.
- B. All required conduit for accessibility to attic space.
- C. Furnishing and installation of all required standard back boxes and conduit.
- D. Installation of special back boxes supplied by Division 28 contractor(s).
- E. Furnishing and installation of all floor boxes, surface raceways, and other wireways which are detailed or specified under Division 26.
- F. Provide equipment-mounting boards as outlined on drawings.
- G. Provide equipment grounding system, conductors, and bus bars and as outlined in Division 26.
- H. Provide 120-volt power and hook-up to equipment provided in Division 28.

- I. Coordination of requirements of Division 28 with the Builder.

1.3 WORK NOT INCLUDED

- A. Contractors shall make no agreement that obligates the Owner to pay any company providing communications, monitoring, or other services. Contractors shall not make selection, purchase, or installation of interconnect instruments/equipment to be used on this project.

1.4 RELATED SECTIONS

- A. The conditions of the Division 0, Division 1, Division 26 requirements, and the contract requirements that include the General Conditions and the Supplementary Conditions apply to work of this division.
- B. Section 26 05 34 - Provisions For Communication, Security & Safety Systems.

1.5 CODES, STANDARDS, AND THEIR ABBREVIATIONS

- A. General:
 - 1. Perform all work in strict accordance with the requirements and recommendations stated in the codes and standards except when requirements are exceeded by the contract documents.
 - 2. In addition to the requirements outlined in other sections of the specifications the following standards are imposed as applicable to the work in each instance:
 - a. OSHA Safety and Health Regulations for Construction.
 - b. NFPA No. 70 National Electrical Code.
 - c. NESC National Electrical Safety Code, ANSI Standard C2.
 - d. NEIS National Electrical Installation Standards.
 - e. Local Codes and Ordinances.
- B. Where local codes or practices exceed or conflict with the NEC, it shall be the Contractor's responsibility to perform the work in accordance with the local code prevailing and local interpretations thereof. Any such additional work shall be performed at no additional cost to the Owner.
- C. Materials and components shall be UL listed and labeled by Underwriters Laboratories, Inc. for the intended use under the latest appropriate testing standard.
- D. The Contractor shall obtain all permits required to commence work. Upon completion of the Work, the Contractor shall obtain and deliver to the Owner's Representative a Certificate of Inspection and Approval from the State Board of Fire Underwriters and other authorities having jurisdiction. The Contractor shall pay required permit fees.

1.6 LIST OF ASSOCIATIONS AND STANDARDS:

ADA:	Americans with Disabilities Act.
ANSI:	American National Standards Institute, 1430 Broadway; New York, NY 10018.
ASTM:	American Society for Testing and Materials, 1916 Race Street; Philadelphia, PA 19103.
BICSI:	(RCDD5 Standards), 8610 Hidden River Parkway, Tampa, FL 33637
CBM:	Certified Ballast Manufacturers Association, 2116 Keith Building; Cleveland, Ohio 44115.
IEEE:	Institute of Electrical and Electronics Engineers, 345 East 47th Street; New York, NY 10017.
ICEA:	Insulated Cable Engineers Association, P.O. Box P, South Yarmouth, MA 02664.
NEC:	National Electrical Code; NFPA No. 70.

NECA: National Electrical Contractors Association, Inc., 7315 Wisconsin Ave.;
Washington, DC 20014.
NEMA: National Electrical Manufacturers Association, 155 East 44th Street; New York,
NY 10017.
NESC: National Electrical Safety Code, ANSI Standard C2.
NFPA: National Fire Protection Association, 60 Batterymarch Street; Boston, MA
02110.
OSHA: Occupational Safety and Health Administration, US Department of Labor;
Washington, DC 20402.
TAS: Texas Accessibility Standards (TAS) Article 9102.
UL: Underwriters Laboratories, Inc., 333 Pfigsten Road; Northbrook, IL 60062.

- A. Nothing in the Contract Documents shall be construed to permit work not conforming to these codes.
- B. When two or more codes or standards are applicable to the same work, then the stricter code or standard shall govern.
- C. The date of the code or standard is that in effect on the date of issue stated on the contract documents, except when a particular publication date is specified.
- D. The Contractor shall comply with all State, Federal, NFPA, local codes and ordinances that may alter any part of the plans or specifications. The Contractor shall bear all costs for correcting any deficiencies due to non-compliance.
- E. Where local codes and ordinances are not in writing or on record but local precedence have been set, the Owner shall pay for any additional resulting cost.

1.7 DEFINITIONS

- A. Approval: It is understood that approval must be obtained from the Architect in writing before proceeding with the proposed work. Approval by the Architect of any changes, submitted by the Contractor, will be considered as general only to aid the Contractor in expediting his work.
- B. The Builder: The primary contractor engaged to oversee the construction project. They may be technically described as a Construction Manager, General Contractor, Managing Construction Contractor, et cetera.
- C. The Contractor: The Contractor engaged to execute the work included a particular section only, although he may be technically described as a Subcontractor to the Builder. If the Contractor, engaged to execute said work, employs Sub-Contractors to perform various portions of the work included under a particular Section, they shall be held responsible for the execution of this work, in full conformity with Contract Document requirements. The Contractor shall cooperate at all times and shall be responsible for the satisfactory cooperation of his Subcontractors with the other Contractors on the job so that all of the various sections and phases of work may be properly coordinated without unnecessary delays or damage.
- D. The Electrical Contractor: The Electrical Contractor shall be engaged to execute the work included Division 26 only.
- E. PDF file or .pdf: The filename extension associated with "Portable Document Format" files, which are multi-platform computer files in the ISO 32000-1:2008 open standard format developed and licensed by Adobe Systems. These files are a digital electronic representation of text, documents, images, and technical drawings in a font and color-accurate fixed-layout format that is platform and display resolution independent. PDF files can be electronically transmitted, viewed, or printed with various free PDF reader application programs, and may allow markups/comments with various PDF editing application programs.

- F. Provide: Defined as requiring both the furnishing and installation of the item or facility indicated, complete in all respects and ready for operation unless otherwise specifically noted.

1.8 SCHEDULE OF VALUES, APPLICATION FOR PAYMENT

- A. The Contractor shall in accordance with the General Provisions of the Contract, including General and Supplementary Conditions, and Division 1, complete a Schedule of Values and Applications for Payment. When a portion of this work separately funded, including donations or E-Rate, the contractor shall accommodate this in the Schedule of Values and Applications for Payment. For E-Rate eligible portions of this work, the contractor will be required to participate in the E-Rate program, comply with all E-Rate regulations, and provide billing as needed. The contractor shall coordinate with the Owner to file Form 471 or latter edition and/or other forms as may be required.

1.9 WARRANTY

- A. The Contractor shall warranty his work against defective materials and workmanship for a period of one year from date of acceptance of the job.
- B. Neither the final payment nor any provisions in Contract Documents shall relieve the Contractor of the responsibility for faulty materials or workmanship.
- C. He shall remedy any defects due thereto, and pay for any damage to other work resulting there from, which shall appear within a period of one year from date of substantial completion.
- D. The Owner shall give notice of observed defects with reasonable promptness.
- E. This Warranty shall not be construed to include the normal maintenance of the various components of the system covered by these specifications.

1.10 SITE VISIT

- A. Before submitting a proposal, each proposed contractor shall examine all plans and specifications relating to the work, shall visit the site of the project, and become fully informed of the extent and character of the work required, including all required utilities.
- B. No consideration will be granted for any alleged misunderstanding of the materials to be furnished or the amount of work to be done, it being fully understood that the tender of a proposal carries with it the agreement to all items and conditions referred to herein, or indicated on the accompanying plans or required by nature of the site of which may be fairly implied as essential to the execution and completion of any and all parts of the work.

1.11 SUBMITTALS

- A. Submittal procedures shall be per Division 1 - General Requirements.
- B. Provide a complete submittal for each section as specified.
- C. Submit complete submittal package within 30 calendar days after award of this work for approval. Equipment is not to be ordered without approval. Partial submittals are not acceptable for review. Each submittal shall include a dated transmittal.
- D. A submittal may be electronically transmitted in PDF file format (preferred) or paper copies may be provided in quantities indicated in Division 1. Paper copies shall be organized including index tabs in a 3-ring black binder of sufficient size.
- E. Each Product data submittal shall include:
 - 1. A cover sheet with the name and location of the project, the name, address, and

- telephone number of the Contractor, and the name, address, and telephone number of the submitting sub-contractor. Include on or after the cover sheet sufficient space for review stamps.
2. An indication of any deviations from Contract Document requirements, including variations and limitations. Show any revisions to equipment layout required by use of selected equipment.
 3. A product data index and complete equipment list including for each product submitted for approval the manufactures name and part number, including options and selections.
 4. Cut-sheets or catalog data illustrating the physical appearance, size, function, compatibility, standards compliance, and other relevant characteristics of each product on the equipment list. Indicate by prominent notation (an arrow, circle, or other means) on each sheet the exact product and options being submitted.
 5. Submit design data, when the scope of work requires, including calculations, schematics, risers, sequences, or other data.
 6. When the contract requires extended product warranties, submit a sample of warranty language.
 7. Any resubmittal shall include a complete revised equipment list and any product data that is revised.
- F. Submit shop or coordination drawings, when specified or the required for the scope of work, which include information that will allow to the Contractor to coordinate interdisciplinary work and when necessary guide the manufacturer or fabricator in producing the product. Shop or coordination drawings shall be specifically prepared to illustrate the submitted portion of work, this may require diagrams, schedules, details, and accurate to scale equipment and device layouts prepared using a CAD or BIM engineering drawing program.
- G. The Engineer's review of submittals is only for confirmation of adherence to design of project and does not relieve the Contractor of final responsibility for furnishing all materials required for a complete working system and in complying with the Contract Documents in all respects.

1.12 PROJECT RECORD DOCUMENTS

- A. The Contractor shall keep a set of plans on the job, noting daily all changes made in connection with the final installation including exact dimensioned locations of all new and uncovered existing utility piping outside the building.
- B. Upon submitting his request for final payment, he shall turn over to the Architect/Engineer, for subsequent transmittal to the Owner revised plans showing "as installed" work.
- C. In addition to the above, the Contractor shall accumulate during the jobs progress the following data in PDF file format (preferred) or paper copies to be turned over to the Architect/Engineer for checking and subsequent delivery to the Owner:
1. All warranties, guarantees, and manufacturer's directions on equipment and material covered by the Contract.
 2. PDF file or paper copies of all Shop Drawing prints and CAD or BIM engineering drawing program files.
 3. Any software programs, data/programming files, passwords, special interface cables, or keys that may be needed to maintain or access equipment.
 4. Set of operating instructions. Operating instructions shall also include recommended maintenance and seasonal changeover procedures.
 5. Any and all other data and/or plans required during construction.
 6. Repair parts lists of all major items and equipment including name, address, and telephone number of local supplier or agent.
 7. The first page, or pages, shall have the names, addresses, and telephone numbers of the following:
 - a. Builder and all Contractors.
 - b. Major Equipment Suppliers

- c. Submit communication systems warranties.

1.13 TRAINING

- A. Upon completion of the work and at a time designated by the Architect, provide formal training sessions for the Owner's operating personnel to include location, operation, and maintenance of all Electronic Safety Systems equipment and systems.
- B. See other sections for time requirements.

1.14 PLANS AND SPECIFICATIONS

- A. The intent of the project drawings is to establish the types of systems and functions, but not to set forth each item essential to the functioning of the system.
- B. Electrical drawings are generally diagrammatic and show approximate location and extent of work.
- C. Install the work complete including minor details necessary to perform the function indicated. Provide Electronic Safety Systems (including all hook-ups) complete in every respect and ready to operate.
- D. If clarification is needed, consult the Architect/Engineer.
- E. Review pertinent drawings and adjust the work to conditions shown. Where discrepancies occur between drawings, specifications, and actual field conditions, immediately notify the Architect/Engineer for his interpretation.
- F. The Architect/Engineer reserves the right to make any reasonable change in the location of any part of this work without additional cost to the Owner.

1.15 PRODUCT SUBSTITUTIONS:

- A. Descriptions and details, acceptable manufacturers' names listed, and specific manufacturer and model number items indicated in the plans and specifications shall establish a standard of quality, function, and design. Manufacturers and model numbers listed "no exceptions" shall not be substituted without specific notice in an addendum. Otherwise, where a specific manufacturer's product is indicated, products of other manufacturers listed as acceptable may be submitted for approval based on the substitute product being, in the opinion of the Engineer, of equivalent or better quality than that of the product specified.
- B. Proposed contractors wishing to propose systems which differ in manufacturer, features, functions, or operating characteristics from those outlined in these specifications must do so in writing to the specifying authority at least ten (10) days prior to the proposal opening.
- C. For manufacturers equipment or models other than that specified, the proposed contractor shall supply proof that such substitute equipment equals or exceeds the features, functions, performance, and quality of the specified equipment. Proposals must include detailed information showing all deviations from the system as specified and include relevant technical and cost data. This shall include a complete description of the proposed substitution, drawings, catalog cuts, performance data, test data, or any other data or information necessary for evaluation.
- D. The Engineer will consider all such submittals and the Architect will issue an addendum listing items that the Engineer considers acceptable. Only such items as specified or approved as acceptable will be installed on this project.

- E. Substitute products for which the proposed contractor does not obtain prior approval will not be considered acceptable for this project. Final approval of the alternate system shall be based on the decision of the Owner and Architect. Prior approval to make a proposal for this project does not automatically ensure the system will be an acceptable equivalent.
- F. The Contractors' proposal represents that the contract proposal price is based solely upon the materials, equipment, and labor described in the Contract Proposal Documents (including addenda, if any) and that he contemplates no substitutions or extras.
- G. The manufacturer of the proposed substitute unit shall provide samples for evaluation, when required, at no charge and non-returnable.
- H. Requests for substitution are understood to mean that the Contractor:
 - 1. Has personally investigated the proposed substitution and determined that it is equivalent or superior in all respects to that specified.
 - 2. Will provide the same guarantee for the substitution that he would for that specified.
 - 3. Will, at no cost to the Owner, replace the substitute item with the specified product if the substitute item fails to perform satisfactorily.
 - 4. After Award of the Contract, substitutions will be considered only under one or more of the following circumstances:
 - a. The substitution is required for compliance with subsequent interpretations of code or insurance requirements.
 - b. The specified product is unavailable through no fault of the Contractor.
 - c. The manufacturer refuses to warranty the specified products as required.
 - d. Subsequent information indicates that the specified product is unable to perform properly or to fit in the designated space.
 - e. In the Engineer's sole judgment, the substitution would be in the Owner's best interest.
 - f. Revisions to the electrical system caused by substitutions shall be under the supervision of the Engineer, at a standard hourly rate charged by the Engineer. Charges from the Engineer, Architect, and Electrical Contractor shall be paid by the Contractor originating the changes.

1.16 FUTURE USE CABLING

- A. When cabling is installed for future use, it shall be identified with a tag of sufficient durability to withstand the environment involved.
- B. Locations and Existing Conditions:
 - 1. Location and condition of any existing equipment or services, when shown, have been obtained from substantially reliable sources, are shown as a general guide only, without guarantees as to accuracy.
 - 2. The Contractor will examine the site, verify all requirements, service points, and availability of all services required to complete this project. No consideration will be granted for any alleged misunderstanding of the materials and labor to be provided as necessitated by nature of the site including those items that may be fairly implied as essential to the execution and completion of any and all parts of this project.

1.17 PROTECTION OF EQUIPMENT AND MATERIALS

- A. The Contractor shall take such precautions as may be necessary to protect his apparatus from damage.
- B. This shall include the creation of all required temporary shelters to protect any apparatus above the floor of the construction and the covering of apparatus in the completed building with tarpaulins or other protective covering.

- C. Failure to comply with the above to the satisfaction of the Owner's inspector will be sufficient cause for the rejection of the equipment in question and its complete replacement by the Contractor.

1.18 FINAL OBSERVATION

- A. It shall be the duty of the Contractor to make a careful observation trip of the entire project, assuring themselves that the work on the project is ready for final acceptance before calling upon the Architect/Engineer to make a final observation.
- B. To avoid delay of final acceptance of the work, the Contractor shall have all necessary bonds, warranties, receipts, affidavits, et cetera, called for in the various articles of these specifications, prepared and signed in advance, together with a letter of transmittal, listing each paper included, and shall deliver the same to the Architect/Engineer at or before the time of said final observation. The Contractor is cautioned to check over each bond, receipt, et cetera, before preparing for submission to verify that the terms check with the requirements of the specifications.
- C. The following and other provision of Division 1 General Conditions will be required at time of final completion:
 - 1. Final clean up completed.
 - 2. All systems are fully operational, all material and devices installed.
 - 3. As built (as installed) drawings and operations manuals.

1.19 PROHIBITED MATERIALS

- A. No new asbestos, lead, or materials containing these substances shall be permitted in this project. The Contractor shall consult the Architect concerning these materials if their presence is suspected. All work in or around existing asbestos or lead materials is at the sole risk of the Contractor and his personnel.

1.20 CUTTING AND PATCHING

- A. Notify the Builder sufficiently ahead of construction of any floors, walls, ceiling, roof, et cetera, of any openings that will be required for his work.
- B. The Contractor shall see that all sleeves required for his work are set at proper times to avoid delay of the job.
- C. All necessary cutting of walls, floors, partitions, ceilings, et cetera, as required for the proper installation of the work under this Contract shall be done at the Subcontractor or at the Subcontractor's expense in a neat and workmanlike manner, and as approved by the Architect/Engineer.
- D. Patching of openings and/or alterations shall be provided by the Electronic Safety Systems Subcontractor or at the Subcontractor's expense in an approved manner.
- E. No joists, beams, girders, or columns shall be cut by any Contractor without first obtaining written permission of the Architect/Engineer.
- F. All openings in firewalls and floors shall be completely sealed after installation for a completely airtight installation. Sealing material shall be non-combustible and UL approved. The installed sealing assembly shall not cause the fire rating of the penetrated structure to be decreased.
- G. All openings in exterior walls shall be sealed watertight.
- H. Seal voids around conduits penetrating fire-rated assemblies and partitions using fire stopping

materials and methods in accordance with NFPA and local codes.

1.21 MANUFACTURERS' INSTRUCTIONS

- A. All equipment and devices shall be installed in accordance with the drawings and specifications, manufacturer's instructions, and applicable codes.
- B. Where specifications call for installation of a product to be in accordance with manufacturer's instructions and/or where manufacturer's instructions are required for installation of a product, it shall be the contractor's responsibility to obtain the necessary applicable manufacturer's instructions and install the product in accordance with the manufacturer's instructions.
- C. It shall be the Contractor's responsibility to install all equipment, materials, and devices shown on the plans and as called out in these specifications even if manufacturer's instructions are absolutely unattainable.

1.22 INSTALLATION

- A. Cooperation with trades of adjacent, related or affected materials or operations, and or trades performing continuations of this work under subsequent contracts are considered a part of this work. In order to effect timely and accurate placing of work and to bring together, in the proper and correct sequence, the work of such trades, including work provided under a Division 1 allowance.
- B. The Electronic Safety Contractor shall coordinate installation of the systems with the Builder, Electrical, Mechanical, and Plumbing Contractors to ensure a complete working system for the Owner.
- C. Where required for accessibility all conduit and boxes for all Electronic Safety Systems shall be provided by the Electrical contractor as specified, including systems in Division 28, any and all allowances shall be included. Normally low voltage wiring shall run open and supported in accessible attic space. All low voltage wiring in exposed areas such as gyms, stages, shops, and field houses shall be enclosed in conduit. Coordinate with, and verify with Division 26 to provide required conduit and boxes at locations and heights as required.
- D. Conduit, innerduct, track, or raceway shall conceal and protect wiring in exposed areas, within walls, through in- accessible areas, floors, chases, under slab, crawlspaces, or underground.
- E. All conduit, duct, track, and raceway runs shall be spaced apart to allow for maintenance, such as the installation of couplings, without disturbing adjacent pathways.
- F. All work must be performed by workers skilled in their trade. The installation must be complete whether the work is concealed or exposed.
- G. Provide stainless screw/bolt hardware wherever stainless devices are used and in potentially wet areas.
- H. Coordinate the actual locations of devices and outlets and equipment with building features and mechanical equipment as indicated on architectural, structural, and mechanical drawings. Review with the Architect any proposed changes in outlet or equipment location. Relocation of devices, before installation, of up to 3 feet from the position indicated, may be directed without additional cost. Remove and relocate outlets placed in an unsuitable location when so requested by the Architect.

1.23 ADDITIONAL MATERIALS: INCLUDE IN THE BASE CONTRACT PROPOSAL

- A. All costs to provide 10 additional fire alarm signals including all cable and devices as directed

by the Architect. Conduit and standard back boxes by Division 26 Electrical Contractor.

PART 2 – PRODUCTS

A. Not Applicable

PART 3 – EXECUTION

A. Not Applicable

END OF SECTION

SECTION 28 16 00

INTRUSION DETECTION SYSTEM

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Security Control Panel.
- B. Initiation Devices.
- C. Notification Devices.

1.2 RELATED WORK

- A. Section 08 71 00 – Door Hardware
- B. Section 26 05 00 – Common Work Results for Electrical
- C. Section 26 05 03 – Equipment Wiring Requirements
- D. Section 26 05 11 – Requirements for Electrical Installation
- E. Section 26 05 19 – Low Voltage Electrical Power Conductors and Cables
- F. Section 27 15 00 – Voice and Data Network Cabling
- G. Section 28 05 00 – Basic Electronic Safety and Security System Requirements.
- H. Section 28 13 00 – Electronic Access Control

1.3 QUALITY ASSURANCE

A. Manufacturer:

- 1. The manufacturer shall have a minimum of ten (10) years documented experience in the development and manufacture of access control software and hardware.
- 2. All equipment shall bear the label of a Nationally Recognized Testing Laboratory (NRTL) such as Intertek Testing Services NA, Inc. (ITSNA - formerly ETL) or Underwriters Laboratories Inc. (UL) and be listed by their re-examination service.

B. Contractor:

- 1. Shall be a factory-authorized installation, service and support company specializing in the selected manufacturer's product, with demonstrated prior experience of a minimum of ten (10) years installing, programming and supporting the selected manufacturer's system.
- 2. Shall be an established intrusion detection systems contractor that has and currently maintains a locally run (within 50 miles of the job site).
- 3. Shall be the manufacturer's representative for both the new installation and the existing systems of integration to assure compliance with manufacturer's installation requirements and warranty adherence. The contractor shall include in their bid a letter stating the contractor is an authorized representative of the security systems specified.
- 4. Shall employ a minimum of five (5) factory trained technicians and a 24-hour emergency service department.
- 5. Shall designate one person to act as the project manager having total responsibility for communications and project technical integrity. This project manager shall have a minimum of three (5) years experience as a supervisor and installer of the systems specified herein and hold a factory Authorization for the specified system.

6. Shall have as a regular, full time employee, a minimum of three employees with the following credentials, certification(s) or education. Should more than one certification be required, one employee may maintain multiple certifications.
 - a. Authorized DMP Entre Certified installer and programmer.
 - b. Valid State of California Contractor's License, C-10 and C-7.
 - c. Valid State of California Alarm Company Operator License, ACO
7. The Digital Monitoring Products (DMP) Authorized Distributor for the Southern California Area is **Time and Alarm Systems of Mira Loma, California (951) 685-1761.**

C. Material:

1. All material which furnished by contractor shall be new, unused and free from defects.
2. Where more than one of any specified item of equipment or material is used, all such items shall be the same product from the same manufacturer.

1.4 APPLICABLE CODES & STANDARDS

- A. 2022 Building Standards Administrative Code, Part 1, Title 24, California Code of Regulations
- B. 2022 California Building Code (CBC) Part 2, Title 24, California Code of Regulations
- C. 2022 California Electrical Code (CEC) Part 3, Title 24, California Code of Regulations
- D. 2022 California Fire Code (CFC) Part 9, Title 24, California Code of Regulations
- E. NFPA Standards
 1. The intrusion detection system shall comply with the applicable provisions of the following current National Fire Protection Association (NFPA) standards:
 - a. NFPA 110, Standard for Emergency and Standby Power Systems
 - b. NFPA 111, Standard on Stored Electrical Energy Emergency and Standby Power Systems
 - c. NFPA 780, Standard for the Installation of Lightning Protection Systems
- F. ADA - Americans with Disabilities Act
- G. CAC – California Administrative Code, Title 24
- H. U.L. Standards
 1. The system shall comply with the applicable provisions of the following U.L. Standards:
 - a. UL 294, Standard for Access Control Systems Units
 - b. UL 609, Standard for Local Burglar Alarm Units and Systems
 - c. UL 634, Standard for Connectors and Switches for Use with Burglar-Alarm Systems
 - d. UL 636, Standard for Holdup Alarm Units and Systems
 - e. UL 639 Standard for Safety for Intrusion-Detection Units
 - f. UL 681, Standard for the Installation and Classification of Burglar and Holdup Alarm Systems
 - g. UL 1076, Standard for Proprietary Burglar Alarm Units and Systems
 - h. UL 1610, Standard for Central Station Burglar Alarm Units
 - i. UL 1635, Standard for Digital Alarm Communicator System Units
 - j. UL 2044, Standard for Commercial Closed Circuit Television Equipment

1.5 SUBMITTALS

- A. Submit shop drawings and product data under provisions of Section 28 05 00.
- B. Product Data Submittal: Provide manufacturer's technical product specification sheet for each individual component type. Submitted data shall show the following:
 - 1. Compliance with each requirement of these documents. The submittal shall acknowledge each requirement of this section, item-by-item.
 - 2. All component options and accessories specific to this project.
 - 3. Electrical power consumption rating and voltage.
 - 4. Wiring requirements.
- C. IP Addresses: Contractor shall provide to Owner, in a documented transmittal and in Microsoft Excel format, the names and locations of devices which require an IP address. An authorized representative of the Owner shall furnish the addresses for the associated devices in Microsoft Excel format in a documented transmittal. Should Owner change the IP address structure after approval of the list, Owner may be responsible for additional fees involved with reprogramming.
- D. System Drawings: Project-specific system CAD drawings shall be provided as follows:
 - 1. Provide a system block diagram noting system components and interconnection between components. The interconnection of components shall clearly indicate all wiring required in the system. When multiple pieces of equipment are required in the exact same configuration (i.e., multiple identical controllers), the diagram may show one device and refer to the others as "typical" of the device shown.
 - 2. Provide schedules describing each system input location by an architecturally familiar reference (i.e., Door 312A). The architectural door schedule shall be used as the basis.
- E. Submit detailed description of Owner training to be conducted at project end, including specific training times.
- F. Quality Assurance:
 - 1. Provide materials documenting experience requirements of the manufacturer and Installing Contractor. (i.e. certifications, credentials)
 - 2. Provide system checkout test procedure to be performed at acceptance. Test procedures shall include all external alarm events.

1.6 SYSTEM DESCRIPTION

- A. This specification section describes the furnishing, installation, commissioning and programming of a complete, turnkey intrusion detection system.
- B. Performance Statement: This specification section and the accompanying access control-specific design documents are performance based, describing the minimum material quality, required features, and operational requirements of the system. These documents do not convey every wire that must be installed and every equipment connection that must be made. Based on the equipment constraints described and the performance required of the system, as presented in these documents, the Vendor and the Contractor are solely responsible for determining all wiring, programming and miscellaneous equipment required for a complete and operational system.

- C. Basic System Description: The security management system shall provide an integrated hardware and software solution for alarm monitoring. The Intrusion Detection system shall be a 12VDC, microprocessor-based, network capable system, complete with an integral DACT that is UL listed. The intrusion detection system shall be capable of providing, at a minimum, the following:
1. Intrusion Detection Control Panel
 - a. Integral Digital Alarm Communications Transmitter (DACT).
 - b. Network Interface capability via copper and/or fiber optic network.
 2. Addressable initiation devices
 3. Addressable control modules
 4. Notification Appliances
 5. Remote Power Supplies
 6. Temperature threshold detection and monitoring
 7. Humidity threshold detection and monitoring
 8. Pressure threshold detection and monitoring
 9. Power loss detection and monitoring, generator switching
 10. Leak detection and monitoring
 11. Carbon monoxide detection and monitoring
 12. Tank level threshold detection and monitoring
 13. Remote Access capability via LAN/WAN network
 14. Access Control System interface capability
 15. Fire Alarm System interface capability

1.7 PROJECT RECORD DOCUMENTS

- A. Submit documents under the provisions of Section 28 05 00.
- B. Provide final system block diagram showing any deviations from shop drawing submittal.
- C. Provide statement that system checkout test, as outlined in the shop drawing submittal, is complete and satisfactory.
- D. Provide schedules documenting:
1. Controller installation locations including specific door numbers being controlled.
 2. All terminal block wiring, including cable numbers.
- E. Warranty: Submit written warranty and complete all Owner registration forms.
- F. Complete all operation and maintenance manuals as described below.

1.8 OPERATION AND MAINTENANCE DATA

- A. Submit documents under the provisions of Section 28 05 00.
- B. Operation Data: Provide full system operation instructions for each piece of equipment.
- C. Maintenance Data: Document any manufacturer's recommended preventative maintenance procedures to be performed by the Owner.

1.9 WARRANTY

- A. Unless otherwise noted, provide warranty for one (1) year after Date of Substantial Completion for all materials and labor.
- B. The warranty shall include emergency service and repair on-site, with acknowledgment response time of one (1) hour from time of notification and on-site response within four (4) hours. The system shall be repaired and restored to operation within twenty-four (24) hours of notification.
- C. Refer to the individual product sections for further warranty requirements of individual system components.

1.10 ANNUAL SERVICE CONTRACT

- A. Provide annual cost for extended service and maintenance warranty after the first year, for the access control system according to the following terms:
 - 1. The term of the warranty shall begin on the system acceptance date and shall continue for one (1) year. The extended service and maintenance warranty may begin following this first year if accepted by the Owner. The term may be automatically renewed for successive one-year periods unless canceled by the Owner. The service and maintenance agreement shall include the following basic services to the Owner, including all necessary parts, labor and service equipment:
 - a. Repair or replace any security equipment item that fails to perform as initially installed, as specified, or as determined per the manufacturer's performance criteria.
 - b. Perform semi-annual preventive maintenance on the security equipment. This preventive maintenance shall include, but is not limited to, cleaning, realignment, inspection, and testing of security devices. The Owner shall receive a written report of these inspections that identifies the security device's status and, if required, a list of all necessary repairs or replacements.
 - c. Provide software maintenance on the security system. Contractor shall install and configure any software updates that the manufacturer provides at no cost. Any additional software options, updates, or enhancements purchased by the Owner shall be installed. The Contractor shall not be responsible for the purchase of additional software packages or the maintenance of Owner data.
 - 2. The Contractor shall be compensated for any repairs or maintenance provided as a result of Owner abuse, misuse, intentional damage, accidental damage, or power fluctuations exceeding specified equipment tolerances.
 - 3. System defects or failures shall be corrected within four (4) hours on the same business day if the Owner makes a service request before 11:00 a.m., or before 12:00 noon the next business day if the Owner makes the request after 11:00 a.m. If requested by the Owner, the Contractor shall respond or remain at the site after normal business hours, and the Owner shall reimburse the Contractor for the incremental cost difference between premium labor rates and standard labor rates. This reimbursement applies to premium labor rates that do not exceed time-and-one-half rates after normal business hours, and double-time rates for Sundays and holidays. The Contractor's services shall be performed in a good and workmanlike manner and remain free from defects for a period of one (1) year.
- B. Provide complete terms and conditions of warranty and service.
- C. The Owner will enter into a contract directly with the Vendor. This specification is not a contract between the Owner and the Vendor to perform these services.

PART 2 - INTRUSION DETECTION PRODUCTS

2.1 INTRUSION DETECTION SYSTEM MANUFACTURERS

- A. This specification is based on the equipment of manufacturer(s) who have been approved by the District/Owner and the Manufacturer(s) herein named shall be considered as meeting the requirements of this specification.
- B. Equipment provided for this project shall be the product of Digital Monitoring Products (DMP). Any new work must be integrated into Entre Software Management Software.

2.2 SUBSTITUTIONS

- A. The Intrusion Detection System shall be Digital Monitoring Products (DMP) AS PER DISTRICT/OWNER STANDARDS. No substitutions will be accepted.

2.3 SYSTEM REQUIREMENTS

- A. The intrusion alarm system specified herein shall include a Digital Alarm Communicator Transmitter (DACT), built-in telephone line monitor, 12,000 event memory buffer, real time clock, calendar, test timer, battery charging / voltage supervision circuitry, battery lead supervision, diagnostics displays, time / event-based scheduling system, lightning / EMI protection circuits, and the associated optional modules and components for a complete intrusion alarm system.
- B. The following describes the general functional requirements of the intrusion alarm system:
 - 1. The intrusion alarm shall provide identification, annunciation, and communication of alarmed detectors by point and each access control user by number.
 - 2. The intrusion alarm shall be capable of segregating the points (i.e., a detector or group of detectors zoned together) into separate, independent "areas."
 - 3. The intrusion alarm shall be "modularly" expandable using hard-wired address identification modules.
 - 4. The intrusion alarm shall have electrically supervised detection loops and power supplies (mains and battery(s)). This supervision shall be programmable for the purposes of reporting this information to the DACR.
 - 5. The intrusion alarm shall be capable of monitoring and switching to active telephone lines when trying to establish communications with the DACR and transmitting a report. The system shall employ Adaptive Technology that allows a Backup communication path programmed for Network or Cellular to automatically ADAPT to the faster check-in rate of the Primary path should the Primary path become unavailable.
 - 6. The intrusion alarm shall be capable of reporting and communicating alarm or trouble event data by reporting to one, two, three or four off-site remote DACRs via dial-up analog telephone lines, or cellular communications via a DMP 263C. **If a 263C Cellular Communicator is required, the cost for (1) One Year of Cellular service shall be included in the base bid for this project.**
 - 7. The intrusion alarm shall be capable of sending (manually or automatically) test and status reports to remote DACRs.
 - 8. The control panel shall be capable of sending text messaging to up to three Cellular Phone Numbers using cellular communications.
 - 9. The control panel shall be capable of sending the following SMS messages:
 - a. One Zone Alarms by Zone Name
 - b. Zone Troubles by Zone Name

- c. Zone Bypass by User
- d. Arming (closings) by user
- e. Disarming (openings) by User
- f. Late to Close
- g. AC Power Trouble and Restoral
- h. System Low Battery
- i. Ambush
- j. Abort, Cancel and Alarm Verified by User
- k. Check-In by User

2.4 SECURITY CONTROL PANEL

A. Digital Monitoring Products (DMP) – Model XR-550DNL-G

1. Standard commercial burglar control/communicator package shall include the following features and capabilities. Security panel shall be a UL Listed System with a lockable enclosure, transformers and internal battery location.
 - a. System shall be Network based and capable of accepting and RJ45 Ethernet connection for offsite programming and Networking of Multiple XR550DNL-G Security Panels through a standard network connection.
 - b. Each System shall be capable of 574 Individual Security Points.
 - c. Each System shall allow for 32 individual reporting areas
 - d. Each System shall allow for 10,000 users with 99 user profiles
 - e. Each System shall be capable of 100 programmable output relays.
 - f. Each System shall have the capacity for a maximum of sixteen (16) keypads.
 - g. Each System shall be capable of supporting and controlling up to 232 Z-Wave devices and up to 20 Z-Wave Favorites for group control.
 - h. System shall be capable of taking over and utilizing existing Bosch/Radionics POPIT module with a DMP 736P Interface Module.
2. Addressable Expansion Module shall be supplied in the quantities and type required for a complete and operational system. Below is a sample list for reference.
 - a. Digital Monitoring Products (DMP) – 708 Bus Extender
 - b. Digital Monitoring Products (DMP) – 710 Bus Splitter / Repeater
 - c. Digital Monitoring Products (DMP) – 714 4 Zone Class B Expansion Module
 - d. Digital Monitoring Products (DMP) – 461 Adapter Module
 - e. Digital Monitoring Products (DMP) – 462N Network Interface Card
 - f. Digital Monitoring Products (DMP) – 462P Printer Interface Card
 - g. Digital Monitoring Products (DMP) – 481 Expansion Interface Card
 - h. Digital Monitoring Products (DMP) – 860 Relay Output Module
 - i. Digital Monitoring Products (DMP) – 893A Dual Phone Line Module
 - 1) Actual Expansion Module required will vary based on the scope of work and construction drawings. All required modules shall be included in the base bid and installed for a complete and operable Intrusion Detection System to the satisfaction of the Owner.
3. Control Panel: Modular construction with surface wall-mounted enclosure.
4. Power Supply: Adequate to serve control panel modules, remote detectors, remote annunciators, relays, and alarm signaling devices. Include battery operated emergency power supply with capacity for operating system in standby mode for 4 hours.

5. System Supervision: Provide electrically-supervised system, with supervised alarm initiating and alarm signaling circuits. Component or power supply failure places system in alarm mode.
 6. Initiating Circuits: Supervised zone module with alarm and trouble indication.
 7. Signal Circuits: Supervised zone coded signal module, sufficient for signal devices connected to system; occurrence of single ground or open condition places circuit in trouble mode and does not disable that circuit from transmitting alarm.
 8. Remote Station Signal Transmitter: Electrically supervised, capable of transmitting alarm and trouble signals over telephone lines to central station receiver.
 9. Auxiliary Relays: Provide sufficient SPDT auxiliary relay contacts for each detection zone to provide accessory functions specified.
 10. Entry and Exit Time Delays: 1-1/2 minutes.
 11. Alarm Sequence of Operation: Actuation of Intrusion Detecting device places system in alarm mode, which causes the following operations:
 - a. Sound and display local alarm signaling devices with non-coded signal.
 - b. Transmit zone-coded signal to central station.
 - c. Indicate location of actuated device on control panel and on remote annunciator panel.
 - d. Alarm Reset: Key-accessible reset function resets alarm system out of alarm if alarm initiating circuits have cleared.
 12. Lamp Test: Manual lamp test function causes alarm indication at each zone at control panel and at annunciator panel.
- B. Point Single Zone Expansion Module
1. Digital Monitoring Products (DMP) 711
 - a. The 711 module serves as the interface between the addressable data loop from the control panel and the conventional initiation devices (i.e. motion sensors and door switches).
 - b. All 711 modules shall be installed in an accessible location and labeled with the device address.
- C. Remote Power Supplies
1. Altronix – Model No. SMP3
 - a. Power supply for passive infrared detectors, 12VDC provide one in each building. Provide power supply, terminal cabinet, transformer and battery as required for a complete and operable system.
 - b. Terminal cabinet enclosure
 - 1) Altronix – Model No. BC300 or BC400 (size as required)
 - c. Transformer 120VAC-12VDC
 - 1) DSC - Model No. DSCPTC1640U
 - d. Battery
 - 1) Yuasa – Model No. NP7-12

2.5 KEYPADS

A. Alarm Command Center (ACC) Keypad

1. Digital Monitoring Products (DMP) 7063AW Keypad

- a. Alarm Command Center (ACC) - Built-in multi-tone sounder. Displays status in custom English text on 32-character display illuminated in blue. ACCs provide "command menu" user interface. ACC can be supervised. Provide keypads in locations as per drawings.
- b. Surface keypad back box shall be a DMP 696-W, back boxes shall be provided in locations required.
- c. The intrusion alarm system shall be designed to include a predetermined time delay, in the order of one minute between entry and alarm. Operation of the keypad shall abort the alarm condition and disable the system until re-armed.
- d. During an alarm condition, the alphanumeric readout on the keypad shall indicate, by room name and number, the location of the alarm.

2.6 INITIATION DEVICES

A. Motion Sensors – Passive Infrared (PIR)

1. Rokonet DS9360 – 360 Degree Ceiling Motion Detector

- a. Ceiling mount (PIR) passive infrared/microwave motion sensor
- b. 360 degree X 50' diameter pattern, with 110 degree angle
- c. Locate motion sensors as indicated on plans.
- d. Connect the data loop via 711 Single Zone Expansion Module

2. Dual-Tec – Model No. DT-7450

- a. Surface wall mount (PIR) passive infrared motion sensor
- b. 50' x 50' range
- c. Locate motion sensors as indicated on plans.
- d. Connect the data loop via 711 Single Zone Expansion Module

B. Glass Break Detectors:

1. Insert Part number

- a. Shock sensor type, mounted to glass.
- b. 10' protection range on single-pane glass.
- c. Piezo transducer technology providing power to sensor. No external power is required.
- d. +15 VDC maximum input.

C. Panic Button:

1. Safety Technology International, Inc. – Model No. SS2029LD-EN

2.7 NOTIFICATION DEVICES

A. Siren

1. ATW Security – Model No. DS-301SET

- a. Ceiling mounted, location above the ceiling adjacent to the security point. A minimum of (1) siren shall be provided for the interior of the building in the main entry point to the Administration Office or a location to be chosen by the Owner

- b. Piezo siren type, with alternating high/low sound.
- c. 106 dB at 10'.
- d. 6 to 13.8 VDC operation

2.8 WIRE / CABLE

A. Interior

- 1. Belden - Model No. 5402UE
 - a. 20/4 Conductor non-twisted CMR with Gray jacket.

B. Exterior

- 1. Belden - Model No. 27600A
 - a. 20/3 pair stranded CMR with black wet location jacket.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Comply with the manufacturer's instructions and recommendations for installation of all products.

B. Provide all system wiring between all components as directed by the manufacturer. System cable/wire and equipment installation shall be in accordance with good engineering practices as established by the California Electrical Code (CEC). Wiring shall meet all applicable electrical codes. All cable/wire shall test free from all grounds and shorts.

1. Protection and dressing of cables:

- a Cables mounted on backboards and within equipment racks, etc., shall be grouped and securely attached to the backboard or enclosure in horizontal and vertical bundles in a neat workmanlike manner using Thomas & Betts "Ty-Rap", Panduit cable mounts and Allen-Tel cable management or equal. Edge protection material ("cat-track") shall be installed on edges of holes, lips of ducts or any other point where cables or harnesses cross metallic edge.

2. Shielding:

- a Cable shielding shall be connected to common ground at the main control unit terminal board and shall be free from ground at any other point within the system. Cable shields shall be terminated in same manner as conductors.

3. Underground cables:

- a Any cable/wire pulled through manholes or pull boxes located below grade, shall be continuous with no splices. The cable/wire shall be intact with no cuts in the protective outer jacket.

4. Labeling:

- a All cable/wires shall be labeled at all points of termination. All labeling shall be based on the room number as provided by the Owner or his representative.

C. Install, terminate and test all alarm contacts. Contacts shall be recessed in the door header.

3.2 FIELD QUALITY CONTROL

- A. Where these specifications require a product or assembly without the use of a brand or trade name, provide a product that meets the requirements of the specifications, as supplied and warranted by the system vendor. If the product or assembly is not available from the system vendor, provide product or assembly as recommended by the system vendor.
- B. Periodic observations will be performed during construction to verify compliance with the requirements of the specifications. These services do not relieve the Contractor of responsibility for compliance with the Contract Documents.

3.3 MANUFACTURER'S FIELD SERVICES

- A. Installation shall be performed by a factory-trained and certified Contractor Installer.
- B. The Installer shall provide a comprehensive, site-specific customer planning guide for the system. The installer shall conduct a conference with the Owner prior to any installation to discuss the programming options of the system and the planning guide. The result of this planning guide shall be the determination of the system access policies for each point.
- C. The Installer shall include labor for all planning and all programming activities required to implement the Owner's access policies for each system point. Any software programmable access policy, within the bounds of the hardware specified, shall be included.
- D. It shall be the responsibility of the Contractor/Installer to provide a complete, functional system as described by the Contract Documents. These responsibilities include:
 - 1. Complete hardware setup, installation and wiring, and software configuration of the system.
 - 2. Complete programming of all operator software in accordance with the Owner's access policies determined by the planning guide conference.
 - 3. Complete system diagnostic verification.
- E. The Installation Contractor shall be present at two (2) four-hour meetings for each site to coordinate all door hardware requirements with the door hardware vendor.

3.4 SYSTEM ACCEPTANCE

- A. The SMS Vendor shall submit for review a formal acceptance and system checkout program. The system checkout procedures shall include all system components and software, including but not limited to all system computers, field controllers, and remote system interfaces. The Contractor shall perform the tests and document all results under the supervision of the manufacturer's system engineer or in the presence of the Inspector of Record (IOR).

3.5 SYSTEM DOCUMENTATION

- A. Complete documentation shall be provided for the system. The documentation shall describe:
 - 1. All operational parameters of the system.
 - 2. Complete documentation of programming and access policies.
 - 3. All data sets.
 - 4. Complete operating instructions for all hardware and software.
- B. The following sections shall be provided in the system documentation:
 - 1. User Manual: A step-by-step guide and instructions detailing all system user functions.

2. Technical Maintenance Manual: A comprehensive document providing all maintenance actions, system testing schedules, troubleshooting flowcharts, functional system layout, wiring diagrams, block diagrams and schematic diagrams.

3.6 SYSTEM TRAINING

- A. All labor and materials required for on-site system training by a certified representative of the system manufacturer shall be provided. Training shall be conducted at the project site using the project equipment.
- B. Provide two weeks advanced notice of training to the Owner.
- C. Provide a training outline agenda describing the subject matter and the recommended audience for each topic.
- D. At a minimum, the following training shall be conducted:
 1. Alarm Monitoring Users: Provide a detailed course outlining the operational features of all aspects of the user interface. Topics shall include alarm monitoring functions, reports, error handling, alarm handling, output relay control and general overview of the report hardware.
 2. Minimum on-site training times shall be:
 - a Alarm Monitoring Users: Four hours.

END OF SECTION

SECTION 28 31 00 FIRE DETECTION AND ALARM

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of this Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section Includes:
 - 1. Provide a complete, fully addressable, power limited, fire detection evacuation system for this project. The system shall be connected, tested, verified by AHJ to be acceptable and left in first class operating condition. All equipment herein specified shall be engineer-approved and California State Fire Marshal (CSFM) listed. The entire installation shall conform to the National Fire Protection Association (NFPA) Standard 72, 2016 90A & CEC Article 760 and authorities having jurisdiction as applicable. The system specified and depicted on the plan is a complete and approved system. The entire fire alarm system has been submitted and approved by the Division of the State Architect as a complete submittal. Any routing of the system wiring that is significantly different than shown on the approved drawings shall have the approval of the engineer and must be obtained prior to construction.
 - 2. Provide all work and material as shown and / or required to provide a fully functional and adequate system as described hereon and as required by the California State Fire Marshal.
 - 3. Supervision: The fire alarm system shall monitor the integrity of all alarm initiating and indicating appliance circuits and provide local and remote status of all connected systems. The system shall be provided with automatically charged standby batteries to maintain system operation for 24 HRS in the normal supervisory mode and 15 minutes of alarm. Batteries shall be supervised for connection to the system and low voltage threshold. The automatic battery charger shall be capable of charging fully discharged system batteries to 100% in 8 hours.
 - 4. The system wiring and installation shall be as stated in drawings and as required by the manufacturer. All wiring shall be color coded, tagged and verified to assure that it is free from shorts and grounds and shall be rated for the appropriate environmental conditions such as well locations.
 - 5. Testing: The completed system shall be tested in accordance with NFPA Standard 72 7.6.6 and 7.8.2.
 - 6. All Fire Alarm wiring shown in drawings shall be installed in conduit.
 - 7. System Operation shall include:
 - a. Separate zone signaling and device status indication for all initiating devices.
 - b. Audible to sound the California uniform fire alarm signal in temporal mode. Devices shall be at least 15dBA above average ambient sound level, but not less than 75dBA at 10' or more than 120dBA.
 - c. Visual devices shall not exceed 2 flashes per second and shall not be slower than 1 flash per second. Visual devices shall be synchronized when 3 or more devices are within the same field of view.
 - d. Supervision of all circuits to indicate any abnormal wiring condition.
 - e. N.O./N.C. integral relays for external device interface or as indicated on drawings.
 - f. Central station connection capable of indicating (3) distinct separate signals as being tamper, trouble and alarm with point reporting capabilities.
 - 8. All work shall be completed as shown on the plans and or as specified within this specification and shall include the following (but is not limited to):

- a. Life safety fire alarm detection and signaling system.
 - b. Furnishing and installation of equipment and devices.
 - c. Conductors, connections and interconnections where specified and all in conduit system.
 - d. Conduit, wire and connections for control of heating and ventilation motors, smoke dampers and smoke exhaust.
 - e. Testing, cleaning and adjusting of completed work.
 - f. Wiring diagrams, as-built drawings and three (3) sets of equipment operations and maintenance instructions for Owner.
 - g. Complete maintenance for two years.
 - h. Proposal for subsequent maintenance contract.
 - i. All work and material for complete and operable systems as indicated or specified.
 - j. Permits, inspections and fees.
 - k. Identification and instruction to Owner Representative. Training shall consist of a minimum of two (2) 6-hour sessions.
9. Coordination with Section 26 05 33: Raceway and Boxes for Electrical Systems.
 10. Furnishing of special back boxes where required for installation of fire alarm devices.
 11. All conductors to be installed in conduit pursuant to Specification Section 26 05 33: Raceway and Boxes for Electrical Systems.
 12. Qualifications: Contractor shall receive written approval and verified test results which shall be submitted to the owner for system from manufacturers recognized representative prior to completion and acceptance.
 13. All initiating devices shall be separately addressed for individual identification at control panel.
 14. As-Built Drawings: A complete set of reproducible "as-built" drawings showing installed wiring, color coding, wire tag notations exact locations of all installed equipment, specific interconnections between all equipment and internal wiring of the equipment shall be delivered to the owner upon completion of the system.
 15. Maintenance Instructions: Three (3) submittals of maintenance instructions shall be provided and shall be complete, easy to read, understandable and shall provide the following information:
 - a. Instructions for replacing any components of the system, including internal parts.
 - b. Instructions for periodic cleaning and adjustments of equipment with a schedule of these functions.
 - c. A complete list of all equipment and components with information as to the address and telephone number of both the manufacturer and local supplier of each item.
 - d. User operating instructions shall be prominently displayed on a separate sheet located next to the control unit in accordance with UL Standard 864. The contractor shall warrant all equipment and wiring free from inherent mechanical and electrical defects for two years from the date of final acceptance.
 16. The FACP shall integrate with the to prevent bells from activating during a fire alarm.
 17. The FACP shall meet the requirements of UL ANSI 864 Ninth Edition. Systems listed to UL ANSI 864 Eighth Edition or earlier revisions are not acceptable.
 18. Per DSA IRA-1 chapter of approval for temporary school use of DSA approved relocatable buildings, Approval of fire alarm and/or fire sprinkler systems for temporary use buildings shall be in accordance with the Chapter 9, CCR, Title 24, Part 2.
 - a. Fire Alarm: Section 3.4.4.4 For buildings sited less than three years and used for educational purposes (instruction), provide an approved manual fire alarm system consisting of manual pull-stations, visual notification appliances and audible device(s) (with a minimum rating of 95 dBA at 10 feet). Buildings more than 25 feet apart are to be provided with additional audible devices to ensure the fire alarm signal can be heard within adjacent buildings.

- b. Communications: Section 3.4.4.5 Buildings more than 25 feet from other buildings, including other temporary buildings, with a stand-alone fire alarm system must be provided with approved "two-way communication" with the main administration offices consisting of an intercom system, permanently mounted telephone or "walkie-talkie" devices or other similar systems. Buildings that are less than 25 feet from existing permanent buildings on the site shall be interconnected with the campus fire alarm system.

B. Substitutions

- 1. Substitution of system components or manufacturer will require the contractor to separately obtain approval with DSA at Contractor's expense and shall meet all requirements of the system as designed and pre-approved.
- 2. All proposed substitutions shall be listed with the California State Fire Marshal.

1.3 SUBMITTALS

A. Comply with applicable provisions of Section 26 05 00: Common Work Results for Electrical.

B. General:

- 1. Two (2) copies of all submittals shall be submitted to the Architect/Engineer for review and approval.
- 2. All references to manufacturers model numbers and other pertinent information herein is intended to establish minimum standards of performance, function, and quality.
- 3. For equipment other than that specified, the contractor shall provide proof that the proposed substitute equipment equals or exceeds the form, feature, function, performance, and quality of the specified equipment.

C. Product Data:

- 1. A complete list of all supplied equipment including model numbers with catalog data sheets on each component.
- 2. Data sheets show California State Fire Marshal Listing, U.L. listing, equipment ratings, dimensions and finishes.
- 3. Highlight actual devices to be used and their amp draw in stand-by and alarm modes.

D. Shop Drawings:

- 1. Provide schematic layout, floor plan, drawings indicating location of all components and equipment, required size and location of conduit and outlets and type and quantity of system conductors. Include voltage drop calculations and battery calculations based on actual number of devices to be installed.
- 2. Include riser and wiring diagrams for overall system and components including control panels, annunciators, power supplies, initiating circuits, notification appliances, control devices and FATC. Address numbers shall be noted on all appliances.
- 3. Include physical and electrical characteristics of equipment to indicate conformance with the Specifications.
- 4. Describe system characteristics and function as well as device wiring diagrams.
- 5. Voltage drop and battery calculations for each control panel and power supply and initiating circuits at 24 hour stand-by and 15 mins alarm.
- 6. System operational matrix.

E. Operating and Maintenance Instruction Manual:

- 1. Manual shall include the following tailored to this specific project:
 - a. Operational description.
 - b. Coded cabling plan.
 - c. Two wire circuit diagrams.
 - d. Wiring destination schedule.

- e. Schematic component diagrams and PC board layouts.
- f. Maintenance and alignment procedures.
- g. Voltage drop and battery calculations.

F. Other documentation

1. In addition to the shop drawings, the following information shall also be included with the submittal.

- a. Manufacturer's technical data sheets for each piece of equipment that will be installed.
- b. Standby battery calculations for the FACP and any remote power supply or other panels that include their own standby batteries.
- c. Voltage drop calculations showing the worst-case end of line voltage for all notification appliance circuits
- d. Detailed description of the overall operation of the system or a sequence of operation matrix.
- e. Proof of factory training and certification of the supervising technician assigned to the project.
- f. Proof of factory training and certification of a service technician employed by the installation company that can be onsite to troubleshoot and repair any service-related problems with the system, within 4 hours of being notified of the problem.

1.4 PERFORMANCE REQUIREMENTS

- A. Alarm, trouble and supervisory signals from all intelligent reporting devices shall be encoded on NFPA Style 4 (Class B) Signaling Line Circuits (SLC).
- B. Device Circuits (IDC) shall be wired Class A (NFPA Style D) as part of an addressable device connected by the SLC Circuit.
- C. Notification Appliance Circuits (NAC) shall be wired Class A (NFPA Style Z) as part of an addressable device connected by the SLC Circuit.
- D. On Style 6 or 7 (Class A) configurations a single ground fault or open circuit on the system Signaling Line Circuit shall not cause system malfunction, loss of operating power or the ability to report an alarm.
- E. Alarm signals arriving at the FACP shall not be lost following a primary power failure (or outage) until the alarm signal is processed and recorded.
- F. NAC circuits and control equipment shall be arranged such that loss of any one (1) NAC circuit will not cause the loss of any other NAC circuit in the system.
- G. Two-way emergency telephone communication circuits shall be supervised for open and short circuit conditions.
- H. The secondary power source of the fire alarm control panel shall be capable of providing at least 24 hours of backup power with the ability to power the system for an additional 15 minutes in an alarm condition, at the end of the 24-hour backup period.

I. Basic System Operation

1. When an off normal condition occurs (Alarm, Supervisory, or Trouble) the respective LED on the FACP shall illuminate.
2. A piezo sounder shall activate at the FACP during any off normal condition until the SILENCE button is pressed by an authorized user.
3. A Red LED shall illuminate when an alarm or pre-alarm condition exists.
4. An Amber (yellow) LED shall illuminate when a Supervisory or Trouble condition exists.
5. A backlit 4-line 40-character LCD screen shall display all messages that refer to an off-normal condition.
6. An Alarm condition shall have priority over all other signals.
7. The FACP shall include an event buffer that maintains the last 4,000 system events including a date and time stamp for each.
8. In response to a fire alarm condition, the systems notification appliances and relay-controlled output circuits that are associated through programming with the device initiating the alarm, shall automatically activate. Additionally, the system shall notify an approved central station via dial-up, IP, or cellular means as deemed acceptable by the local Authority Having Jurisdiction (AHJ).

1.5 QUALITY ASSURANCE

- A. Loads of Equipment and Components
 - a. Follow IEEE Standard where applicable.
 - b. Provide fuse protection for equipment and spare fuses.
 - c. Design systems for operation at 120 volts, normal or emergency power as indicated, 60 Hz nominal input.
 - d. Operating voltage dissipated by resistors shall not exceed 25% of ratings.
 - e. Operating voltage of capacitors shall not exceed 80% of rated voltage.
 - f. Operating loads and voltages on transistors and solid-state devices shall not exceed manufacturer's recommendation for normal full load operation.
 - g. Use electronic components of types and rating commonly available from stock of established commercial distribution.
- B. Regulatory Requirements
 1. The specifications and standards shall fully comply with the latest issue of the current code and standards.
 2. All requirements of the Authority Having Jurisdiction (AHJ).

The FACP and associated field devices system shall comply with the following Underwriters Laboratories Inc. (UL) USA listing standards as applicable.

1. No. 38 Manually Actuated Signaling Boxes
2. No. 50 Cabinets and Boxes
3. No. 864 Control Units for Fire Protective Signaling Systems
4. No. 268 Smoke Detectors for Fire Protective Signaling Systems
5. No. 268A Smoke Detectors for Duct Applications
6. No. 346 Waterflow Indicators for Fire Protective Signaling Systems
7. No. 464 Audible Signaling Appliances

- 8. No. 521 Heat Detectors for Fire Protective Signaling Systems
- 9. No. 1638 Private Mode Emergency and General Utility Signaling
- 10. No. 1971 Visual Notification Appliances

1.6 WARRANTY

- A. For a period of two years from date of final acceptance, the system shall be under full guarantee for materials and labor at no cost to the Owner. The system shall be under a service contract with a technician authorized by the manufacturer. Replacement parts and labor shall be readily available during normal business hours while the service contract is in effect. A complete system inspection and test shall be performed at five months and again at eleven months after final acceptance. Tests shall include all smoke detector sensitivity settings.
- B. Conform to applicable provisions of the General Requirements.
- C. Service technicians and replacement components for the system shall be available locally from a service representative of the manufacturer who is able to provide evidence of technical training and authorization by the manufacturer.
- D. All component failures shall be remedied to the satisfaction of the Owner.
- E. A continuing service contract shall be offered at time of bid to commence at the expiration of warranty included with the system.

1.7 ACCEPTABLE MANUFACTURER

- A. All fire alarm system devices and equipment shall be manufactured with the one indicated on the drawing or approved equivalent. no other manufacturers will be accepted.
- B. All equipment, materials, accessories, devices, etc. covered by the specifications and/or noted on the contract drawings shall be new and unused and be UL. listed for their intended use.
- C. All equipment provided shall be available for purchase from at least two authorized distributors within the service area.

1.8 MAINTENANCE:

Maintenance and testing shall be on a semi-annual basis or as required by the AHJ. A preventative maintenance schedule shall be provided by the contractor describing the protocol for preventative maintenance. The schedule shall include:

Systematic testing and complete inspection of the entire fire alarm system including control panels, field devices, and wiring terminations including smoke sensors, heat sensors, manual pull stations, sprinkler system switches, remote panels, power supplies, and terminal boxes, and all other fire alarm accessories, in accordance with NFPA 72. Cleaning and adjusting of these devices shall be conducted at this time.

An inspection and test of system power supplies, batteries, circuit breakers, and fuses as well as a load test of the batteries shall be conducted in accordance with NFPA 72.

Placing the system into an alarm condition and checking each notification device for proper operation.

Removing devices from the FACP SLC circuit to ensure a trouble condition occurs.

Input and output mapping shall be tested to ensure proper sequence of operation.

Signal transmission shall be tested to the Monitoring Station.

A report showing the calibrated sensitivity of each of the systems smoke detectors shall be generated from the fire alarm control panel and verified to ensure all smoke detectors are within UL tolerance.

Following each periodic maintenance and test, the owner shall be provided with a detailed report of the test results including any deficiencies found.

PART 2 PRODUCT

2.1 MANUFACTURERS

- A. Fire Alarm Control Panel (FACP): Simplex
- B. Fire Alarm Power Supply: Simplex
- C. Area Smoke Detectors and Heat Detectors: Simplex
- D. Strobes, Combination Horn/strobe and Weatherproof Horn: Simplex

2.2 MATERIALS

- A. Main FACP or network node shall contain a microprocessor based Central Processing Unit (CPU) and power supply in an economical space saving single board design. The CPU shall communicate with and control the following types of equipment used to make up the system: intelligent addressable smoke and thermal (heat) detectors, addressable modules, printer, annunciators, and other system-controlled devices.
- B. System Devices and components shall be provided as specified on the fire alarm equipment legend and as shown on associated electrical drawing.

2.3 COMPONENTS

EXISTING FIRE ALARM CONTROL PANEL (FACP)

- A. FACP shall be as indicated model on the drawing or approved equivalent.

2.1 System description

A. The fire alarm system as outlined on the drawings, shall be a fire life safety system as manufactured by the panel indicated on the drawing. It shall be complete with all necessary hardware, software and memory specifically tailored for this project.

B. All equipment needed for a complete operable system, (whether specifically indicated or not) shall be included in this section. It shall be the installing contractor's responsibility for a complete and operable system upon completion of this project.

2.2 Automatic alarm operations

A. The fire alarm system operation subsequent to the alarm initiation via pull station, smoke detector, heat detector, sprinkler flow switch, etc., shall be as follows:

1. All audible alarm indicating devices shall sound the temporal signal code in synchronization with each other, until silenced at the control panel or at the remote annunciator.
2. All visual alarm indicating devices shall flash per NFPA requirements in synchronization with each other, until reset at the control panel or at the remote annunciator.
3. Alarm audible devices and alarm visual devices shall operate on the same circuit
4. The alarm signals shall be inhibited from being silenced for a period of at least 1 minute after commencing operation. this rate is to be field programmable for actual AHJ requirements.
5. Display type and location of alarm per point on the main control panel lcd display.
6. Display type and location of alarm per point on remote lcd annunciator.
7. List on printer the time, date, type, and user defined message for each event printed.
8. Graphically display on the fireworks station, school diagram showing whole school, with graphic scrolling thru system prompts, down to point of alarm activation.
9. Subsequent alarms are to report to the main control panel and fireworks, shall indicate to the operator that a subsequent alarm is present, and also indicate the number of subsequent alarms.
10. Shut down all associated air handlers in alarm zone.

2.3 Automatic supervisory operation

A. All data, initiating, indicating and supervisory lines shall be constantly monitored for integrity. indicate opens, shorts, grounds, at main control panel and remote annunciator.

2.4 operation

- A. During the normal state, the normal led (green) shall flash. the first line of the lcd shall display the time in (hh: mm: ss) as well as the number of active points (ap) and the number of disabled points (dp) in the system.
- B. When the control panel goes into alarm condition, the normal led (green) extinguishes and the alarm led (red) shall light, the buzzer pulsates, and the lcd indicates the time, the number of messages waiting, the type of alarm, the point id number of devices, and the time that the alarm occurred. the second line is dedicated to the user specified message.
- C. To silence the panel buzzer, the operator shall press the local silence button and the buzzer will silence.
- D. To silence the audible devices, the operator shall press the alarm silence button. a new alarm shall cause the audibles to resound.

E. During the trouble condition, the amber trouble led shall light, the normal led shall go out, and the buzzer shall pulsate. the display shall indicate the point id number of the device, the time the event occurred and up to a 40-character custom user description.

F. During the monitor or supervisory condition, the appropriate led shall light, the normal led shall go out, and the buzzer shall pulsate. the display shall indicate the point id number of the device, the time the event occurred and up to a 40-character custom user description.

The intelligent fire alarm amplifier shall be as indicated model on the drawing or approved equivalent. The intelligent 50 or 70-watt amplifier is used to amplify the audio message for distribution throughout the facility. Since it is designed as a self-contained distributed amplifier it can be conveniently located near the area of protection to reduce wiring demands.

Each amplifier can produce 50 or 70 -watts of audio power. Up to four amplifiers can be used on the evacuation system. The amplifier has its own power supply with battery backup and four speaker circuits which can be expanded to eight speaker circuits. The amplifier is fully supervised by the main panel for trouble conditions.

B. Fire Alarm Power Module:

1. The intelligent fire alarm power module shall be as indicated model on the drawing or approved equivalent. It delivers 6 amps of notification appliance circuit power and built-in synchronization. Its switch mode power supply design is up to 50% more efficient than competitive linear mode power supplies.
2. The power supply is a 6-amp notification power expander that provides its own AC power connection, battery charging circuit, and backup battery for use with the same manufacturer series fire alarm control panels (FACPs). The power supply is the cost-effective solution for powering notification appliances required by the Americans with Disabilities Act (ADA). It has built-in ANSI cadence pattern. The output circuits can be programmed as notification appliance circuits, or as auxiliary power (configurable for constant, resettable, or door holder power).

C. Intelligent Photoelectric Smoke Detector

1. The intelligent photoelectric smoke detector shall be as indicated model on the drawing or approved equivalent and shall use the photoelectric (light-scattering) principal to measure smoke density and shall, on command from the control panel, send data to the panel representing the analog level of smoke density.

D. Intelligent Thermal Detectors

1. The intelligent thermal detectors be as indicated model on the drawing or approved equivalent addressable devices rated at 135 degrees Fahrenheit (58 degrees Celsius) and have a rate-of-rise element rated at 15 degrees F (9.4 degrees C) per minute. A high heat thermal detector rated at 190 degrees Fahrenheit shall also be available. The thermal detectors shall connect via two wires to the fire alarm control panel signaling line circuit.

E. Control Relay Module:

1. The Control Relay is intended for use in intelligent, two-wire systems where the individual address of each module is selected using the built-in rotary switches. It allows a compatible control panel to switch discrete contacts by code command. The relay contains two isolated sets of Form-C contacts, which operate as a DPDT switch and are rated in accordance with the table in the manual. Circuit connections to the relay contacts are not supervised by the module. The module also has a panel-controlled LED indicator.

- F. Intelligent Monitor Module:
1. The monitor module indicated on the drawing is an addressable monitor module for use with Honeywell Silent Knight Series fire alarm control panels (FACPs). The monitor module is intended for use in intelligent, two-wire systems, where individual address of each module is selected using the built-in rotary switches.
 2. It supports Class A supervised or Class B supervised wiring to the load device. Conventional 4-wire smoke detectors can be monitored for alarm and trouble conditions.
- G. Ceiling Mounted Strobe
1. The notification appliances shall be as indicated model or approved equivalent model as Visual Strobe appliances for ceiling-mount applications with a low-profile design or approved equals. The Strobes shall be listed for UL Standard 1971 (Emergency Devices for the Hearing-Impaired) for Indoor Fire Protection Service.
 2. The Series shall be Restriction of Hazardous Substances (RoHS) compliant and contain no mercury or other hazardous substances.
 3. All Series shall meet the requirements of FCC Part 15 and ICES-003.
 4. All inputs shall be compatible with standard reverse polarity supervision of circuit wiring by a Fire Alarm Control Panel (FACP) with the ability to operate from 16 to 33 VDC.
 5. The Strobe appliances shall produce a flash rate of one (1) flash per second over the Regulated Voltage Range and shall incorporate a Light Emitting Diode (LED) as the light source with a rugged Lexan® lens. The appliances shall be of low current design. The LED strobe flash duration shall be 20 ms. Where multi-candela appliances are specified, the strobe intensity shall have 4 field selectable settings at 15, 30, 75, 95 candela for ceiling-mount applications. The selector switch for selecting the candela shall be tamper resistant. Appliances with candela settings shall show the candela selection in a visible location at all times when installed.
 6. The Strobe mounting options shall include Ceiling backboxes, 4" square, 1 1/2 or 2 1/8" deep and 4" Octagonal, 1 1/2" or 2 1/8" deep. Two wire appliance wiring shall be capable of directly connecting to the mounting base. Removal of an appliance shall result in a supervision fault condition by the Fire Alarm Control Panel (FACP).
 7. All notification appliances shall be backwards compatible.
 8. The ceiling models shall have a low-profile measuring.
 9. When synchronization is required, the appliance shall be compatible with Sync Modules, PS Power Supplies, or other manufacturer's panels with built-in manufacturer Patented Sync Protocol. The strobes shall not drift out of synchronization at any time during operation. If the sync protocol fails to operate, the strobe shall revert to a non-synchronized flash-rate and still maintain (1) flash per second over its Regulated Voltage Range. The appliance shall also be designed so that the audible signal may be silenced while maintaining strobe activation when used with patented sync protocol.
- H. Combination Horn Strobes
1. The Horn Strobes are designed for high efficiency sound output for indoor applications. The product line features intelligible communications with crisp, clear messages and tone signaling, ideal for mass notification.
 2. Providing a sleek aesthetic appearance, the wall and ceiling appliances feature dual voltage (25/70 VRMS) capability and field-selectable taps from 1/8 to 2 watts. For faster and easier installation, the low-profile design incorporates a speaker mounting plate, and each model has a built-in level adjustment feature and Snap-On cover with no visible mounting screws.
 3. For visible signaling to meet the hearing impaired, the E horn Strobe models incorporate the low current draw of the Strobes.
 4. Ceiling mount models are available in multi-candela ceiling strobe with field selectable

intensities of 15/30/75/95/110/115cd or the high intensity strobe with field selectable 135/150/177/185cd.

5. The strobe portion of all Horn Strobes may be synchronized when used in conjunction with the Sync Modules, Power Supplies or other manufacturers panels incorporating the manufacturer Patented Sync Protocol.
Synchronized strobes offer an easy way to comply with ADA recommendations \ concerning photosensitive epilepsy.
6. Horn Strobes are UL Listed for indoor use under Standard 1971 (Signaling Devices for the Hearing-Impaired) and Standard 1480 (Speaker Appliances). All inputs employ IN/OUT wiring terminals for fast installation using #12 to #18 AWG wiring.
7. All models shall have listed sound output of up to 87 dB at 10 feet and a listed frequency response of 400 to 4000 Hz. The speaker shall also incorporate a sealed back construction.
8. The horn and horn strobe appliances shall be designed for indoor flush mounting. The speaker and speaker strobe shall incorporate a speaker mounting plate with a Snap-On grille cover with no visible screws for a level, aesthetic finish and shall mount to standard electrical hardware. The finish of the Speakers and Speaker Strobes shall be red. All speaker and speaker strobe appliances shall be backward compatible.
9. When synchronization is required, the strobe portion of the appliance shall be compatible with sync modules or the Power Supplies with built-in Patented Sync Protocol. The strobes shall not drift out of synchronization at any time during operation. If the sync module or Power Supply fails to operate, (i.e., contacts remain closed), the strobe shall revert to a non-synchronized flash rate.

I. Weatherproof Horn

1. Weatherproof notification appliances shall be UL listed for outdoor use. The appliances shall be available for optional wall mounting or ceiling mounting to weatherproof backboxes using either exposed conduit, concealed conduit, or semi-flush mounting to a recessed electrical box in walls or ceilings using indicated manufacturer mounting accessories.
2. Wall-mount outdoor notification appliances can be used indoors or outdoors in wet or dry applications, and can provide reliable operation from -40°F to 151°F. These speakers provide a broad frequency response range, low harmonic distortion and maintain a high sound pressure level at all tap settings to provide accurate and intelligible broadcast of evacuation messages.
3. Field-selectable settings, including candela, speaker voltage and power settings, and automatic selection of 12- or 24-volt operation enable installers to easily adapt devices to meet requirements.
4. Weatherproof audibles shall be System sensor models or approved equals. The speaker devices shall be able to produce a continuous output or a temporal code-3 output that can be synchronized.
5. WP notification appliances shall be listed to Underwriters Laboratories Standard S4048 for outdoor fire protective signaling systems. Devices shall have a frequency range of 400 to 4,000 Hz and shall have an operating temperature from -40°F to 150.8°F and shall have power taps and wattage settings that are selected by rotary switches. The WP notification appliances must be installed with its weatherproof back box in order to remain outdoor approved per UL listing S4048 and shall be suitable for use in air handling spaces and wet environments.

J. Battery

1. The battery shall have sufficient capacity to power the fire alarm system for no less than twenty-four hours plus 15 minutes of alarm upon a normal AC power failure.
2. The batteries are to be completely maintenance free. No liquids are required. Fluid level checks for refilling, spills, and leakage shall not be required.
3. If necessary, to meet standby requirements, external battery and charger systems

may be used.

- K. Addressable Manual Fire Alarm Box (manual station)
 - 1. Addressable manual fire alarm boxes shall, on command from the control panel, send data to the panel representing the state of the manual switch and the addressable communication module status. They shall use a key operated test-reset lock and shall be designed so that after actual emergency operation, they cannot be restored to normal use except by the use of a key.
 - 2. All operated stations shall have a positive, visual indication of operation and utilize a key type reset.
 - 3. Manual fire alarm boxes shall be constructed of Lexan with clearly visible operating instructions provided on the cover. The word FIRE shall appear on the front of the stations in raised letters, 1.75 inches (44 mm) or larger.

PART 3 EXECUTION

3.1 COORDINATION

- A. Refer to the electrical and mechanical drawings and specifications to determine quantities and location of devices and required scope of work and coordinate work with mechanical and electrical installers. Provide function described under mechanical section Sequence of Control, for fire and/or emergency conditions. Submit proposed interconnection to elevator supplier. Submit conduit and pathing requirements to electrical installer. For self-contained door release, coordinate with door supplier.

3.2 GENERAL

- A. Comply with all applicable paragraphs in Section 26 05 00: Common Work Results for Electrical, apply as though repeated herein
- B. Install system(s) in accordance with manufacturer's instructions.
- C. Include services of certified technicians to supervise installation, provide adjustments, provide final connections, system testing and system training to Owner Representative

3.3 INSTALLATION

The complete system shall be installed by one (1) contractor and the installing contractor must be a certified dealer of the specified system. No subcontractors, to the awarded proposing contractor, will be allowed to install any portion of this system Including, but not limited to:

- 1. Wiring
 - 2. Field device installation
 - 3. System programming
 - 4. FACP installation
 - 5. Remote power supply installation
- A. The installing contractor shall install the network fire alarm system in as instructed by the manufacturer's instructions.
- B. Installation shall be in accordance with the CEC, NFPA 72, local and state codes, as shown on the drawings, and as recommended by the major equipment manufacturer.
- C. All conduit, junction boxes, conduit supports, and hangers shall be concealed in finished

areas and may be exposed in unfinished areas. Smoke detectors shall not be installed prior to the system programming and test period. If construction is ongoing during this period, measures shall be taken to protect smoke detectors from contamination and physical damage.

- D. All fire detection and alarm system devices, control panels shall be flush mounted when located in finished areas and may be surface mounted when located in unfinished areas.
- E. Manual fire alarm boxes shall be suitable for surface mounting or semi-flush mounting as shown on the plans and shall be installed not less than 42 inches (1067 mm), nor more than 48 inches (122 mm) above the finished floor.
- F. The fire alarm control panel shall be connected to a separate dedicated branch circuit, maximum 20 amperes. This circuit shall be labeled at the main power distribution panel as FIRE ALARM. Fire alarm control panel primary power wiring shall be 12 AWG. The control panel cabinet shall be grounded securely to either a cold-water pipe or grounding rod. The control panel enclosure shall feature a quick removal chassis to facilitate rapid replacement of the FACP electronics.

3.4 GROUNDING

- A. All equipment to be grounded by means of green ground wire to "U" contact of duplex receptacles and bonded to ground provided under 26 05 26: Grounding and Bonding of Electrical Systems.

3.5 INSPECTION

- A. Systems to meet all the requirements of the CSFM and IOR and AHJ and shall be approved thereby before installation and prior to final acceptance.
- B. Closeouts:
 - 1. It is the intent of these specifications and of the architect/engineer that a continued program of system maintenance be continued by the owner in compliance with NFPA Standard 72H. It is mandatory that the installing contractor provide such services and make available these services to the owner upon completion of the project.
 - 2. As part of the closeout documents, fire alarm contractor will provide owner with AutoCAD as built drawings indicating locations of devices, routing of wiring, and panel information. All room numbers indicated on final close out documents and all panel settings shall be listed by actual building room numbers and not by room number indicated on construction documents. CAD files shall be AutoCAD 2004 or later. Provide the owner with one Mylar plot of each drawing and two blue line prints of each drawing. Provide the owner with electronic versions of the as-built CD's.
 - 3. Locate next to building FACP and other fire alarm panels.
 - 4. A building graphic shall be provided mounted in aluminum-extruded frame with plexi-glass front. Graphic shall locate all fire alarm devices, power supplies, and FACP.
 - 5. State FML-005 certificate shall also be framed and mounted near the fire alarm panel. Fire alarm panel shall have white FM required installation sticker attached to it.
- C. Graphic shall include actual room numbers posted as part of the building graphics package, include as part of substantial completion requirement

3.6 LOCATION

- A. Before installation, verify exact location of control equipment and outlets. The Owner reserves the right to relocate system components within a radius of 10' at no increase in cost before rough-in work is started for the respective component.

3.7 WIRING

- A. All fire alarm wiring shall be new.
- B. Furnish all conductors, equipment, terminal strips, etc., and labor to install a complete and operable system. All cable conductors shall be color coded and numbered for identification at all terminals. Green shall be for grounding conductor only. Use red insulation and or red jacketing on all fire alarm cable.
- C. All wiring shall be in accordance with NFPA 72, the California Electrical Code, Local Codes, and article 760 of NFPA Standard 70. All wiring sizes shall conform to recommendations of the equipment manufacturer, and as indicated on the engineered shop drawings.
- D. All wire shall be U.L. Listed FPL for limited energy (300V) and fire alarm applications and shall be installed in conduit. Limited energy FPLP or MPP wire may be run open in return air ceiling plenums provided such wire is U.L. Listed for such applications and is of the low smoke producing fluorocarbon type and complies with CEC Article 760 if so, approved by the local authority having jurisdiction.
- E. No A.C. wiring or any other wiring shall be run in the same conduit as fire alarm wiring.
- F. Wiring used for the multiplex communication circuit (SLC) shall be twisted and support a minimum wiring distance of 10,000 feet when sized at 12 AWG. The design of the system shall permit use of IDC and NAC wiring in the same conduit with the SLC communication circuit. Shielded wire shall not be required.
- G. The fire alarm control panel shall be capable of T-tapping NFPA Style 4 (Class B) Signaling Line Circuits (SLCs). Systems which do not allow or have restrictions in, for example, the number of T-taps, length of T-taps etc., is not acceptable.
- H. Contractor shall provide a service loop located above each device installed on the entire project. The service loop shall be a minimum of 5'.
- I. Contractor shall provide a service loop located above each type of panel installed. The service loop shall be a minimum of 10', but shall have enough length to allow for the panel to be relocated to any wall within the room that panel is located in.
- J. All service loops shall be installed in the accessible ceiling that is nearest to each device and panel. No service loops shall be installed in open spaces or non-accessible spaces

3.8 TERMINAL BOXES, JUNCTION BOXES AND CABINETS:

- A. All boxes and cabinets shall be UL listed for their use and purpose.

3.9 CONDUIT / RACEWAY:

- A. All wire shall be installed in an approved conduit/raceway system (except where permitted by NEC and the local authority having jurisdiction). Maximum conduit "fill" shall not exceed

40% per CEC.

- B. Conduit and raceway system shall be installed as specified under the general electrical section of the specifications, and per CEC, local, and state requirements.
- C. Minimum conduit size shall be 3/4" (19.1 mm). Install conduit per engineered shop drawings.
- D. Systems utilizing open wiring techniques with low smoke plenum cable shall provide conduit in all inaccessible locations, inside concealed walls, all mechanical/electrical rooms, or other areas where wiring might be exposed or subject to damage.
- E. All vertical wiring and all main trunk/riser wiring shall be installed in a complete raceway/conduit system. All riser boxes shall be adequately sized for the number of conductors traversing the respective box as well as the number of terminations required.
- F. 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, per CEC Article 760-29.
- G. Wiring for 24-volt DC control, alarm notification, emergency communication and similar power-limited auxiliary functions may be run in the same conduit as initiating and signaling line circuits. All circuits shall be provided with transient suppression devices and the system shall be designed to permit simultaneous operation of all circuits without interference or loss of signals.
- H. Conduit shall not enter the fire alarm control panel or any other remotely mounted control panel equipment or back boxes, except where conduit entry is specified by the FACP manufacturer.
- I. All wiring associated with smoke control system shall be installed in conduit per current adopted codes regardless of voltages or ratings.

3.10 TESTING

- A. After all equipment specified herein for each system has been installed and is in operating condition, conduct performance tests to determine if the installation and components comply with these specifications. Furnish competent personnel, all test material and approved test instruments and conduct the tests under supervision of factory personnel, in the presence of the Engineer, the building and fire inspecting agencies:
 - 1. The contractor's job foreman, in the presence of a representative of the manufacturer, a representative of the owner, and the fire department shall operate every installed device to verify proper operation and correct annunciation at the control panel.
 - 2. At least on half of all tests shall be performed on battery standby power.
 - 3. Where application of heat would destroy any detector, it may be manually activated.
 - 4. The signaling line circuits and notification appliance circuits shall be opened in at least two (2) locations to verify the presence of supervision.
 - 5. When the testing has been completed to the satisfaction of the contractor representative IOR, representatives of the manufacturer and owner, a notarized letter co-signed by each attesting to the satisfactory completion of said testing shall be forwarded to the owner and the authority having jurisdiction.
 - 6. The contractor shall leave the fire alarm system in proper working order, and, without additional expense to the owner, shall replace any defective materials or equipment provided by him under this contract within two years from the date of final acceptance by the awarding authority.
 - 7. The local responding fire department must be notified prior to the final test in

accordance with local requirements and when requested, participate in system testing and evaluation.

3.11 WALK TEST

- A. Notify Owner, Architect and Engineer when system is 100 percent operational. Schedule walk-through of the entire facility and verify that each initiating and each indicating device is operating properly.
- B. Provide report at conclusion of walk through certifying all fire alarm devices are working.
- C. Walk test shall include a representative from owner maintenance department.
- D. Walk test to show in a printed report all AHU shutdown, strobes/horns, heat and smoke detectors. Report shall list all devices by approximate location to rooms, and device number.

3.12 SOFTWARE

- A. Installer shall provide a backup copy of the installed program database (on CD) upon completion of the project. They shall also provide the current version of system software, for the panel provided, on CD.

3.13 REPORT

- A. Prepare written report of final test results, signed by witnessing parties. Submit to the Engineer in triplicate for final approval.

END OF SECTION 28 31 00

SECTION 311000 - SITE CLEARING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:

1. Protecting existing vegetation to remain.
2. Removing existing vegetation.
3. Clearing and grubbing.
4. Stripping and stockpiling topsoil.
5. Stripping and stockpiling rock.
6. Removing above- and below-grade site improvements.
7. Disconnecting, capping or sealing, and **abandoning site utilities in place.**
8. Temporary erosion and sedimentation control.

- B. Related Requirements:

1. Section 015000 "Temporary Facilities and Controls" for temporary erosion- and sedimentation-control measures.
2. Section 015639 "Temporary Tree and Plant Protection"

- C. Related Requirements:

1. Section 01500 "Temporary Facilities and Controls" for temporary erosion- and sedimentation-control measures.
2. Section 015639 "Temporary Tree and Plant Protection"
3. Section 024119 "Selective Demo"

1.3 DEFINITIONS

- A. Subsoil: Soil beneath the level of subgrade; soil beneath the topsoil layers of a naturally occurring soil profile, typified by less than 1 percent organic matter and few soil organisms.
- B. Surface Soil: Soil that is present at the top layer of the existing soil profile. In undisturbed areas, surface soil is typically called "topsoil," but in disturbed areas such as urban environments, the surface soil can be subsoil.

- C. Topsoil: Top layer of the soil profile consisting of existing native surface topsoil or existing in-place surface soil; the zone where plant roots grow.
- D. Topsoil: Top layer of the soil profile consisting of existing native surface topsoil or existing in-place surface soil; the zone where plant roots grow. Its appearance is generally friable, pervious, and black or a darker shade of brown, gray, or red than underlying subsoil; reasonably free of subsoil, clay lumps, gravel, and other objects larger than **3 inches** in diameter; and free of weeds, roots, toxic materials, or other nonsoil materials.
- E. Plant-Protection Zone: Area surrounding individual trees, groups of trees, shrubs, or other vegetation to be protected during construction and indicated on Drawings.
- F. Tree-Protection Zone: Area surrounding individual trees or groups of trees to be protected during construction and **according to requirements in Section 015639 "Temporary Tree and Plant Protection."** Ref. Tree protection plan and sheet for details.
- G. Vegetation: Trees, shrubs, groundcovers, grass, and other plants.

1.4 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project Site

1.5 MATERIAL OWNERSHIP

- A. Except for materials indicated to be stockpiled or otherwise remain Owner's property, cleared materials shall become **Contractor's property** and shall be removed from Project site.

1.6 INFORMATIONAL SUBMITTALS

- A. Existing Conditions: Documentation of existing trees and plantings, adjoining construction, and site improvements that establishes preconstruction conditions that might be misconstrued as damage caused by site clearing.
 - 1. Use sufficiently detailed photographs or video recordings.
 - 2. Include plans and notations to indicate specific wounds and damage conditions of each tree or other plant designated to remain.
- B. Topsoil stripping and stockpiling program.
- C. Rock stockpiling program.
- D. **Plan indicating existing vegetation protection and fence layout**
- E. Record Drawings: Identifying and accurately showing locations of capped utilities and other subsurface structural, electrical, and mechanical conditions.
- F. Burning: Documentation of compliance with burning requirements and permitting of authorities having jurisdiction. Identify location(s) and conditions under which burning will be performed.

1.7 QUALITY ASSURANCE

- A. Topsoil Stripping and Stockpiling Program: Prepare a written program to systematically demonstrate the ability of personnel to properly follow procedures and handle materials and equipment during the Work. Include dimensioned diagrams for placement and protection of stockpiles.
- B. Rock Stockpiling Program: Prepare a written program to systematically demonstrate the ability of personnel to properly follow procedures and handle materials and equipment during the Work. Include dimensioned diagrams for placement and protection of stockpiles.

1.8 FIELD CONDITIONS

- A. Traffic: Minimize interference with adjoining roads, streets, walks, and other adjacent occupied or used facilities during site-clearing operations.
 - 1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction.
 - 2. Provide alternate routes around closed or obstructed trafficways if required by Owner or authorities having jurisdiction.
- B. Improvements on Adjoining Property: Authority for performing site clearing indicated on property adjoining Owner's property will be obtained by Owner before award of Contract.
 - 1. Do not proceed with work on adjoining property until directed by Architect.
- C. Salvageable Improvements: Carefully remove items indicated to be salvaged and store on Owner's premises.
- D. Utility Locator Service: Notify **utility locator service** for area where Project is located before site clearing.
- E. Do not commence site clearing operations until temporary **erosion- and sedimentation-control and plant-protection** measures are in place.
- F. Tree- and Plant-Protection Zones: Protect according to requirements in Section 015639 "Temporary Tree and Plant Protection."
- G. Soil Stripping, Handling, and Stockpiling: Perform only when the soil is dry or slightly moist.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Satisfactory Soil Material: Requirements for satisfactory soil material are specified in Section 312000 "Earth Moving."
 - 1. Obtain approved borrow soil material off-site when satisfactory soil material is not available on-site.
- B. Antirust Coating: Fast-curing, lead- and chromate-free, self-curing, universal modified-alkyd primer complying with **surface-tolerant, anticorrosive metal primer**.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Protect and maintain benchmarks and survey control points from disturbance during construction.
- B. Verify that trees, shrubs, and other vegetation to remain or to be relocated have been flagged and that protection zones have been identified and enclosed according to requirements in Section 015639 "Temporary Tree and Plant Protection."
- C. Protect existing site improvements to remain from damage during construction.
 - 1. Restore damaged improvements to their original condition, as acceptable to Owner.

3.2 TEMPORARY EROSION AND SEDIMENTATION CONTROL

- A. Provide temporary erosion- and sedimentation-control measures to prevent soil erosion and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways, according to erosion- and sedimentation-control Drawings and requirements of authorities having jurisdiction.
- B. Verify that flows of water redirected from construction areas or generated by construction activity do not enter or cross protection zones.
- C. Inspect, maintain, and repair erosion- and sedimentation-control measures during construction until permanent vegetation has been established.
- D. Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

3.3 TREE AND PLANT PROTECTION

- A. Protect trees and plants remaining on-site according to requirements in Section 015639 "Temporary Tree and Plant Protection."
- B. Repair or replace trees, shrubs, and other vegetation indicated to remain or be relocated that are damaged by construction operations according to requirements in Section 015639 "Temporary Tree and Plant Protection."

3.4 EXISTING UTILITIES

- A. Owner will arrange for disconnecting and sealing indicated utilities that serve existing structures before site clearing, when requested by Contractor.
 - 1. Verify that utilities have been disconnected and capped before proceeding with site clearing.
- B. Locate, identify, disconnect, and seal or cap utilities indicated to be removed **or abandoned in place.**

1. Arrange with utility companies to shut off indicated utilities.
 2. Owner will arrange to shut off indicated utilities when requested by Contractor.
- C. Locate, identify, and disconnect utilities indicated to be abandoned in place.
- D. Interrupting Existing Utilities: Do not interrupt utilities serving facilities occupied by Owner or others, unless permitted under the following conditions and then only after arranging to provide temporary utility services according to requirements indicated:
1. Notify Architect not less than **[two]** **<Insert number>** days in advance of proposed utility interruptions.
 2. Do not proceed with utility interruptions without Architect's written permission.
- E. Excavate for and remove underground utilities indicated to be removed.
- F. Removal of underground utilities is included in earthwork sections; in applicable fire suppression, plumbing, HVAC, electrical, communications, electronic safety and security, and utilities sections; and in Section 024116 "Structure Demolition" and Section 024119 "Selective Demolition."

3.5 CLEARING AND GRUBBING

- A. Remove obstructions, trees, shrubs, and other vegetation to permit installation of new construction.
1. Do not remove trees, shrubs, and other vegetation indicated to remain or to be relocated.
 2. Grind down stumps and remove roots larger than 2 inches in diameter, obstructions, and debris to a depth of 18 inches below exposed subgrade.
 3. Use only hand methods or air spade for grubbing within protection zones.
 4. Chip removed tree branches and Dispose of off site.
- B. Fill depressions caused by clearing and grubbing operations with satisfactory soil material unless further excavation or earthwork is indicated.
1. Place fill material in horizontal layers not exceeding a loose depth of **8 inches** and compact each layer to a density equal to adjacent original ground.

3.6 TOPSOIL STRIPPING

- A. Remove sod and grass before stripping topsoil.
- B. Strip topsoil to depth **6 inches** in a manner to prevent intermingling with underlying subsoil or other waste materials.
1. Remove subsoil and nonsoil materials from topsoil, including clay lumps, gravel, and other objects larger than **2 inches** in diameter; trash, debris, weeds, roots, and other waste materials.
- C. Stockpile topsoil away from edge of excavations without intermixing with subsoil or other materials. Grade and shape stockpiles to drain surface water. Cover to prevent windblown dust and erosion by water.
1. Limit height of topsoil stockpiles to **96 inches**.

2. Do not stockpile topsoil within protection zones.
3. Dispose of surplus topsoil. Surplus topsoil is that which exceeds quantity indicated to be stockpiled or reused.
4. Stockpile surplus topsoil to allow for respreading deeper topsoil.

3.7 STOCKPILING ROCK

- A. Remove from **construction area** and stock pile naturally formed rocks that measure more than **2 foot** across in least dimension. Do not include excavated or crushed rock.
 1. Separate or wash off non-rock materials from rocks, including soil, clay lumps, gravel, and other objects larger than **1 inches** in diameter; trash, debris, weeds, roots, and other waste materials.
- B. Stockpile rock **away from edge of excavations** without intermixing with other materials. Cover to prevent windblown debris from accumulating among rocks.
 1. Limit height of rock stockpiles to **48 inches**.
 2. Do not stockpile rock within protection zones.
 3. Dispose of surplus rock. Surplus rock is that which exceeds quantity indicated to be stockpiled or reused.
 4. Stockpile surplus rock to allow later use by the Owner.

3.8 SITE IMPROVEMENTS

- A. Remove existing above- and below-grade improvements as indicated and necessary to facilitate new construction.
- B. Remove slabs, paving, curbs, gutters, and aggregate base as indicated.
 1. Unless existing full-depth joints coincide with line of demolition, neatly saw-cut along line of existing pavement to remain before removing adjacent existing pavement. Saw-cut faces vertically.
 2. Paint cut ends of steel reinforcement in concrete to remain with two coats of antirust coating, following coating manufacturer's written instructions. Keep paint off surfaces that will remain exposed.

3.9 DISPOSAL OF SURPLUS AND WASTE MATERIALS

- A. Remove surplus soil material, unsuitable topsoil, obstructions, demolished materials, and waste materials including trash and debris, and legally dispose of them off Owner's property.
- B. Burning tree, shrub, and other vegetation waste is permitted according to burning requirements and permitting of authorities having jurisdiction. Control such burning to produce the least smoke or air pollutants and minimum annoyance to surrounding properties. Burning of other waste and debris is prohibited.
- C. Separate recyclable materials produced during site clearing from other nonrecyclable materials. Store or stockpile without intermixing with other materials and transport them to recycling facilities. Do not interfere with other Project work.

PBK Architects
Project No. 230538

William Woollett Jr. Aquatics Center Addition
City of Irvine

END OF SECTION 311000

SECTION 31 20 00 EARTHWORK

PART 1 - GENERAL

1.01 SUMMARY

- A. The work of this section shall include excavation, unclassified cut, unclassified fill, removing existing unsatisfactory material, preparing areas to be filled, spreading and compacting of fill in the areas to be filled, and all other work necessary to complete the grading of the site. It shall be the Contractor's responsibility to place, spread, moisten or dry, and compact the fill in strict accordance with these specifications to the lines and grades indicated on project plans or as directed in writing by the Geotechnical Engineer. Included with this Work are the following:
 - 1. General exterior grading, cutting and filling, including grading for building area, paving, planting areas, banks and hillsides.
 - 2. Excavating, filling, backfilling, and compacting for Project site pavement, planting areas, buildings, and other structures.
 - 3. Subgrade preparation for hardscape.
 - 4. Excavating and backfilling trenches.
 - 5. Shoring plan guidelines.
- B. Related Sections: The following Sections contain requirements that relate to this Section.
 - 1. Section 01 41 32 - Import Materials Testing.
 - 2. Section 01 71 23 - Field Engineering.
 - 3. Section 32 12 16 - Asphalt Paving.
 - 4. Section 32 13 13 – Concrete Paving.

1.02 DEFINITIONS

- A. Excavation consists of the removal of material encountered to subgrade elevations and the reuse or disposal of materials removed.
- B. Subgrade: The uppermost surface of an excavation or the top surface of a fill or backfill immediately below subbase, drainage fill, or topsoil materials.
- C. Borrow: Soil material obtained off site when sufficient approved soil material is not available from excavations.
- D. Base Course: The layer placed between the subgrade and surface pavement in a paving system.
- E. Drainage Fill: Course of washed granular material supporting slab on grade placed to cut off upward capillary flow of pore water.
- F. Permeable Backfill: Provide permeable backfill material behind retaining structures consisting of gravel, crushed gravel, crushed rock, natural sands, manufactured sand, or combinations.

- G. Unauthorized excavation consists of removing materials beyond indicated subgrade elevations or dimensions without direction by the Architect. Unauthorized excavation, as well as remedial work directed by the Architect, shall be at the Contractor's expense.
- H. Structures: Buildings, footings, foundations, retaining walls, slabs, tanks, curbs, mechanical and electrical appurtenances, or other man made stationary features constructed above or below ground surface.
- I. Utilities include underground pipes, conduits, ducts, and cables, as well as underground services within building lines.

1.03 SUBMITTALS TO CONSTRUCTION MANAGER

- A. General: Submit the following according to the Conditions of the Contract and Division 1 Specification Sections.
- B. Imported Soils: CONTRACTOR shall provide the services of a licensed environmental professional (licensed State of California Professional Engineer [PE Civil], Registered Geologist [RG] or Registered Environmental Assessor II [REA II]) familiar with environmental site assessment and waste classification and disposal requirements. The CONTRACTOR shall provide an independent approved California Department of Health Services certified testing laboratory, to perform sampling and testing of imported fill materials in accordance with the terms as specified in Section 01 41 32: Import Materials Testing.
 - 1. Testing laboratory must be pre-approved by the Division of State Architect.
- C. Product data for the following:
 - 1. Each type of plastic warning tape.
 - 2. Filter fabric.
- D. Samples of the following:
 - 1. 12 by 12 inch sample of filter fabric.
- E. Test Reports: In addition to test reports required under field quality control, submit the following:
 - 1. One optimum moisture-maximum density curve for each soil sample.
 - 2. Laboratory analysis of each soil material proposed for fill or backfill from borrow sources.
- F. Excavation support & protection (shoring) shop drawings for informational purposes: Prepared by or under the supervision of a qualified professional engineer for excavation support and protection systems.

1.04 QUALITY ASSURANCE

- A. Codes and Standards:
 - 1. 2022 California Building Code, Title 24, Part 2, Volume 2 of 2, Appendix J, Grading.
 - 2. ASTM D422 - Method for Particle Size Analysis of Soils

3. ASTM D1556 - Test Method for Density of Soil in Place by the Sand-Cone Method.
 4. ASTM D1557 - Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures Using 10-lb (4.54 kg) and 18-inch (457-mm) Drop.
 5. ASTM D2216 - Method for Laboratory Determination of Water (Moisture) Content of Soil, Rock, and Soil Aggregate Mixtures.
 6. ASTM D2922 - Test Method for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depths).
 7. ASTM D3017 - Test Method for Moisture Content of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depths).
 8. ASTM D4318 - Test Method for Liquid Limit, Plastic Limit and Plasticity Index of Soils.
 9. AASHTO T217 - Determination of Moisture in Soils by Means of a Calcium Carbide Gas Pressure Meter.
 10. ASTM D4829 - Expansion Index Test.
- B. Conditions/Specifications and Special Provisions, as well as the Standard Specifications for Public Works Construction ("GREENBOOK"), 2021 Edition, adopted by the Southern California Chapter, American Public Works Association; herein referred to as the "Standard Specifications".
- C. Sampling, testing, and certification of imported soils shall be performed in accordance with Section 01 41 32 - Import Materials Testing.
- D. Comply with all requirements of permit for export of soil from site. If a permit is required, it is to be obtained and paid for by Contractor. Furnish copies of all permits and licenses required by the authority with jurisdiction to the Owner's representative.
- E. Professional Observation: A soils engineer will be retained by the Owner for purposes of inspection, testing and approval of all work under this section. Perform work of this Section under inspection and approval of the soils engineer. Give soils engineer not less than 48 hours advance notice of readiness for inspection.
- F. The soils engineer will have the authority over all filling, grading, and compaction operations, including interruption of work if deemed necessary due to improper work
- G. Pre-Grading Conference: Conduct conference at Project site to comply with requirements of Division 1 Section "Project Meetings."
1. Before commencing earthwork operations, meet with representatives of the governing authorities, Owner, Architect, consultants, Geotechnical Engineer, independent testing agency, and other concerned entities. Review earthwork procedures and responsibilities including testing and inspection procedures and requirements. Notify participants at least 3 working days prior to convening conference. Record discussions and agreements and furnish a copy to each participant.

1.05 CONSTRUCTION MONITORING

- A. All earthwork and foundation construction should be monitored by a qualified engineer/technician under the supervision of a Geotechnical Engineer, including;

1. Observation of all site preparations;
 2. Observation of shoring installation, if needed;
 3. Observation of all site excavations;
 4. Test and approval of all import soil;
 5. Observation of placement of all compacted fills and backfills;
 6. Observation of all surface and subsurface drainage systems;
 7. Observation of all foundation and pile excavations;
 8. Observation of subgrade preparation for paved and building areas.
- B. The Geotechnical Engineer of Record should be notified at least three (3) days in advance of the start of construction. A joint meeting between the Contractor and Geotechnical Engineer is recommended prior to the start of construction to discuss specific procedures and scheduling. The Geotechnical Engineer should be present to observe the soil conditions encountered during construction, to evaluate the applicability of the recommendations presented in the Soils Report to the soil conditions encountered, and to recommend appropriate changes in design or construction if conditions differ from those described herein. The Geotechnical Engineer of Record should inspect and approval all imported backfill material prior to its placement as backfill, approve the subgrade beneath all fills, fill placement and bottom of all foundation excavations before concrete or steel is placed.
- C. The Geotechnical Engineer shall submit compaction reports to the Construction Manager and the Civil Engineer at the completion of the work, including test results and plot plans indicating the locations from which the tested samples of fill were taken. The Geotechnical Engineer shall keep the Construction Manager informed on the progress of the grading work.

1.06 IMPORT AND EXPORT OF EARTH MATERIALS

- A. Fees: Pay as required by government authority having jurisdiction over the area.
- B. Bonds: Post as required by government authority having jurisdiction over the area.
- C. Hauling Routes and Restrictions: Comply with requirements of authorities having jurisdiction over the area.

1.07 DIG ALERT NOTIFICATION

- A. Before any excavation in or near the public right-of-way, the Contractor must contact the Underground Service Alert of Southern California (Dig Alert) at 811 for information on buried utilities and pipelines.
- B. Delineation of the proposed excavation site is mandatory. Mark the area to be excavated with water soluble or chalk based white paint on paved surfaces or with other suitable markings such as flags or stakes on unpaved areas.
- C. Call at least Two (2) full working days prior to digging.
- D. If the members (utility companies) have facilities within the work area, they will mark them prior to the start of your excavation and if not, they will let you know there is no conflict. A

different color is used for each utility type (electricity is marked in red, gas in yellow, water in blue, sewer in green, telephone and cable TV in orange).

- E. The Law requires you to hand expose to the point of no conflict 24" (inches) on either side of the underground facility, so you know its exact location before using power equipment.
- F. If caught digging without a Dig Alert ticket you can be fined as much as \$50,000 per California government code 4216.

1.08 SUBSURFACE CONDITIONS

- A. Where investigations of subsurface conditions have been made by the Owner with respect to subsurface conditions, utilities, foundation, or other structural designs, and that information is shown in the Plans, it represents only a statement by the Owner as to the character of materials which have actually been encountered by the Owner's investigation. This information is only included for the convenience of Bidders.
- B. Investigations of subsurface conditions are made for the purpose of design only. The Owner assumes no responsibility with respect to the sufficiency or accuracy of borings or of the log of test borings or other preliminary investigations or of the interpretation thereof. There is no guaranty, either expressed or implied, that the conditions indicated are representative of those existing throughout the Work, or any part of it, or that unanticipated conditions may not occur. When a log of test borings is included in the Plans, it is expressly understood and agreed that said log of test borings does not constitute a part of the Contract. The log of test borings represents only an opinion of the Owner as to the character of the materials to be encountered, and is included in the Plans only for the convenience of the Bidders. Making information available to Bidders is not to be construed in any way as a waiver of the provisions of the first paragraph of this Section, and Bidders must satisfy themselves through their own investigations as to conditions to be encountered

1.09 GRADING

- A. If the Contractor encounters any suspected cultural resource, or unique archaeological or paleontological resource, during the course of construction, the Contractor shall halt or divert work and notify the District Representative immediately. The District will evaluate the situation and if warranted, will consult with a qualified archeologist or paleontologist to determine further actions.
- B. If human remains are encountered unexpectedly during construction excavation and grading activities, the State Health and Safety Code Section 7050.5 requires that no further disturbance shall occur until the County Coroner has made the necessary findings as to origin and disposition pursuant to PRC Section 5097.98, and the Contractor will notify the District Representative immediately. If the remains are determined to be of Native American descent, the coroner has 24 hours to notify the Native American Heritage Commission.

1.10 PROJECT CONDITIONS

- A. Contractor shall determine existing conditions under which the Contractor will operate in performing the Work.
- B. A Geotechnical Investigation Report has been prepared by John R. Byerly Inc. for this project. The Contractor shall comply with John R. Byerly Inc. Report No. 8566 / File No. S-14708 (dated July 17, 2024) and Supplemental Geotechnical Investigation Report File No. S-14708 (dated June 16, 2025). Prior to bidding or performing the work of this

project, the contractor shall obtain a copy of these reports, and shall thoroughly familiarize himself/herself with its contents. Any information obtained from such reports, or any information given on any drawings as to subsurface soil conditions or to elevations of existing elevations or elevations of underlying rock, is approximate only, is not guaranteed.

- C. Information on Drawings does not constitute a guarantee of accuracy or uniformity of soil conditions over the Project site.
- D. Existing utilities: Locate existing underground utilities in all areas of work prior to excavation or commencement of work. If utilities are to remain in place provide adequate means of protection during earthwork operations.
 - 1. Should uncharted, or incorrectly charted piping or other utilities be encountered during excavation, consult Utility Owner immediately for direction. Cooperate with Owner and Utility companies in keeping respective services and facilities in operation. Repair damaged utilities to the satisfaction of Utility Company.
 - 2. Do not interrupt existing utilities serving facilities occupied or used by Owner, or others, except when permitted in writing by Owner's Representative, and then only after acceptable temporary services have been provided.
 - 3. Demolish and completely remove from site existing underground utilities indicated to be removed. Coordinate with utility companies for shut off of services if lines are active.
- E. Noise and Dust Abatement: Exercise all reasonable and necessary means to abate dust, dirt rising and undue noise. Perform necessary sprinkling and wetting of construction site to allay dust as required by applicable codes and ordinances.
- F. Water for Grading: Contractor shall obtain and pay for all water required for his grading operation. This may include, but is not limited to, payment of deposits to utility for construction meter, and payment of all monthly service and water charges. Construction meter shall be in place throughout construction period unless alternative arrangements are made with the local water purveyor to provide construction water for all purposes. Contractor shall be aware of water moratoriums and restrictions, and shall immediately advise Owner of effects on construction schedules.
- G. Existing Conditions: Prior to commencing work at site, verify agreement of existing conditions with indicated conditions. Notify Owner's Representative in writing of discrepancies found. Start of work without notification constitutes acceptance of conditions, without cause for extra compensation.
- H. Field obstructions, grade differences or differences in dimensions may exist that might not have been considered or observed during design of this project. Contractor shall promptly notify the Engineer and the Owner in writing upon discovery of and before disturbing, any physical conditions differing from those represented by approved plans and specifications. In the event this notification is not performed, the Contractor shall assume full responsibility for necessary revisions.

PART 2 - PRODUCTS

2.01 SOIL MATERIALS

- A. General: All soils materials to be used throughout the site shall be approved for use by the Geotechnical testing engineer. Provide approved borrow soil materials from off-site when sufficient approved soil materials are not available from excavations.

- B. No earthwork analysis has been completed with respect to the volumes of soils to be excavated, placed, or imported in order to provide the finished grades shown on the plans. **The Contractor is solely responsible for verifying the earthwork quantities necessary to complete the project.**
- C. Satisfactory Soil Materials:
1. The on-site soils should provide adequate quality fill material below structure and hardscape areas provided they are free from significant organic matter and other deleterious materials and are at acceptable moisture contents.
- D. Borrow / Imported Fill Material: Soil excavated from site or imported conforming to requirements for fill material.
1. Import fill should be inorganic, granular, non-expansive soil free from rocks or lumps greater than 8 inches in maximum dimension, and should exhibit a very low expansion potential (expansion index less than 21), negligible sulfate content (less than 1,000 ppm soluble sulfate by weight), and low corrosion potential.
 2. Soils proposed for import shall be tested pursuant to the requirements of Section 01 41 32: Import Materials Testing, unless a variance has been requested by CONTRACTOR and approved by the OAR prior to the import of the subject materials.
- E. Base Course Material For Use Under Asphalt Pavement: Crushed base material shall consist of materials that meet the provisions listed below.
1. Crushed Aggregate Base (CAB) per Section 200-2.2, 3/4" maximum of the Standard Specifications for Public Works Construction (Green Book).
 2. Crushed aggregate base (CAB) shall consist of native rock without naturally occurring asbestos or recycled materials. The Contractor shall submit written documentation, which identifies the source, volume, and proposed transport date of the material for review and approval by the Owner's Construction Manager prior to importing the material. A statement on company letterhead from the source, stamped by either a California Professional Geologist or Engineer, which states that the subject materials are native rock, do not contain any recycled materials and that the source does not mine ultramafic materials, a source of natural occurring asbestos shall be included in the submittal to Owner's Construction Manager.
 3. Crushed Miscellaneous Base (CMB) per Section 200-2.4, fine sieve, of the Standard Specifications for Public Works Construction (Green Book). Prior to import, submit written certification to OAR that crushed Miscellaneous Base (CMB) does not contain Polychlorinated biphenyls (PCB) above laboratory detection limits when tested in accordance with EPA Method 8082.
- F. Engineered Fill: On-site and import soils, if any, to be placed as fill should be free of trash, debris, roots, vegetation, contaminated material, or deleterious materials. Fill should generally be free of rocks or lumps of material in excess of 4 inches in diameter. Rocks or hard lumps larger than approximately 4 inches in diameter should be broken into smaller pieces or should be removed from the site. Any soil to be placed as fill, whether onsite or imported material, should be accepted by a soils engineer.
- G. Bedding Material for Trenches:

1. Bedding sand shall be as defined by Standard Specifications, Section 200-1.5, and shall be free of expansive material and organic matter. On-site soils are not considered suitable for bedding of utilities.
2. Sand providing a sand equivalent of at least 30. All of the sand bedding shall be compacted to a minimum 90 percent of maximum density as indicated in the Contract Documents by mechanical means. Flooding and jetting shall not be permitted without prior written approval from the Geotechnical Engineer. Where sheeting or shoring is used densification of the bedding shall be accomplished after the sheeting or shoring has been removed from the bedding zone, unless the sheeting or shoring is to be cut off or left in place. Pipe bedding material shall be placed in horizontal layers not exceeding (8) eight inches.
3. The use of gravel is not acceptable unless approved by the civil engineer of record.

H. Backfill Material for Trenches:

1. The on-site soils have been determined to be suitable for being used for backfilling purposes in trenches. Utility trenches should be backfilled with granular materials and mechanically compacted. Fill materials should be compacted to a minimum relative compaction of 90 percent, unless indicated otherwise. The relative compaction should be determined by ASTM D1557.

2.02 ACCESSORIES

- A. Detectable Warning Tape: Acid and alkali-resistant polyethylene film metallic warning tape manufactured for marking and identifying underground utilities, 6 inches wide and 4 mils thick minimum, continuously inscribed with a description of the utility, with metallic core encased in a protective jacket for corrosion protection, detectable by metal detector when tape is buried up to 30 inches deep.
1. Tape Colors: Provide tape colors to utilities as follows:
 - a. Red: Electric, Fire Water.
 - b. Yellow: Gas, oil, steam, and dangerous materials.
 - c. Orange: Telephone and other communications.
 - d. Blue: Water systems, with "Caution: Water Line Below."
 - e. Green: Sewer systems, with "Caution: Sewer Line Below."
 - f. Green: Storm systems, with "Caution; Storm Drain Line Below."

2.03 EXCAVATION SUPPORT & PROTECTION – SHORING PLAN

- A. The CONTRACTOR shall have at the Worksite, copies or suitable extracts of: Construction Safety Orders, Tunnel Safety Orders and General Industry Safety Orders issued by the State Division of Industrial Safety. The CONTRACTOR shall comply with provisions of these and all other applicable laws, ordinances, and regulations.
- B. Before excavating any trench 5 feet or more in depth, the CONTRACTOR shall submit a detailed plan to the Owner showing the design of shoring, bracing, sloping, or other revisions to be made for the Workers' protection from the hazard of caving ground during the excavation of such trench. If the plan varies from the shoring system standards, the plan shall be prepared by a registered Civil Engineer. No excavation shall start until the

DISTRICT has accepted the plan and the CONTRACTOR has obtained a permit from the State Division of Industrial Safety. A copy of the permit shall be submitted to the DISTRICT.

- C. The INSPECTOR will provide a competent person trench/excavation certification form to the CONTRACTOR. It shall be completely filled out before any worker has access to trench or excavation and returned to the INSPECTOR before the end of the first working day. The CONTRACTOR shall certify by this form the name of the competent person administering the Work, the soil classification, and the type of excavation protective system provided and/or installed.
- D. The CONTRACTOR shall completely fence all excavations to provided protection against anyone falling into the excavation and to the satisfaction of the INSPECTOR. The fencing shall be in place at all times except when workers are present and actual construction operations are in progress.
- E. The fencing material shall be chain link fabric or welded wire fabric (6x6-W9xW9 minimum) and 6 feet high, constructed according to one of the following:
 - 1. Tensioned fencing material and have top and bottom tension wires securely fastened to driven steel posts or other equally rigid elements at a maximum spacing of 12 feet; or
 - 2. Untensioned fencing materials securely fastened to extended trench shoring elements at a maximum spacing of 8 feet and fastened to continuous top and bottom rails constructed of nominal 2 in x 4 in lumber or equally rigid material. Framed panels with suitable supporting elements fastened together to form a continuous fence may also be used.
- F. Payment for performing all work necessary to provide safety measures shall be included in the prices bid for other items of work except where separate bid items for excavation safety are provided, or required by law.

PART 3 - EXECUTION

3.01 PREPARATION

- A. Protect adjacent property and existing improvements and structures as necessary to prevent undermining, caving of cuts, and miscellaneous damage.
- B. Provide cribbing, sheeting, and shoring necessary to safely retain the earth banks and protect excavations and adjoining grades from caving and other damage resulting from excavating together with suitable forms of protection against bodily injury to personnel employed on the work and the general public. Be responsible for the design, installation, and maintenance of required cribbing and shoring and shall meet the approval of the State Division of Industrial Safety and local governing agencies requirements.
- C. Utility lines and structures shown shall be protected and treated as indicated. Where work not shown is encountered, report it to the Architect before proceeding with excavation. Encase active lines in sleeves where they pass through concrete; remove inactive lines as directed, and plug the remaining ends. Bear the costs for repairs to damaged or broken utilities and any damages related thereto.
- D. Protect existing improvements and adjacent properties from storm damage and flood hazard originating on this project until final acceptance by the Owner. Prevent silt run-off from the limits of work in accordance with governmental requirements.

- E. A minimum 6-foot high, temporary chain link fence and gates, (pair 26' wide, minimum) shall be erected prior to any grading operations at the construction limits perimeter. Coordinate the exact location with Architect and Inspector.

3.02 DEWATERING

- A. Prevent surface water and subsurface or ground water from entering excavations, from ponding on prepared subgrades, and from flooding Project site and surrounding area. Any water entering an excavation shall be immediately pumped out and the exposed excavation allowed to dry.
- B. Protect subgrades and foundation soils from softening and damage by rain or water accumulation.

3.03 GRADE STAKES

- A. The Contractor's Surveyor will set grade stakes. The Surveyor shall be a California registered land surveyor or licensed Civil Engineer. The Surveyor shall be hired and paid by the Contractor, and shall be subject to the approval of the District. Contractor shall notify the District at least 48 hours before staking is to be started. The District will determine if work is ready for staking.
- B. All work shall conform to the lines, elevations, and grades shown on the Construction Plans. Three consecutive points set on the same slope shall be used together so that any variation from a straight grade can be detected. Any such variation shall be reported to the Engineer. In the absence of such report, the Contractor shall be responsible for any error in the grade of the finished work.
- C. Protect and maintain stakes in place until their removal is approved by the District. Grade or location stakes lost or disturbed by Contractor, shall be reset by the Surveyor at the expense of Contractor.
- D. Grades for underground conduits will be set at the surface of the ground. The Contractor shall transfer them to the bottom of the trench.

3.04 EXCAVATION

- A. Unclassified Excavations: Comply with the Standard Specifications for Public Works Construction, Section 300: "Earthwork", except as modified herein.
- B. In preparation for grading, the construction areas should be cleared of surface vegetation, concrete, pavement and any loose surficial soils. Any unsuitable material encountered should be properly disposed of and not incorporated into any new fill.
- C. Excavate to the depths, lines and grades indicated on the approved Grading Plan. Excavate sufficiently over-size to permit installation and removal of concrete forms and other required work. Should soil of inadequate density and bearing capability be encountered at the elevations indicated on the drawings, or where new fill is to be placed upon existing loose fill material exposed by excavation, the excavation shall be carried to the depth required to attain soil of bearing quality as determined by the Geotechnical Engineer.
- D. A California Licensed Surveyor (LS) must provide grade stakes and elevations for the Geotechnical Engineer to verify that the over-excavation depths, shown on the construction drawings for asphalt concrete pavement and concrete pavement structural sections, have been achieved prior to re-compaction.

- E. Should footing excavations exceed required dimensions or should sloughing occur, fill such extra space with concrete at no additional cost to the contract. If unsuitable material is found at the indicated depths, immediately notify the Inspector.
- F. Notify the Inspector 48 hours before foundation excavations are ready for inspection.
- G. The bottoms of footings shall be free of loose material, debris, and water before concrete is placed.
- H. Cut banks shall be neatly trimmed to the required finish surface as the cut progresses, or the Contractor shall have the option of leaving the cuts full and finish grading by mechanical equipment which shall produce the finish surfaces as shown on the Drawings.
- I. Surplus earth not needed for filling and grading shall be disposed of in a legal manner off the site.
- J. All applicable requirements of the California Construction and General Industry Safety Orders, the Occupational Safety and Health Act of 1970, and the Construction Safety Act should also be followed.
- K. Bills of lading or equivalent documentation will be submitted to the IOR on a daily basis.
- L. Upon completion of import operations, provide the OAR a certification statement attesting that all imported material has been obtained from the identified source site.

3.05 HAZARDOUS MATERIALS

- A. See Section 01 41 32: Import Materials Testing.
- B. All import fill material shall be characterized, handled, and documented in accordance with applicable US EPA and State of California hazardous waste and hazardous materials regulations.
- C. "Contaminated" shall mean any soil or geotechnical material at a concentration, which would require disposal at a regulated facility (i.e., California hazardous or RCRA hazardous).
- D. Owner's Authorized Representative (OAR) must be notified at least 72 hours prior to the disposal of any hazardous waste or hazardous material. No material disposal or reuse can take place without prior written approval of the OAR.
- E. Replacement of earth material, that has been removed due to hazardous waste reasons, shall be placed back to meet the requirements of Section 2.01,F – Engineered Fill.

3.06 TEMPOARY EXCAVATION

- A. Refer to project specific geotechnical report, for specific requirements.

3.07 OVER-EXCAVATION AND SUBGRADE PREPARATION

- A. Refer to project specific geotechnical report, for specific requirements.

3.08 EXCAVATION FOR HARDSCAPE

- A. Refer to sheet C6.0, Details 2, 1A, 1B & 1C, in the construction documents for subgrade preparation requirements under hardscape.

- B. The subgrade preparation recommendations are based on the assumption that soils encountered during field exploration are representative of soils throughout the site. However, there can be unforeseen and unanticipated variations in soils between points of subsurface exploration. For this reason, the actual scarification and over-excavation depths will have to be determined on the basis of in-grading observations and testing performed by representatives of the Owner's geotechnical consultant.
- C. Whenever batch trucks or other paving equipment cause rutting of the subgrade or subbase in asphalt or concrete placement areas, inspectors shall immediately stop construction. Construction shall not be allowed to resume until distorted subgrade or subbase is repaired. Contractors and inspectors should locate by proof rolling, any questionable unstable areas in advance to avoid distortion under equipment. Wet, unstable areas must be dried out or replaced before starting placement of asphalt. Locating wet or soft areas in advance can be accomplished by testing finished subgrade or subbase with a loaded truck. Construction of asphalt or concrete pavement should not proceed unless testing gives a reasonable indication that distortions will not occur during construction of overlying pavement. When repair, aeration, and recompaction are required to correct damage from Contractor's operation, all necessary repair will be done at Contractor's expense. However, if the Engineer determines that additional depth of aeration and recompaction are needed, that should be paid by change order.
- D. A California Licensed Surveyor (LS) must provide grade stakes and elevations for the Geotechnical Engineer to verify that the over-excavation depths, shown on the construction drawings for asphalt concrete pavement structural sections, have been achieved prior to re-compaction.
- E. Subgrade tolerances: Subgrade for pavement shall not vary more than 0.02' from the specified grade and cross section established by the Engineer. Subgrade for base material shall not vary more than 0.04' from the specified grade and cross section. Variations within the above specified tolerances shall be compensating so that the average grade and cross section specified are met.

3.09 EXCAVATION, BACKFILL & COMPACTION FOR UTILITIES

- A. Field conditions may require deviations from information indicated on Drawings. Such changes in work shall be covered by a Change Order, indicating an increase or decrease in the Contract sum.
- B. Before excavation, Contractor shall contact the "Underground Service Alert of Southern California" (USASC) for information on buried utilities and pipelines.
- C. When connections are to be made to any existing pipe, conduit, or other appurtenances, the actual elevation or position of which cannot be determined without excavation, the Contractor shall excavate for, and expose, the existing improvement before laying any pipe or conduit. The Engineer shall be given the opportunity to inspect the existing pipe or conduit before connection is made. Any adjustments in line or grade which may be necessary to accomplish the intent of the plans will be made, and the Contractor will be paid for any additional work resulting from such change in line or grade.
- D. Trenches, ditches, pits, sumps, and similar items which are outside the barricaded working area shall be barricaded to conform to Cal OSHA standards.
- E. Trenches over 5'-0" in depth shall conform to the Construction Safety Orders of the California Division of Industrial Safety, see Section 2.3 EXCAVATION SUPPORT & PROTECTION – SHORING PLAN.

- F. Safe and suitable ladders which project 2 feet above the top of the trench shall be provided for all trenches over 4 feet in depth. One ladder shall be provided for each 50 feet of open trench, or fraction thereof, and be so located that workers in the trench need not move more than 25 feet to a ladder.
- G. Where indicated and/or required to excavate in lawn areas, protect adjoining lawn areas outside of the Work area. Replace or install removed sod upon completion of backfill by installing sod level with adjacent lawns. If installation of removed sod fails, furnish sod and install to match existing lawns.
- H. Backfill over excavations to the required elevations with earth, gravel, sand, or concrete and compact as required. Provide excavations free from standing water by pumping, draining, or providing protection against water intrusion. Slope adjacent grades away from excavations to minimize entry of water.
- I. Do not excavate trenches parallel to footings closer than 18" from the face of the footing or below a plane having a downward slope of 2 horizontal to one vertical, from a line 9" above bottom of footings.
- J. If soft, spongy, unstable, or other unsuitable material is encountered upon which the bedding material or pipe is to be placed, this material shall be removed to a depth ordered by the Engineer and replaced with bedding material suitably densified. Additional bedding so ordered, over the amount required by the Plans or Specifications, will be paid for as provided in the Bid. If the necessity for such additional bedding material has been caused by an act of failure on the part of the Contractor or is required for control of groundwater, the Contractor shall bear the expense of the additional excavation and bedding.
- K. Unless indicated otherwise on the plans are within this specification, excavate trenches to the required depths for utilities, such as pipes, conduit and tanks, with minimum allowances of 6 inches at the bottom and 6 inches at the sides for bedding of unprotected piping or as required for concrete encasement of conduits as indicated on Drawings. Maximum allowances at the sides for trenching shall be 12 inches. Grade bottom of trenches to a uniform smooth surface. Remove loose soil from the excavation before installing sand bedding or concrete encasement.
- L. Where portions of existing structures, walks, paving, etc. must be removed or cut for pipe or conduit installation, replace the material with equal quality, finished to match adjacent work.
- M. Provide a minimum clear dimension of 6 inches from sides of wall excavation to outer surfaces of buried pipes or conduits installed in the same trench or outside surfaces of containers and/or tanks.
- N. DO NOT place backfill until the bedding and pipe work installed has been inspected, tested and approved by the Inspector. Remove excavated rocky material unsuitable for backfill from the site prior to final backfilling.
- O. Bedding material immediately around a utility line and to a point 12 inches above the line should consist of sand, fine-grained gravel, or cement slurry to support the line and protect it.
- P. Bedding zone shall be defined as the area containing the material specified that is supporting, surrounding, and extending to 12" (inches) above the top of pipe.
- Q. Bedding material shall first be placed on a firm and unyielding subgrade so that the pipe is supported for the full length of the barrel. There shall be 6" (inch) minimum of bedding

below the pipe barrel and 1" (inch) clearance below a projecting bell for sewer, storm drain and water pipe. The material in the bedding zone shall be placed and densified by mechanical compaction only.

- R. Mechanically compacted backfill shall comply with section 306-1.3.2 of the Standard Specifications for Public Works Construction.
- S. Concrete backfill trenches that carry below or pass under footings and that are excavated within 18 inches of footings. Place concrete to level of bottom of footings.
- T. Fill voids with approved backfill materials as shoring bracing and sheeting is removed.

3.10 INSPECTION & TESTING AT TRENCHES

- A. Pipe will be inspected in the field before and after laying. If any cause for rejection is discovered in a pipe after it has been laid, it shall be subject to rejection. Any corrective work shall be approved by the Engineer and shall be at NO cost to the Owner.
- B. The Inspector or Geotechnical Engineer will inspect all subgrades and excavations prior to placing bedding & backfill materials.
- C. DO NOT place backfill until the bedding and pipe work installed has been inspected, tested and approved by the Inspector. Remove excavated rocky material unsuitable for backfill from the site prior to final backfilling.
- D. Utility backfill compaction test shall be performed in accordance with ASTM D1557, method "C".
- E. Utility backfill in place density test per ASTM D 1556 (sand cone) or other test method as considered appropriate by the Geotechnical Engineer.
- F. Hydrostatic pressure tests shall be done only after backfill has been placed and final compaction has been achieved.

3.11 APPROVAL OF SUBGRADE

- A. Notify Geotechnical Engineer when excavations have reached required over-excavation subgrade.
- B. When Geotechnical Engineer determines that unforeseen unsatisfactory soil is present, continue work only after receiving direction from the Contracting Officer.
- C. Reconstruct subgrades damaged by rain, accumulated water or construction activities as directed by the Soils Engineer.

3.12 UNAUTHORIZED EXCAVATION

- A. Fill of unauthorized excavation below bottoms of foundations or wall footings will be engineered fill.
- B. Fill unauthorized excavations under other construction as directed by the Soils Engineer.
- C. Where indicated widths of utility trenches are exceeded, provide stronger pipe, or special installation procedures, as required by the Geotechnical Engineer.

3.13 STORAGE OF SOIL MATERIALS

- A. After the site has been stripped of all debris, vegetation and organic materials, excavated on site soils may be reused as engineered fill provided they meet the satisfactory soils material conditions in Section 2.01, part C. High in-site moisture contents will require aeration prior to placement as engineered fill.
- B. Stockpile excavated materials acceptable for backfill and fill soil materials, including acceptable borrow materials. Stockpile soil materials without intermixing. Place, grade, and shape stockpiles to drain surface water. Stockpile soil materials away from edge of excavations. Do not store within drip line of remaining trees. Cover to prevent wind-blown dust.

3.14 PLACEMENT OF ENGINEERED FILL

- A. Spreading and Compacting Fill Material:
 - 1. Except for the soils below the swimming pool, all fill should be placed in 8-inch or less lifts, moisture conditioned or dried to at least 2 percent above the optimum moisture content, and densified to a minimum relative compaction of 90 percent (ASTM D 1557). Aggregate base placed below the splash pad and hardscape areas should be densified to a minimum relative compaction of 95 percent (ASTM D 1557).
 - 2. Due to the restrictions in differential settlement below the swimming pool, engineered fill below the pool should be placed in 8-inch or less lifts, moisture conditioned or dried to at least 2 percent above the optimum moisture content, and densified to a minimum relative compaction of 95 percent (ASTM D 1557). Due to the cohesive nature of the soil below the pool and the challenges of achieving at least 95 percent relative compaction in that type of material, it may be prudent to backfill the pool excavation entirely with compacted aggregate base.
- B. Compaction Testing:
 - 1. The Geotechnical Engineer's representative shall observe the excavation, filling, and compacting operations and shall make density tests in the fill material so that he can state his opinion as to whether or not the fill was constructed in accordance with the specifications. If the surface is disturbed, the density tests shall be made in the compacted materials below the disturbed zone. When these tests indicate that the density or moisture content of any layer of fill or portion thereof does not meet the specified density or moisture content, the particular layer or portions shall be reworked until the specified density and moisture content have been obtained.
 - 2. Sampling and testing of materials for determination of compliance with the specified compaction requirements will be conducted by the Geotechnical Engineer's representative at any location and time as the Owner may determine.
 - 3. The Contractor shall be responsible for excavation of the test pits and for providing and installing any shoring, ladders, or other equipment necessary to protect the testing personnel. The Contractor shall also suspend operations as necessary and at no cost to the owner for the purpose of conducting such testing.
 - 4. Test pits shall be excavated in the backfill by the Contractor as directed by the Engineer for the purpose of testing the backfill compaction. At the option of

Engineer, density tests may be taken on a lift of compacted backfill immediately before placing the next lift.

5. Any settlement noted in backfill, fill, or in structures built over the backfill or fill within the one-year warranty period will be considered to be caused by improper compaction methods and shall be corrected at the Contractor's expense. Structures damaged by settlement shall be restored to their original condition by the Contractor at the Contractor's expense.
6. When initial compaction testing performed by the Engineer indicates the required density has not been obtained, the Contractor shall re-compact or replace the backfill as necessary to meet the specified minimum density.
7. The Contractor shall be responsible for rescheduling compaction testing with the Engineer and shall bear all costs for subsequent retesting in the areas of noncompliance. Costs associated with retesting and scheduling delays shall be the sole responsibility of the Contractor. The Engineer will deduct the costs for testing of materials and work found to be unacceptable, as determined by the tests performed by the Owner and the costs for testing of material sources identified by the Contractor which are not used for the work, from moneys due or to become due to the Contractor. The amount deducted will be determined by the Engineer.

3.15 BACKFILL - GENERAL

- A. Backfill excavations promptly, but not before completing the following:
 1. Acceptance of construction below finish grade including, where applicable, dampproofing, waterproofing, and perimeter insulation.
 2. Surveying locations of underground utilities for record documents.
 3. Testing, inspecting, and approval of underground utilities.
 4. Concrete formwork removal.
 5. Removal of trash and debris from excavation.
 6. Removal of temporary shoring and bracing, and sheeting.
 7. Installing permanent or temporary horizontal bracing on horizontally supported walls.

3.16 GRADING

- A. Rough & Fine Grading: Rough grade area sufficiently high to require cutting by fine grading.
- B. General: Uniformly grade areas to a smooth surface, free from irregular surface changes. Comply with compaction requirements and grade to cross sections, lines, and elevations indicated.
 1. Provide a smooth transition between existing adjacent grades and new grades.
 2. Cut out soft spots, fill low spots, and trim high spots to conform to required surface tolerances.
 3. Grade area for paving to a depth below finish grades indicated, equal to base and pavement thickness to be constructed.

4. Cut banks neatly to required finish grades as cut progresses, or leave cuts full and finish grading by mechanical equipment, which will produce finish grades indicated on Drawings.
 5. Grade filled banks full and compact beyond grade of finish bank so that when trimmed to finish grades, soil is compacted to density specified for final slope face.
 6. Bring areas to be graded to approximate finish grades and then scarify, moisten and roll to obtain required density. Scarify, moisten and roll resulting high and low areas to obtain required finish grades by cutting and filling.
 7. Grade future planting areas so that, upon cultivation and fertilization, they will conform to finish grades indicated for planting areas.
 8. Protect all utilities.
- C. Site Grading: Slope grades to direct water away from buildings and to prevent ponding. Finish subgrades to required elevations within the following tolerances:
1. Building pad tolerance plus or minus ½ inch (0.05-foot).
 2. Lawn or Unpaved Areas: Plus or minus (0.10-foot).
 3. Walks: Plus or minus (0.04-foot).
 4. Pavements: Plus or minus (0.04-foot).
- D. Grading Inside Building Lines: Finish subgrade to a tolerance of ½ inch when tested with a 10-foot straightedge.

3.17 FIELD QUALITY CONTROL

- A. The CONTRACTOR shall provide an independent approved California Department of Health Services certified testing laboratory, to perform sampling and testing of import/export fill materials in accordance with the terms as specified in Section 01 31 32: Import Materials Testing.
- B. A Geotechnical Engineer, designated by the Owner, will be engaged to perform continuous inspection of the placing and compacting of all fills and backfills within the limits of grading of this project. All work shall be done in accordance with the approved plans and these specifications and as recommended and approved by the Geotechnical Engineer. Revised recommendations relating to conditions differing from the approved soils engineering and engineering geology reports shall be submitted to the owner, inspector, architect and the civil engineer. Costs for all such inspections and tests shall be paid by the Owner. The Contractor shall be responsible for notifying the Geotechnical Engineer in advance so that he may be present to perform his services as needed.
- C. The Geotechnical Engineer shall submit compaction reports to the Construction Manager and the Architect at the completion of the work, including test results and plot plans indicating the locations from which the tested samples of fill were taken. The Geotechnical Engineer shall keep the Construction Manager informed on the progress of the grading work.
- D. Testing Agency Services: Allow testing agency to inspect and test each subgrade and each fill or backfill layer. Do not proceed until test results for previously completed work verify compliance with requirements.
1. Perform field in-place density tests according to ASTM D 1556 (sand cone method) or other test method as considered appropriate by Geotechnical Engineer.
 - a. Field in place density tests may also be performed by the nuclear method according to ASTM D 2922, provided that calibration curves are

periodically checked and adjusted to correlate to tests performed using ASTM D 1556. With each density calibration check, check the calibration curves furnished with the moisture gages according to ASTM D 3017.

- b. When field in place density tests are performed using nuclear methods, make calibration checks of both density and moisture gages at beginning of work, on each different type of material encountered, and at intervals as directed by the Architect.
- 2. Paved and Building Slab Areas: At subgrade and at each compacted fill and backfill layer, perform at least one field in-place density test for every 2,000 sq. ft. or less of paved area or building slab, but in no case fewer than three tests.
- 3. Foundation Wall Backfill: In each compacted backfill layer, perform at least one field in place density test for each 100 feet or less of wall length, but no fewer than two tests along a wall face.
- 4. Trench Backfill: In each compacted initial and final backfill layer, perform at least one field in place density test for each 150 feet or less of trench, but no fewer than two tests.
- E. When testing agency reports that subgrades, fills, or backfills are below specified density, scarify and moisten or aerate, or remove and replace soil to the depth required, recompact and retest until required density is obtained.
- F. Owner's inspector will inspect foundation excavations when completed and ready for forms, after forms are in place, and before first placement of concrete.

3.18 PROTECTION

- A. Protecting Graded Areas: Protect newly graded areas from traffic, freezing, and erosion. Keep free of trash and debris.
- B. Repair and re establish grades to specified tolerances where completed or partially completed surfaces become eroded, rutted, settled, or lose compaction due to subsequent construction operations or weather conditions.
 - 1. Scarify or remove and replace material to depth directed by the Architect; reshape and recompact at optimum moisture content to the required density.
- C. Settling: Where settling occurs during the Project correction period, remove finished surfacing, backfill with additional approved material, compact, and reconstruct surfacing.
 - 1. Restore appearance, quality, and condition of finished surfacing to match adjacent work, and eliminate evidence of restoration to the greatest extent possible.

3.19 DISPOSAL OF SURPLUS AND WASTE MATERIALS

- A. Disposal: Remove surplus satisfactory soil and waste material, including unsatisfactory soil, trash, and debris, and legally dispose of it off the Owner's property.

END OF SECTION 31 20 00

SECTION 31 2215 - FINISH GRADING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes
 - 1. Machinery restrictions.
 - 2. Excavation, filling and backfilling of on site material.
 - 3. Subgrade preparation and spreading of topsoil.
 - 4. Finished grading.
 - 5. Prevention of excessive weed growth in lawns.
 - 6. Drainage.
- B. Related Sections
 - 1. Landscape Rough Grade – Section 31 22 14
 - 2. Lawns and Grasses - Section 32 92 00
 - 3. Planting - Section 32 93 00

1.2 GENERAL PROVISIONS

- A. Finished grading shall be defined as placing and grading of additional soil that will be required to bring the grade to the required grades for lawns, shrub and groundcover beds.
- B. Additional fill materials shall generally be defined as topsoil as specified herein unless otherwise specified.
- C. Where practicable and as directed, the use of heavy machinery shall be kept to a minimum.
- D. Refer to Section 32 93 00 for finish grading of shrub and groundcover beds.

1.3 INFORMATIONAL SUBMITTALS

- A. Soil analysis of all on site topsoil to be used for finished grading and planting media prior to stock piling. Soil tests/analysis to be submitted to Landscape Architect along with any planned amendments to meet requirements.

PART 2 - PRODUCTS

2.1 FILL

- A. General Qualifications: Fill shall be a clean, dry soil of a loamy character, well drained and well graded with a plasticity index not to exceed 20 or fall below 8. Fill material shall contain no oils, alkalies, acids, rubbish or other deleterious materials. The pH shall be similar to the approved topsoil.

2.2 TOPSOIL

- A. Topsoil material that will be required for finish grading operations shall conform to the requirements included within this Section and shall come from on site stockpiles.
- B. General Qualifications for Topsoil:
"On-Site" Topsoil shall be considered as material conforming to the following minimum criteria:
 - 1. Natural, friable, loamy soil, typical of local topsoil which produces heavy vegetative growth, free from subsoil, weeds, sods, stiff clay, stones larger than 1", toxic substances, debris, or other substances which may be harmful to plant growth. Do not deliver in muddy condition.
 - 2. Acidity/Alkalinity: pH 6.0 to pH 7.5.
- C. Grading Analysis: 2" sieve, 100% minimum passing. Number 4 sieve, 90% minimum passing. Number 10 sieve, 80% minimum passing.
 - 1. Sand, Silt, and Clay Content (from ASSHTO M146):
 - a. Sand 20 - 45%
 - b. Silt 20 - 40%
 - c. Clay 10 -15%
 - 2. All topsoil shall be free from all herbicides and insecticides which might adversely affect subsequent growth of turf or plantings or which might otherwise contain materials toxic to humans and pets.
- D. Non-Conforming Material: The Contractor shall not be permitted to use on-site material which does not conform to the above minimum criteria for fine grade operations. At the discretion of the Owner's representative, such material can either be amended to meet the minimum requirements or shall be removed from the site and replaced with suitable material as specified herein.
- E. It shall be the Contractor's responsibility to verify that the existing topsoil conforms to these specifications. Topsoil determined to be non-conforming subsequent to the award of a contract shall not be means for extra compensation unless otherwise provided for herein.
- F. Soil Analysis: **The Contractor shall obtain an agricultural soil analysis of topsoil taken from four areas of the site.** These samples shall be submitted to an accredited and approved soils laboratory at Contractor's cost. Submit results of soil analysis to the Owner for review. The soil analysis shall include recommendations for amendments to the soil to produce optimum plant growth from the variety of plants and grasses proposed. These amendments shall be made at the Contractor's expense and shall be included in the bid.

2.3 SAND

- A. Shall be Bank Sand. Sample shall be submitted for approval. Sand shall be used for minor finish grade corrections and shall not be permitted for grading purposes if the depth exceeds 1/2" to achieve the finished grade.

PART 3 - EXECUTION

3.1 WORKMANSHIP

- A. Work shall be performed by personnel trained and experienced in this work and shall be done under the direction of a superintendent on Contractor's staff.

3.2 PREPARATION OF SUBGRADE AND SPREADING OF TOPSOIL

- A. The subgrade soil when at optimum soil moisture shall be loosened to a depth of 4" by disking or tilling and then graded to remove all ridges and depressions so that it will be everywhere parallel to the proposed finished grade. All stones over 1 1/2" in any dimensions, sticks, rubbish and other extraneous matter shall be removed during this operation. If soil clumps over 2" in diameter remain, then make additional passes with a harrow or other approved equipment to reduce below the 2" size. No heavy objects except rollers shall be moved over lawn areas after the subgrade soil has been prepared before topsoil is spread.
- B. After the subgrade soil has been prepared, topsoil from the stockpile areas and imported topsoil shall be spread evenly therein to depth of 4" by an approved method. No topsoil shall be spread in a frozen or muddy condition. Areas to receive topsoil are defined as follows:
 - 1. "On-Site Topsoil" – Areas to receive grass (sod, hydroseed, native seeding).
- C. On all grass areas, the finished surface of the topsoil shall conform to the finished grade and shall be free from hollows or other inequalities, stones, sticks and other extraneous matter.
- D. Existing "Topsoil" will not be used for groundcover, perennial, or shrub areas to meet final grade. Imported planting soil shall be used to "cap" the repurposed topsoil and eliminate the germination of any dormant seed.

3.3 FINISH GRADING

- A. In areas to receive lawns, this Contractor shall till, disc, or otherwise scarify the soil to a depth of 4" removing all clods, stones, and related material 1" or larger.
- B. This Contractor shall be responsible for minor adjustments to the finished subgrade if such treatment is required in the opinion of the Owner's representative.
- C. The Contractor may use machinery acceptable to the Owner's representative to complete most of the work to re-establishing finished grade.
- D. Hand-rake the surface, removing all clods and undesirable material greater than 1/2" from ground surface. Fill all low spots and cut irregularities to the acceptance of the Owner's representative. Roll the entire surface evenly with a 200 pound water ballast roller or other means acceptable.
- E. During the finished grading operations, all swales and additional swales that may be required to drain areas where there are existing plant materials, shall be finished. In general, all grade adjustments shall be made so there are no areas that will have standing water.
- F. To prevent excessive weed growth in the lawn areas, the Contractor should be prepared to immediately install the sod or seeding upon the completed and acceptable finished grade.
- G. Prior to installation of grass or groundcovers, contact Landscape Architect to inspect and approve finish grade.

END OF SECTION

SECTION 32 12 16 ASPHALT PAVING

PART 1 - GENERAL

1.1 REQUIREMENT

- A. The Contractor shall furnish all tools, equipment, materials, and supplies and shall perform all labor required to complete the work as indicated in the Contract Documents and specified herein.
- B. The following types of pavement shall be covered in this Section:
 - 1. Paving for utility trenching, parking lots, playgrounds, areas between buildings, adjacent to planting and turf areas, and as indicated on Construction Documents.
- C. Related Sections:
 - 1. Section 31 20 00: Earthwork.
 - 2. Section 32 12 36: Seal Coats.
 - 3. Section 32 17 13: Pavement Markings.

1.2 QUALITY ASSURANCE

- A. The work provided herein shall conform to and be in accordance with the Contract Plans, General Conditions/Specifications and Special Provisions, as well as the Standard Specifications for Public Works Construction ("GREENBOOK"), 2021 Edition, adopted by the Southern California Chapter, American Public Works Association; herein referred to as the "Standard Specifications".
- B. The Owner's inspector shall test the temperature of each batch of asphaltic concrete prior to placement. At the time of delivery to the work site, the temperature of mixture shall not be lower than 260 degrees F or higher than 320 degrees F, the lower limit to be approached in warm weather and the higher in cold weather. If asphaltic concrete temperature is not within these tolerances the affected batch shall be rejected. Any and all costs due to the rejected asphaltic concrete shall be the responsibility of the paving contractor.

1.3 ESTABLISHMENT OF GRADES

- A. The Contractor's Surveyor will set grade stakes. The Surveyor shall be a California registered land surveyor or licensed Civil Engineer. The Surveyor shall be hired and paid by the Contractor, and shall be subject to the approval of the Owner. Contractor shall notify the Owner at least 48 hours before staking is to be started. The Owner will determine if work is ready for staking.
- B. All work shall conform to the lines, elevations, and grades shown on the Construction Plans. Three consecutive points set on the same slope shall be used together so that any variation from a straight grade can be detected. Any such variation shall be reported to the Engineer. In the absence of such report, the Contractor shall be responsible for any error in the grade of the finished work.
- C. Protect and maintain stakes in place until their removal is approved by the Owner. Grade or location stakes lost or disturbed by Contractor, shall be reset by the Surveyor at the expense of Contractor.
- D. Areas having drainage gradients of 2 percent or more shall have elevation stakes, set with instrument, at grid intervals of 25 feet. Intermediate stakes may be set by using a tightly-drawn

string line over the tops of adjacent stakes. Grade stakes must be set at all grade breaks, grade changes, etc.

- E. Areas having drainage gradients of less than 2 percent shall have elevation stakes, set with instrument, at 10 foot intervals. Grade stakes must be set at all grade breaks, grade changes, etc.

1.4 SUBMITTALS

- A. Mix Designs: The CONTRACTOR shall formulate a job-mix formula using the Hveem method in accordance with Standard Specifications Section 203-6.2 and submit it to the ENGINEER for approval. The resultant mixture shall have Hveem properties conforming to Standard Specifications Section 203-6.4.3.
- B. Samples:
 - 1. Prior to the delivery of specified aggregate to the site, the CONTRACTOR shall submit samples of the material for the INSPECTOR's acceptance in accordance with Standard Specifications Section 4-1.4. Samples shall be typical of materials to be furnished from the proposed source and in conformance with the specified requirements.
 - 2. Aggregate base gradation and quality certifications shall be dated within 30 days of the submittal.
- C. Certificates
 - 1. Twenty days prior to the delivery of aggregates, asphalt materials, and paving mixes to the project site, the Contractor shall submit to the Engineer certificates and test results of compliance of such materials with these specifications.
 - 2. Submit certificates of compliance from the supplier for bituminous materials for paint binder, asphaltic concrete, and seal coat.
 - 3. Submit weigh master's certificates or certified delivery tickets for each truck load of asphaltic material delivered to the project site.
 - 4. Upon completion of the weed control treatment, and as a condition for final acceptance, furnish a written certificate stating the brand name of the sterilant and the manufacturer, and that the sterilant used had at least the minimum required concentration, and that the rate and method of application complied in every respect with the conditions and standards contained herein.

1.5 QUALITY CONTROL

- A. Asphaltic Concrete Producers Qualifications: Use only materials furnished by a bulk asphaltic concrete producer regularly engaged in production of hot mix, hot laid bituminous concrete.
- B. Applicator Qualifications: Paving machine and roller operators shall be fully trained and experienced in the installation of asphaltic concrete paving on projects of similar size and complexity.
- C. Regulatory Requirements: The quantity of volatile organic compounds (V.O.C.) used in weed killer, seal coat, primer and other materials shall not exceed the limits permitted under the current regulations of the local authorities having jurisdiction.

1.6 ENVIRONMENTAL LIMITATIONS

- A. Do not apply asphalt materials if substrate is wet or excessively damp or if the following conditions are not met:

1. Tack Coats: Minimum surface temperature of 60 deg F.
2. Asphalt Base Course: Minimum surface temperature of 40 deg F and rising at time of placement.
3. Asphalt Surface Course: Minimum surface temperature of 60 deg F at time of placement.

1.7 PAVEMENT-MARKING PAINT

- A. Proceed with pavement marking only on clean, dry surfaces and at a minimum ambient or surface temperature of 40 deg F for oil-based materials, 50 deg F for water-based materials, and not exceeding 95 deg F.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Base Course Material: Crushed aggregate base material shall consist of materials that meet the provisions of Specifications Section 31 20 00 Earthwork, Part 2.01F.
- B. Asphalt Surfacing Materials: Furnish asphalt surfacing meeting the following requirement, furnished from a commercial asphalt central mixing plant.
 1. Paint Binder/Tack Coat: Asphalt emulsion shall be CSS-1 or CSS-1h and shall conform to the requirements of Standard Specifications Section 203-3 Emulsified Asphalt.
 2. Asphalt Concrete Composition & Grading:
 - a. Asphalt concrete shall conform to Standard Specification Section 203-6.4, Type III-C3-PG-64-10 unless noted otherwise on the plans.
 - b. Rubberized asphalt paving is not allowed.
- C. Weed Control:
 1. The soils sterilant shall be in accordance with current EPA acceptable standard and the California Department of Pesticide Regulations for soils sterilant. Sterilant shall be selected as appropriate for the environment in which is it to be placed. Contractor shall be licensed with the State of California to apply sterilant. Sterilant shall be commercial grade for commercial application. Payment for soil sterilization will include full compensation for application and all materials and incidental work required.
 2. Apply Dow Elanco Spike 80DF, or approved equal, to the subgrade soil under all new asphalt, prior to asphalt paving. Spike 80DF weed control should be applied at the rate of seven pounds per acre. If another manufacturer is used follow their recommendations.
- D. Headers and Stakes:
 1. Headers: Redwood, Construction Heart Grade, size 2 x 6, unless otherwise indicated on construction drawings
 2. Stakes: 2 x 4 redwood or 2 x 3 Douglas fir, Construction Grade.
 3. Nails: Common, galvanized, 12d minimum.

PART 3 - EXECUTION

3.1 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 adjacent undisturbed earth.
- C. Fasten headers in place with redwood or Douglas fir stakes of length necessary to extend into solid grade 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 2-12d 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 anchorage as required to fasten headers in place

3.2 SUBGRADE PREPARATION

- A. Subgrade Preparation:
 - 1. Refer to detail 1 on sheet C3.00 for requirements.
- B. The subgrade preparation recommendations on C3.00 are based on the assumption that soils encountered during field exploration are representative of soils throughout the site. However, there can be unforeseen and unanticipated variations in soils between points of subsurface exploration. For this reason, the actual subgrade preparation will have to be determined on the basis of in-grading observations and testing performed by representatives of the project geotechnical consultant.
- C. A California Licensed Surveyor (LS) must provide grade stakes and elevations for the Geotechnical Engineer to verify that the over-excavation depths, shown on the construction drawings for asphalt concrete pavement structural sections, have been achieved prior to re-compaction.
- D. Subgrade tolerances: Subgrade for pavement shall not vary more than 0.02' from the specified grade and cross section established by the Engineer. Subgrade for subbase or base material shall not vary more than 0.04' from the specified grade and cross section. Variations within the above specified tolerances shall be compensating so that the average grade and cross section specified are met.
- E. Correct irregularities by dressing down or filling as may be required, to bring areas to true subgrade elevations.
- F. Where filling is required, scarify the subgrade to bond the new material to the in place material; use additional material as required, subject to the approval of the Architect, and provided by the Contractor.
- G. Remove excess material from the site to a legal disposal area.

3.3 APPLICATION GENERAL

- A. Finish elevations, extent of asphalt paving and locations of type of asphalt and class of base shall be as indicated and specified herein and on the Construction Documents. Bring subgrade elevations sufficiently below the finish elevations of the paving so as to accommodate the thickness of paving and base.

3.4 STERILANT APPLICATION

- A. Place herbicide above all aggregate base course under new asphalt pavement. Meet the applicable environmental control requirements. Apply as directed by the manufacturer's printed instructions just before application of the base course. Sterilant shall not be applied within two feet of planting areas.

3.5 APPLICATION OF BASE COURSE

- A. Install base course material, encompassing spreading and compacting, in accordance with the S.S.P.W.C. Section 301-2, Untreated Base.
- B. After preparing the subgrade all traffic on the subgrade shall be avoided. Should it be necessary to haul over the prepared subgrade, the CONTRACTOR shall drag and roll the traveled way as frequently as may be necessary to remove ruts, cuts, and breaks in the surface. All cuts, ruts, and breaks in the surface of the subgrade that are not removed by the above operations shall be raked and hand tamped. All equipment used for transporting materials over the prepared subgrade shall be equipped with pneumatic tires.
- C. Continued use of sections of prepared subgrade for hauling, so as to cut up or deform it from the true cross-section, will not be permitted. The CONTRACTOR shall protect the prepared subgrade from all traffic.
- D. Maintain the surface in its finished condition until the succeeding layer is placed.

3.6 PLACING ASPHALT CONCRETE SURFACING:

- A. Asphalt binder (tack coat) shall be applied to all existing pavement surfaces to be overlaid and/or joined per section 302-5.4 of the Standard Specifications. Asphalt binder (tack coat) shall be applied to existing surfaces to be surfaced and between layers of asphalt concrete, except when eliminated by the Engineer. A layer of asphalt binder (tack coat) shall be applied to all vertical-cut faces and between subsequent AC lifts.
- B. Asphalt Concrete Pavement:
 - 1. All work shall be in accordance with Section 302-5 of the Standard Specifications, except as noted herein. Asphalt concrete work shall include full-depth patching and variable thick asphalt concrete transition areas. The Contractor shall, on a daily basis, provide the Inspector with copies of certificates of weight for all materials delivered to the job site and/or incorporated in the work. At no time shall the coarse aggregate that has segregated from the mix be scattered across the paved mat.
 - 2. Asphalt concrete shall not be placed on any surface, which contains ponded water or excessive moisture in the opinion of the Engineer. If paving operations are in progress and rain or fog forces a shut down, loaded trucks in transit shall return to the plant, and no compensation will be allowed therefore. The Contractor shall furnish and use canvas tarpaulins to cover all loads of asphalt from the time that the mixture is loaded until it is discharged from the delivery vehicle, unless otherwise directed in writing by the Engineer.
 - 3. The Inspector will examine the base before the paving has begun. The Contractor will correct any deficiencies before the paving is started.
 - 4. Asphalt concrete of the class indicated in Section 2.B.2 shall be laid in courses conforming to S.S.P.W.C. Table 302-5.5(A) unless otherwise stated herein.
 - 5. Successive courses may be laid upon previously laid courses as soon as the previous course has cooled sufficiently to show no perceivable displacement under equipment or loaded material delivery trucks and a tack coat has been applied.

6. Wherever AC pavement does not terminate against a curb, gutter, or another pavement, the Contractor shall provide and install a redwood or pressure treated Douglas fir header at the line of termination.
7. Smoothness of asphalt shall conform to section 302-5.6.2 of the Standard Specifications
8. Density shall conform to the below requirements:
 - a. In-place density of the Asphalt Concrete will be based on test results from a nuclear gauge and core samples taken in accordance with CTM 375, "Determining the in Place Density and Relative Compaction of Asphalt Concrete Pavement" except as modified below. The Inspector will determine when core sample testing shall be completed.
 - b. Asphalt Concrete shall be compacted to not less than 95.0 percent for a single test and not less than an average in place density of 96.0 percent relative compaction of the Laboratory Test Maximum Density as determined by, Caltrans Testing Method (CTM) 375 except as modified by these specifications.
 - c. The materials testing laboratory, paid for by the contractor, will obtain random samples of the hot mix asphalt material from behind the paving machine in accordance with Caltrans Testing Method (CTM) 125, "Methods for Sampling Highway Materials and Products in Roadway Structural Sections", to determine the Laboratory Test Maximum Density of the asphalt mixture in accordance with CTM 308.
 - d. Asphalt Concrete compaction shall be accepted based upon passing tests taken from the nuclear gauge. In the event that the nuclear gauge testing presents failing results, then core samples will be the determination for the in place density and acceptance or rejection of the compaction.
 - e. When core testing is to be performed to determine the relative compaction after nuclear gauge testing has not produced passing tests, the materials testing laboratory will obtain four 4" diameter core specimens (or four 6" diameter core specimens) for determination of relative density of the completed pavement. The four cores shall represent the sample frequency requirements specified in CTM 375.
9. Pavement at all longitudinal joints shall have a Field Density of 95%, as described in 302-5.6.2 of the Standard Specifications. When the test results of the field cores are less than 95% Relative Compaction, the Contractor shall remove a 1 foot wide section on each side of the longitudinal joint. The Contractor shall replace the removed pavement with an asphalt mix that meets the job specification at no additional cost to the Owner.

3.7 FLOOD TESTING

- A. Flood Test: Before acceptance, all pavements shall be water tested to ensure proper drainage as directed by the Inspector. The Contractor shall provide water for this purpose. The flooding shall be done by water tank truck. Depressions where the water ponds to a depth of more than 0.01 foot shall be filled with Type E/School Mix pavement or the slope corrected to provide proper drainage. The edges of the fill shall be feathered and smoothed so that the joint between the fill and the original surface is invisible. Practical field measurement: 0.01 foot = two quarters stacked.
- B. No standing water shall remain after 60 minutes on a 70 degree F (or warmer) day.

3.8 SEAL COAT

- A. Allow new asphalt pavement to cure 30 days before application of seal coat. See Project Specification Section 32 12 36: Seal Coats.

3.9 FIELD QUALITY CONTROL

- A. Thickness: Tolerances for asphalt pavement thickness shall be ¼ inch, plus or minus.

- B. All paving shall drain properly before being accepted. Upon completion, the pavement shall be true to grade and cross section. The asphalt substrate, shall not vary from the planned cross slope by more than ± 0.1 . When a 10 foot straightedge is laid on the finished surface of the asphalt, the surface shall not vary from the edge of the straightedge more than 1/8 inch, except at grade breaks. Where paving does not meet these tolerances, the paving material shall be repaired by a method determined by the Owner. Repairs shall not be made to pavement surface by feather-edging at the join lines. All expenses for pavement repair up shall be borne by the Contractor at NO cost to the Owner.
- C. Corrective Measures: It is the Contractor's responsibility to determine if the planarity, cross slopes, and general specifications have been met. If all of the conditions have been met the Contractor must notify the Owner in writing of the acceptance of the asphalt paving.

3.10 PROTECTION

- A. Protect the Work of this section until Substantial Completion.

3.11 CLEAN UP

- A. Clean all debris and unused materials from the paving operation. Clean all surfaces that have been spattered or defaced as a result of the paving operation. Asphalt or asphalt stains which are noticeable upon surfaces of concrete, or materials which will be exposed to view, shall be promptly and completely removed. Cleaning shall be done in a manner that will not result in any discharge of contaminated materials into any catch basin. All expenses for clean up shall be borne by the Contractor at NO cost to the Owner.

END OF SECTION 32 12 16

SECTION 32 13 13 CONCRETE PAVING

PART 1 - GENERAL

1.01 THE REQUIREMENT

- A. The CONTRACTOR shall furnish all materials for concrete in accordance with the provisions of this Section and shall form, mix, place, cure, repair, finish, and do all other work as required to produce finished concrete, in accordance with the requirements of the Contract Documents.
- B. The following types of concrete shall be covered in this Section:
 - 1. Portland cement concrete pavement, concrete pool deck, flatwork, curbs, gutters, retaining curbs, swales, trash pick-up areas, ramps, mowing strips, fence post footings, sliding gate concrete, catch basins, pipe bedding and encasements, transition structures, flagpoles and light standard bases and footings, splash blocks and equipment pads.
 - 2. Portland cement concrete paving shall be stable, firm and slip resistant and shall comply with CBC sections 11B-302 and 11B-403.

1.02 REFERENCE SPECIFICATIONS, CODES, AND STANDARDS

- A. Comply with the reference specifications of the GENERAL REQUIREMENTS.
- B. The work provided herein shall conform to and be in accordance with the Contract Plans, General Conditions/Specifications and Special Provisions, as well as the Standard Specifications for Public Works Construction ("GREENBOOK"), 2021 Edition, adopted by the Southern California Chapter, American Public Works Association; herein referred to as the "Standard Specifications" and the 2022 California Building Code.
- C. Comply with the current provisions of the following Codes and Standards.
 - 1. Federal Specifications:
 - a. UU-B-790A (Int.Amd. 1) Building Paper, Vegetable Fiber (Kraft, Waterproofed, Water Repellant and Fire Resistant).
 - 2. Commercial Standards:
 - a. ACI 214 Recommended Practice for Evaluation of Strength Test Results of Concrete.
 - b. ACI 301 Specifications for Structural Concrete for Buildings.
 - c. ACI 315 Details and Detailing of Concrete Reinforcement.
 - d. ACI 318-14 Building Code Requirements for Reinforced Concrete.
 - e. ACI 347 Recommended Practice for Concrete Formwork.
 - f. ACI 350 Recommended Practice for Sanitary Structure.
 - g. ASTM C 31 Practices for Making and Curing Concrete Test Specimens in the Field.
 - h. ASTM C 33 Specification for Concrete Aggregates.

- i. ASTM C 39 Test Method for Compressive Strength of Cylindrical Concrete Specimens.
- j. ASTM C 40 Test Method for Organic Impurities in Fine Aggregates for Concrete.
- k. ASTM C 42 Methods of Obtaining and Testing Drilled Cores and Sawed Beams of Concrete.
- l. ASTM C 78 Specification for Flexural Strength.
- m. ASTM C 88 Test Method for Soundness of Aggregates by use of Sodium Sulfate or Magnesium Sulfate.
- n. ASTM C 94 Specification for Ready-Mixed Concrete.
- o. ASTM C 114 Method for Chemical Analysis of Hydraulic Cement.
- p. ASTM C 131 Test Method for Resistance to Degradation of Small-Sized Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine.
- q. ASTM C 136 Method for Sieve Analysis of Fine and Coarse Aggregate.
- r. ASTM C 143 Test Method for Slump of Portland Cement Concrete.
- s. ASTM C 150 Specification for Portland Cement.
- t. ASTM C 156 Test Method for Water Retention by Concrete Curing Materials.
- u. ASTM C 157 Test Method for Length Change of Hardened Hydraulic Cement Mortar and Concrete.
- v. ASTM C 172 Specification for Sampling Fresh Concrete.
- w. ASTM C 192 Method of Making and Curing Concrete Test Specimens in the Laboratory.
- x. ASTM C 260 Specification for Air-Entraining Admixtures for Concrete.
- y. ASTM C 289 Test Method for Potential Reactivity of Aggregates (Chemical Method).
- z. ASTM C 311 Method for Sampling and Testing Fly Ash or Natural Pozzolans for Use as a Mineral Admixture in Portland Cement Concrete.
- aa. ASTM C 494 Specification for Chemical Admixtures for Concrete.
- bb. ASTM C 618 Specification for Fly Ash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture in Portland Cement Concrete.
- cc. ASTM C 979 Specification for Pigments for Integrally Colored Concrete
- dd. ASTM D 1751 Specification for Preformed Expansion Joint Fillers for Concrete Paving and Structural Construction (Non-extruding and Resilient Bituminous Types).

- ee. ASTM E 119 Method for Fire Tests of Building Construction and Materials.

1.03 CONTRACTOR SUBMITTALS

- A. Submittals shall be made in accordance with GENERAL REQUIREMENTS.
- B. The following submittals and specific information shall be provided.
1. Mix Designs: Prior to beginning the WORK, the CONTRACTOR shall submit to the ENGINEER, for review, and approval, preliminary concrete mix designs for each class and type of concrete specified herein. The mix designs shall be designed by an independent testing laboratory acceptable to the ENGINEER. All costs related to such mix design shall be borne by the CONTRACTOR.
 - a. Each concrete mix submittal shall contain the following information:
 - 1) Slump on which the design is based.
 - 2) Total gallons of water per cubic yard.
 - 3) Brand, type, composition and quantity of cement.
 - 4) Brand type, composition and quantity of fly ash.
 - 5) Specific Gravity and gradation of each aggregate.
 - 6) Ratio of fine to total aggregate per cubic yard.
 - 7) Weight (surface dry) of each aggregate per cubic yard.
 - 8) Brand, type, and ASTM designation, active chemical ingredients and quantity of each admixture.
 - 9) Copy of the Building and Safety Research Report Approval for each concrete admixture.
 - 10) Air content.
 - 11) Compressive strength based on 7 day and 28 day compression tests, including standard deviation calculations, corroborative data (if applicable), and required average comprehensive strength per ACI 318, Section 5.
 - 12) Time of initial set.
 - 13) Certification stamp and signature by a Civil or Structural engineer registered in state of California.
 - 14) Certificate of Compliance for Cement.
 2. Certified Delivery Tickets: Where ready-mix concrete is used, the CONTRACTOR shall provide certified weighmaster delivery tickets at the time of delivery of each load of concrete. Each certificate shall show the public weighmaster's signature, and the total quantities, by weight of cement, sand, each class of aggregate, admixtures, and the amounts of water in the aggregate and added at the batching plant as well as the amount of water allowed to be added at the site for the specific design mix. Each certificate shall, in addition, state the mix number, total yield in cubic yards, and the time of day, to the nearest minute, corresponding to when the batch was dispatched, when it left the

CONCRETE PAVING

plant, when it arrived at the job, the time that unloading began, and the time that unloading was finished.

3. When a water reducing admixture is to be used, the CONTRACTOR shall furnish mix designs for concrete both with and without the admixture.
4. The CONTRACTOR shall furnish a Certificate of Compliance signed by the supplier identifying the type of fly ash and stating that the fly ash complies with ASTM C 618 and these Specifications, together with all supporting test data prior to the use of the fly ash the sample represents. The supporting data shall also contain test results confirming that the fly ash in combination with the cement and water to be used meets all strength requirements and is compatible with air-entraining agents and other admixtures.
5. The CONTRACTOR shall submit to the ENGINEER for review the design mix for fly ash concrete together with the design mix for portland cement (non-fly ash) concrete as specified in this Section.

1.04 QUALITY ASSURANCE

- A. Testing for Portland Cement Concrete shall be sampled and tested in accordance with the ASTM and California Tests listed in the Standard Specifications for Public Works Construction, 2021 Edition, Section 201-1.1.5.
- B. Samples for strength tests of each class of concrete placed each day shall be taken not less than once a day, or not less than once for each 50 cubic yards of concrete, or not less than once for each 2,000 square feet of surface area for slabs. Additional samples for seven-day compressive strength tests shall be taken for each class of concrete at the beginning of the concrete work or whenever the mix or aggregate is changed.
- C. The cost of all laboratory tests on cement, aggregates, and concrete, will be borne by the CONTRACTOR.
- D. Concrete for testing shall be supplied by the CONTRACTOR at no cost to the Owner, and the CONTRACTOR shall provide assistance and facilities to the INSPECTOR in obtaining samples, and disposal and cleanup of excess material.
- E. Curbs and gutters shall be staked by a Land Surveyor licensed to practice in the State of California.
- F. Job Mock-Up
 1. General
 - a. Make samples on-site; revise as required; obtain Architect's approval, 10 days prior to casting finished work.
 - b. Finished work to match approved samples.
 - c. Approved sample may be incorporated into the work. Retain samples until completion of all concrete work.
 - d. Include typical tooled joint control in sample.
 2. Broom Finished Concrete; Exterior Flatwork: Provide sample, 20 s.f. minimum area.
 3. "Sacked" Vertical Surface; Exterior Wall: Provide sample, 5 sf. minimum area.

- G. Construction Tolerances: The CONTRACTOR shall set and maintain concrete forms and perform finishing operations so as to ensure that the completed work is within the tolerances specified herein. Surface defects and irregularities are defined as finishes and are to be distinguished from tolerances. Tolerance is the specified permissible variation from lines, grades, or dimensions shown. Where tolerances are not stated in the specifications, permissible deviations will be in accordance with ACI 347.
- H. Construction tolerances shall not violate dimensions, grades, slopes required by CBC for accessibility requirements. Adjust work accordingly to comply with requirements.
- I. The following construction tolerances are hereby established and apply to finished walls and slab unless otherwise shown:

<u>Item</u>	<u>Tolerance</u>
Variation of the constructed linear outline from the established position in plan.	In 10 feet: 1/8-inch; In 20 feet or more: 1/4-inch
Variation from the level or from the grades shown.	In 10 feet: 1/8-inch; In 20 feet or more: 1/4-inch
Variation from the plumb	In 10 feet: 1/8-inch; In 20 feet or more: 1/4-inch
Variation in the thickness of slabs and walls.	Minus 1/8-inch; Plus 1/4-inch
Variation in the locations and sizes of slabs and wall openings.	Plus or minus 1/8-inch

PART 2 - PRODUCTS

2.01 CONSTRUCTION MATERIALS

- A. Materials shall be delivered, stored, and handled so as to prevent damage by water or breakage. Only one brand of cement shall be used. Cement reclaimed from cleaning bags or leaking containers shall not be used. All cement shall be used in the sequence of receipt of shipments.
- B. All materials furnished for the work shall comply with the requirements of Sections 201, 203, and 204 of ACI 301, as applicable.
- C. Storage of materials shall conform to the requirements of Section 205 of ACI 301.
- D. Form Materials: Plywood, metal, metal-framed plywood, or other acceptable panel-type materials to provide full-depth, continuous, straight, smooth exposed surfaces. Conform to Section 303-5.2 of the Standard Specifications.
1. Use flexible or curved forms for curves of a 100-foot or less radius.
- E. Reinforcing Materials: As follows:
1. Steel Reinforcing Bars: ASTM A 615 deformed grade 60 billet steel, plain finish, unless otherwise specified on Construction Document. Fabrication, sampling and jobsite handling shall conform to the requirements in ASTM Designation: D 3963, except the 2 samples shall be 30 inches long.

2. Dowels:

- a. Dowel bars shall be plain round smooth conforming to the requirements in ASTM Designation: A 615/A 615M, Grade 60 except that the two samples required in ASTM Designation: D 3963/D 3963M shall be 18 inches long. Dowel bars shall be free from burrs or other deformations detrimental to free movement of the bars in the concrete
- b. Dowel bars shall be lubricated with a bond breaker over the entire bar. A bond breaker application of petroleum paraffin based lubricant or white-pigmented curing compound shall be used to coat the dowel bars completely prior to placement. Oil and asphalt based bond breakers shall not be used. Paraffin based lubricant shall be Dayton Superior DSC BB-Coat or Valvoline Tectyl 506 or an approved equal. Paraffin based lubricant shall be factory applied. White pigmented curing compound shall conform to the requirements of ASTM Designation: C 309, Type 2, Class A, and shall contain 22 percent minimum nonvolatile vehicles consisting of at least 50 percent paraffin wax. Curing compound shall be applied in 2 separate applications, the last application not more than 8 hours prior to placement of the dowel bars. Each application of curing compound shall be applied at the approximate rate of one gallon per 15 square yards.

3. Epoxy for bonding tie bars and dowel bars 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 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 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. 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. Epoxy shall be applied in conformance with the manufacturer's recommendations.

- a. Simpson Strong-Tie Set-3G High Strength Epoxy Adhesive (or approved equal) ICC-ES ESR-4057.

F. Concrete Materials: As follows:

1. Cement shall be standard brand portland cement conforming to ASTM C 150 for Type II. Portland cement shall contain not more than 0.60 percent alkalies. The term "alkalies" referred to herein is defined as the sum of the percentage of sodium oxide and 0.658 times the percentage of potassium oxide ($\text{Na}_2\text{O} + 0.658 \text{K}_2\text{O}$). These oxides shall be determined in accordance with ASTM C 114. A single brand of cement shall be used throughout the work, and prior to its use, the brand shall be acceptable to the ENGINEER. The cement shall be suitably protected from exposure to moisture until used. Cement that has become lumpy shall not be used. Sacked cement shall be stored in such a manner so as to permit access for inspection and sampling. Certified mill test reports for each shipment of cement to be used shall be submitted to the INSPECTOR.
2. Concurrent with strength design criteria, concrete shall also be proportioned to provide the requisite durability to satisfy the exposure conditions imposed by either environment and/or service. Durability, in this context, refers to the ability of the concrete to resist deterioration from the environment or service in which it is placed. Concrete proportioned in accordance with ACI 318, chapter 4, Durability Requirements, will meet this criteria.

3. Combined Aggregate: 1" maximum coarse aggregate size conforming to Grading C of Standard Specifications Section 201-1.3.2(A). Aggregates shall be obtained from pits acceptable to the INSPECTOR, shall be non-reactive, and shall conform to ASTM C 33.
4. Water: Shall be potable, clean, and free from objectionable quantities of silty organic matter, alkali, salts and other impurities. The water shall be considered potable, for the purposes of this Section only, if it meets the requirements of the local governmental agencies.
5. *"Pea gravel" mix is not acceptable*, unless specifically approved in writing by the Civil Engineer of Record prior to construction.

G. Admixtures:

1. The ENGINEER may require the use of admixtures or the CONTRACTOR may propose to use admixtures to control the set, effect water reduction, and increase workability. In either case, the addition of an admixture shall be at the CONTRACTOR's expense. The use and continued use of an admixture shall be approved by the ENGINEER. Admixtures specified herein, other than calcium chloride, shall conform to the requirements of ASTM C 494. The required quantity of cement shall be used in the mix regardless of whether or not an admixture is used. Admixtures shall contain no free chloride ions, be non-toxic after 30 days, and shall be compatible with and made by the same manufacturer as the air entraining admixture.
2. These admixtures shall not be used in greater doses than those recommended by the manufacturer or permitted by the ENGINEER. The permitted dosage of the admixture shall not exceed that which will result in an increase in the driving shrinkage of the concrete in excess of 20 percent when used in precast or prestressed concrete, or 10 percent when used in any other structural concrete. The strength of concrete containing the admixture in the amount of proposed shall, at the age of 48 hours and longer be not less than that of similar concrete without the admixture. The admixture shall not adversely affect the specified air content, unless permitted by the ENGINEER.
3. Set controlling admixture shall be either with or without water-reducing properties. Where the air temperature at the time of placement is expected to be consistently over 80 degrees F, a set retarding admixture such as [Sika Chemical Corporation's Plastiment], [Master Builder's Pozzoloth 300R], or equal shall be used. Where the air temperature at the time of placement is expected to be consistently under 40 degrees F, a set accelerating admixture such as [Sika Chemical Corporation's Plastocrete 161FL], [Master Builder's Pozzoloth 50C], or equal shall be used.
4. Low range water reducer shall conform to ASTM C 494, Type A. It shall be either a hydroxylated carboxylic acid type or a hydroxylated polymer type. The quantity of admixture used and the method of mixing shall be in accordance with the manufacturer's instructions and recommendations.
5. High range water reducer shall be sulfonated polymer conforming to ASTM C 494, Type F or G.
 - a. If the high range water reducing agent is added to the concrete at the batch plant, it shall be second generation type, [Daracem 100, as manufactured by W.R. Grace & Co.]; [Pozzoloth 430R, as manufactured by Masterbuilders]; or equal. High range water reducer shall be added to

the concrete after all other ingredients have been mixed and initial slump has been verified.

- b. If the high range water reducer is added to the concrete at the job site, it shall be used in conjunction with a low range water reducer and shall be [Pozzolith 400N and Pozzolith MBL82, as manufactured by Masterbuilders]; [WRDA 19 and WRDA 79, as manufactured by W.R. Grace & Co.]; or equal. Concrete shall have a slump of 3-inches \pm 1/2-inch prior to adding the high range water reducing admixture at the job site. The high range water reducing admixture shall be accurately measured and pressure injected into the mixer as a single dose by an experienced technician. A standby system shall be provided and tested prior to each day's operation of the job site system.
- 6. Air-entraining agent meeting the requirements of ASTM C 260, shall be used. Sufficient air-entraining agent shall be used to provide a total air content of 3 to 4 percent; provided that, when the mean daily temperature in the vicinity of the worksite falls below 40 degrees F for more than one day, the total air content provided shall be 5 to 6 percent. The Owner reserves the right, at any time, to sample and test the air-entraining agent received on the job by the CONTRACTOR. The air-entraining agent shall be added to the batch in a portion of the mixing water. The solution shall be batched by means of a mechanical batcher capable of accurate measurement.
- 7. Calcium Chloride: Except as otherwise provided herein, calcium chloride will not be permitted to be used in concrete.
- 8. Fly ash/pozzolan shall conform to ASTM C 618 and the following supplementary requirements:
 - a. Class F fly ash
 - o Loss on ignition, maximum 4 percent
 - o S03 content, maximum 3 percent
 - o Moisture content, maximum 1 percent
 - b. Class F fly ash, as a percent by weight of total cementitious material, shall not exceed 15 percent.
 - c. When Sulfate Resistant or Special Exposure Concrete is specified, test results shall be submitted to the Engineer as specified in Section 2-5.3 of the Standard Specifications. The test result shall show that the fly ash to be used is effective in contributing to sulfate resistance in conformance with ASTM C618, Table 3 (optional physical requirements) as tested in accordance with ASTM C 1012. The data submitted shall be less than 6 months old.

H. Curing Materials:

- 1. Concrete curing compound shall conform to the requirements of ASTM C309 Type 1-D (clear or translucent with a fugitive dye), Class B (Resin Type Only), except the loss of water shall not exceed 0.15 kilograms per square meter in 24 hours nor 0.45 kilograms per square meter in 72 hours when tested in accordance with ASTM C 156. The CONTRACTOR shall provide, when requested by the ENGINEER, certified copies of vendor's test report showing compliance with ASTM C 309 and these specifications. The testing and the report shall be supplied without cost to the Agency. All compounds shall be furnished by the CONTRACTOR in sealed original containers labeled in accordance with ASTM C 309 and with the date of manufacture.

2. Polyethylene sheet for use as concrete curing blanket shall be white and conform to ASTM C 171. The loss of moisture when determined in accordance with the requirements of ASTM C 156 shall not exceed 0.055 grams per square centimeter of surface.
 3. Polyethylene-coated burlap for use as concrete curing blanket shall conform to ASTM C 171. The loss of moisture, when determined in accordance with the requirements of ASTM C 156, shall not exceed 0.055 grams per square centimeter of surface.
- I. Expansion Joint Filler Material
1. Fiber expansion joint, W.R. Meadows, or approved equal, 3/8-inch thick material conforming to ASTM D 1751.
 2. Silicone Joint Sealant: Premium-grade, high-performance, moisture-cured, single-component, polyurethane-based, non-sag elastomeric sealant. Meets Federal specification TT-S-00230C. Meets ASTM C-920, Type S, Class 25 or 35; Grade NS, Use T or NT, Shore A Hardness (21 day) 35-45. A Certificate of Compliance for the silicone sealant shall be furnished to the Engineer. 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.
 - a. Sika Corporation, Sikaflex-2C NS/CL or approved equal.
- J. Related Materials: As follows:
1. Damp-proofing agent shall be an asphalt emulsion, such as [Sonneborn Hydrocide 660], [Flintkote C-13-E Foundation Coating], or equal.
 2. Epoxy adhesives shall be the following products for the applications specified:
 - a. For bonding freshly-mixed, plastic concrete to hardened concrete, [Sikadur Hi-Mod Epoxy Adhesive, as manufactured by Sika Chemical Corporation]; [Concresive 1001-LPL, as manufactured by Adhesive Engineering Company]; or equal.
 - b. For bonding hardened concrete or masonry to steel, [Colma-Dur Gel], [Sikadur Hi-Mod Gel], or equal.
- K. Light Duty Site Concrete Mix Design: At a minimum, site work concrete (flatwork and curbs) shall conform to the Standard Specifications for Public Works Construction, Section 201-1.1.2 mix class 560-C-3250.
1. Compressive Strength: minimum of 3,250 psi at 28 days compressive strength.
 2. Slump Limit: 4 inches at point of placement.
 3. Air Content: 4% +/- 1% percent.
- L. Heavy Duty Site Concrete Mix Design: At a minimum, heavy duty site work concrete shall conform to the Standard Specifications for Public Works Construction, Section 201-1.1.2 mix class 650-CLE-4000P.
1. Compressive Strength: minimum of 4,000 psi at 28 days compressive strength.
 2. Slump Limit: 4 inches at point of placement.

3. Air Content: 4% +/- 1% percent.
- M. Pool Deck Concrete Mix Design: At a minimum, pool deck concrete shall conform to the Standard Specifications for Public Works Construction, Section 201-1.1.2 mix class 650-CLE-4000P.
1. Compressive Strength: minimum of 4,000 psi at 28 days compressive strength.
 2. Slump Limit: 4 inches at point of placement.
 3. Concrete shall have XYPEX C-500 Crystalline waterproofing admixture. 2% - 2.5% by weight of cement concrete. Contact Xypex Technical Services to confirm dosage. (To be used for swimming pool decks only).
 4. Natural gray concrete.
- N. Slurry Mix Design:
1. Compressive Strength: 100 psi at min. 28 days compr. strength.
 2. Slump Limit: 5 inches at point of placement.
 3. Cement per cu yard (sacks): 1.0
 4. Aggregate Gradation: "E" per S.S.P.W.C. table 201-1.3.2.

PART 3 - EXECUTION

3.01 PREPARATION OF SURFACES FOR CONCRETING

- A. General: Earth surfaces shall be thoroughly wetted by sprinkling, prior to the placing of any concrete, and these surfaces shall be kept moist by frequent sprinkling up to the time of placing concrete thereon. The surface shall be free from standing water, mud, and debris at the time of placing concrete.
- B. Subgrade Preparation:
1. Refer to Table 1 on sheet C6.0 of the construction documents.
- C. The subgrade preparation recommendations on C6.0 are based on the assumption that soils encountered during field exploration are representative of soils throughout the site. However, there can be unforeseen and unanticipated variations in soils between points of subsurface exploration. For this reason, the actual scarification or over-excavation depths will have to be determined on the basis of in-grading observations and testing performed by representatives of the project geotechnical consultant.
- D. A California Licensed Surveyor (LS) must provide grade stakes and elevations for the Geotechnical Engineer to verify that the over-excavation depths, shown on the construction drawings for concrete pavement structural sections, have been achieved prior to re-compaction.
- E. Joints in Concrete: Concrete surfaces upon or against which concrete is to be placed, where the placement of the old concrete has been stopped or interrupted so that, as determined by the ENGINEER, the new concrete cannot be incorporated integrally with that previously placed, are defined as construction joints. The surfaces of horizontal joints shall be given a compacted, roughened surface for good bond. Except where the Drawings call for joint surfaces to be coated, the joint surfaces shall be cleaned of all laitance, loose or defective concrete, and foreign material. Such cleaning shall be

accomplished by sandblasting followed by thorough washing. All pools of water shall be removed from the surface of construction joints before the new concrete is placed.

- F. Embedded Items: No concrete shall be placed until all formwork, installation of parts to be embedded, reinforcement steel, and preparation of surfaces involved in the placing have been completed and ACCEPTED by the INSPECTOR at least 24 hours before placement of concrete. All surfaces of forms and embedded items that have become encrusted with dried grout from concrete previously placed shall be cleaned of all such grout before the surrounding or adjacent concrete is placed.
- G. All inserts or other embedded items shall conform to the requirements herein.
- H. All reinforcement, anchor bolts, sleeves, inserts, and similar items shall be set and secured in the forms where shown or by shop drawings and shall be acceptable to the INSPECTOR before any concrete is placed. Accuracy of placement is the responsibility of the CONTRACTOR.
- I. Where concrete is to be cast against old concrete, (greater than 60 days of age), the surface of the old concrete shall be thoroughly cleaned and roughened by sand-blasting, exposing the aggregate. In concrete shear-walls, suspended slabs and roof slabs, the interface surface at construction joints shall be roughened to a full amplitude of one quarter inch. The hardened surface shall be cleaned of all latent foreign material and washed clean, prior to the application of an epoxy bonding agent.
- J. No concrete shall be placed in any structure until all water entering the space to be filled with concrete has been properly cut off or has been diverted by pipes, or other means, and carried out of the forms, clear of the work. No concrete shall be deposited underwater nor shall the CONTRACTOR allow still water to rise on any concrete until the concrete has attained its initial set. Water shall not be permitted to flow over the surface of any concrete in such manner and at such velocity as will injure the surface finish of the concrete. Pumping or other necessary dewatering operations for removing ground water, if required, will be subject to the review of the ENGINEER.
- K. Corrosion Protection: Pipe, conduit, dowels, and other ferrous items required to be embedded in concrete construction shall be so positioned and supported prior to placement of concrete that there will be a minimum of 2-inches clearance between said items and any part of the concrete reinforcement. Securing such items in position by wiring or welding them to the reinforcement will not be permitted.
- L. Openings for pipes, inserts for pipe hangers and brackets, and the setting of anchors shall, where practicable, be provided for during the placing of concrete.
- M. Anchor bolts shall be accurately set, and shall be maintained in position by templates while being embedded in concrete.
- N. Cleaning: The surfaces of all metalwork to be in contact with concrete shall be thoroughly cleaned of all dirt, grease, loose scale and rust, grout, mortar, and other foreign substances immediately before the concrete is placed.

3.02 HANDLING, TRANSPORTING, AND PLACING

- A. General: Placing of concrete shall conform to the applicable requirements of ACI 301 and the requirements of this Section.
- B. The total elapsed time between the addition of water at the batch plant and the completion of the discharge of the P.C.C. from the mixer shall not exceed 90 minutes. All P.C.C. remaining in the mixer after said 90-minute time limit shall be rejected and removed from the project site.

- C. Non-Conforming Work or Materials: Concrete which upon or before placing is found not to conform to the requirements specified herein shall be rejected and immediately removed from the work. Concrete which is not placed in accordance with these Specifications, or which is of inferior quality, shall be removed and replaced by and at the expense of the CONTRACTOR.
- D. Whenever batch trucks or other paving equipment cause rutting of the subgrade or subbase in concrete placement areas, inspectors shall immediately stop construction. Construction shall not be allowed to resume until distorted subgrade or subbase is repaired. Contractors and inspectors should locate by proof rolling, any questionable unstable areas in advance to avoid distortion under equipment. Wet, unstable areas must be dried out or replaced before starting placement of asphalt. Locating wet or soft areas in advance can be accomplished by testing finished subgrade or subbase with a loaded truck. Construction of concrete pavement should not proceed unless testing gives a reasonable indication that distortions will not occur during construction of overlying pavement. When repair, aeration, and recompaction are required to correct damage from Contractor's operation, all necessary repair will be done at Contractor's expense. However, if the Engineer determines that additional depth of aeration and recompaction are needed, that should be paid by change order.
- E. All pull boxes, meter boxes, valve covers and manholes shall be adjusted to proposed finish grade prior to placement of the P.C.C.
- F. Dowel Placement:
 - 1. Dowel bars shall be centered on the joint within a tolerance of ± 2 inches in the longitudinal direction directly over the contact joint or sawcut for the transverse weakened plane joints, as shown on the plans. Prior to placement of dowel bars, the Contractor shall submit to the Engineer a written procedure to identify the transverse weakened plane joint locations relative to the middle of the dowel bars and the procedure for consolidating concrete around the dowel bars.
 - 2. Dowel bars shall be placed at longitudinal joints as shown on the plans. Dowel bars shall be placed as shown on the plans by using mechanical insertion. When dowel bars are placed by mechanical insertion, the concrete over the dowel bars shall be reworked and refinished so that there is no evidence on the surface of the completed pavement that there has been any insertion performed. When drill and bonding of dowel bars is performed at contact joints, a grout retention ring shall be used.
- G. Concrete shall not be placed until the forms and reinforcement have been inspected, all preparations for the placement have been completed, and the preparations have been checked by the project inspector, all subject to the observation of the engineer or architect.
- H. Casting New Concrete Against Old: An approved epoxy adhesive bonding agent shall be applied to the old surfaces according to the manufacturer's written recommendations. This provision shall not apply to joints where waterstop is installed.
- I. Conveyor Belts and Chutes: All ends of chutes, hopper gates, and all other points of concrete discharge throughout the CONTRACTOR'S conveying, hoisting and placing system shall be so designed and arranged that concrete passing from them will not fall separated into whatever receptacle immediately receives it. Conveyor belts, if used, shall be of a type acceptable to the INSPECTOR. Chutes longer than 50 feet will not be permitted. Minimum slopes of chutes shall be such that concrete of the specified consistency will readily flow in them. If a conveyor belt is used, it shall be wiped clean by a device operated in such a manner that none of the mortar adhering to the belt will be wasted. All conveyor belts and chutes shall be covered. Sufficient illumination shall be

provided in the interior of all forms so that the concrete at the places of deposit is visible from the deck or runway.

- J. Placement in Slabs: Concrete placed in sloping slabs shall proceed uniformly from the bottom of the slab to the top, for the full width of the pour. As the work progresses, the concrete shall be vibrated and carefully worked around the slab reinforcement, and the surface of the slab shall be screeded in an up-slope direction.
- K. Temperature of Concrete: The temperature of concrete when it is being placed shall be not more than 90 degrees F nor less than 40 degrees F in moderate weather, and not less than 50 degrees F in weather during which the mean daily temperature drops below 40 degrees F. Concrete ingredients shall not be heated to a temperature higher than that necessary to keep the temperature of the mixed concrete, as placed, from falling below the specified minimum temperature. If concrete is placed when the weather is such that the temperature of the concrete would exceed 90 degrees F, the CONTRACTOR shall employ effective means, such as precooling of aggregates and mixing water using ice or placing at night, as necessary to maintain the temperature of the concrete, as it is placed, below 90 degrees F. The CONTRACTOR shall be entitled to no additional compensation on account of the foregoing requirements.
- L. Cold Weather Placement: Earth foundations shall be free from frost or ice when concrete is placed upon or against them. Fly ash concrete shall not be placed when the air temperature falls below 50 degrees F.
- M. A transverse construction joint shall be constructed, including dowel bars, at the end of each day's work or where concrete placement is interrupted for more than 30 minutes, to coincide with the next contraction joint location. If sufficient concrete has not been mixed to form a slab to match the next contraction 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 excess concrete shall be at the Contractor's expense. Excess material shall become the property of the Contractor and shall be disposed of. 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.
- N. Float Finish: Begin floating when bleed water sheen has disappeared and the concrete surface has stiffened sufficiently to permit operations. Float surfaces to true planes within a tolerance of 1/4 inch in 10 feet as determined by a 10-foot-long straightedge placed anywhere on the surface in any direction. The finished surface shall be free from humps, sags, blemishes or other irregularities Cut down high spots and fill low spots. Refloat surface immediately to a uniform granular texture.
- O. Broom Finish Type:
 - 1. Surfaces Sloped Less than 6%: Provide a medium salt (medium broom) finish by drawing a soft bristle broom across concrete surface, perpendicular to line of traffic, to provide a uniform fine line texture.
 - 2. Surfaces Sloped greater than 6%: Provide a slip resistant (heavy broom finish) by striating surface 1/16 inch to 1/8 inch deep with a stiff-bristled broom, perpendicular to line of traffic.
- P. Joints:
 - 1. Joints: Joints in concrete curb, gutter and flatwork shall be designated as expansion joints and control joints. Joints for concrete flatwork shall be provided in spacing noted on the architectural plans. Expansion joints for curbs / curb & gutter shall be placed at no greater than 15 feet on center or as indicated on construction drawings.

- a. Expansion Joints: Provide premolded joint filler, material meeting Section 2.01-I herein.
 - 1) Extend expansion joint fillers full-width and depth of joint, and 1/4" below finished surface where joint filler is indicated. If no joint sealer is called for, place top of premolded joint filler flush with top of concrete or curb.
 - 2) Where silicone joint sealer is noted on the construction documents, the premolded joint filler strips shall be placed 1" below the surface of the concrete or curb, the full width of the expansion joint. The remainder of all joints shall be filled to within 1/4" below the surface of the concrete with the silicone joint sealant.
 - 3) Provide expansion joint filler strips, with elastomeric sealer, between p.c.c. walk and curb, p.c.c. walk and buildings, & p.c.c. walk and retaining walls and at locations noted on the construction documents. The depth of the filler strip shall be the depth of the p.c.c. walk plus 1 inch with the top set flush with the specified grade of the top of curb or walk.
 - b. Control Joints:
 - 1) Control joints in site work concrete shall comply with details on sheet C6.0.
- Q. Protection: In hot, dry, and windy weather protect concrete from rapid moisture loss before and during finishing operations with an evaporation-control film. Apply according to manufacturer's instructions after screeding and bull floating, but before floating.

3.03 TAMPING AND VIBRATING

- A. As concrete is placed in the forms or in excavations, it shall be thoroughly settled and compacted, throughout the entire depth of the layer which is being consolidated, into a dense, homogeneous mass, filling all corners and angles, thoroughly embedding the reinforcement, eliminating rock pockets, and bringing only a slight excess of water to the exposed surface of concrete during placement. Vibrators shall be high speed power vibrators (8000 to 10,000 rpm) of an immersion type in sufficient number and with (at least one) standby units as required.
- B. Care shall be used in placing concrete around waterstops. The concrete shall be carefully worked by rodding and vibrating to make sure that all air and rock pockets have been eliminated. Where flat-strip type waterstops are placed horizontally, the concrete shall be worked under the waterstops by hand, making sure that all air and rock pockets have been eliminated. Concrete surrounding the waterstops shall be given additional vibration, over and above that used for adjacent concrete placement to assure complete embedment of the waterstops in the concrete.
- C. Concrete in walls shall be internally vibrated and at the same time rammed, stirred, or worked with suitable appliances, tamping bars, shovels, or forked tools until it completely fills the forms or excavations and closes snugly against all surfaces. Subsequent layers of concrete shall not be placed until the layers previously placed have been worked thoroughly as specified. Vibrators shall be provided in sufficient numbers, with standby units as required, to accomplish the results herein specified within 15 minutes after concrete of the prescribed consistency is placed in the forms. The vibrating head shall be kept from contact with the surfaces of the forms. Care shall be taken not to vibrate

concrete excessively or to work it in any manner that causes segregation of its constituents.

3.04 CURING

- A. Comply with 2022 California Building Code, Title 24, Part 2, Volume 2, Section 1905A.11.
 - 1. Begin final curing procedures immediately following initial curing and before concrete has dried. Continue final curing for at least seven (7) days in accordance with ACI 301 procedures. Avoid rapid drying at end of final curing period.
- B. Curing Methods: Perform curing of concrete by curing as herein specified.
 - 1. Provide moisture-curing by the following methods:
 - a. Keep concrete surface continuously wet by covering with water.
 - b. Continuous water-fog spray.
 - c. Covering concrete surface with specified absorptive cover, thoroughly saturating cover with water and keeping continuously wet. Place absorptive cover to provide coverage of concrete surfaces and edges, with 4 inch lap over adjacent absorptive covers.
 - 2. Provide curing and sealing compound to exposed exterior slabs, walks, and curbs, as follows:
 - a. Apply specified curing and sealing compound to concrete slabs as soon as final finishing operations are complete (within 2 hours). Apply uniformly in continuous operation by power-spray or roller in accordance with manufacturer's directions. Re-coat areas subjected to heavy rainfall within 3 hours after initial application. Maintain continuity of coating and repair damage during curing period.
 - b. Do not use membrane curing compounds on surfaces which are to be covered with coating material applied directly to concrete, liquid, floor hardener, waterproofing, dampproofing, membrane roofing, flooring (such as ceramic or quarry tile, glue-down carpet), painting, and other coatings and finish materials, unless otherwise acceptable to Architect.
- C. Concrete slabs and paving shall be properly cured and protected against damage and defacement of nature during construction operations. If weather is hot or surface has dried out, spray surface with fine mist of water starting not later than two hours after final troweling. Surface of finish shall be kept continuously wet for at least ten days. Wetting is considered emergency work and shall be performed on weekends and holidays if necessary.
- D. The CONTRACTOR shall protect all concrete against injury or damage from excessive heat, lack of moisture, overstress, or any other cause until final acceptance by the Owner. Particular care shall be taken to prevent the drying of concrete and to avoid roughening or otherwise damaging the surface. Any concrete found to be damaged, or which may have been originally defective, or which becomes defective at any time prior to the final acceptance of the completed work, or which departs from the established line or grade, or which, for any other reason, does not conform to the requirements of the Contract Documents, shall be satisfactorily repaired or removed and replaced with acceptable concrete at the CONTRACTOR'S expense. Exclude traffic from concrete paving for at least 7 days after placement.

- E. Maintain concrete paving free of stains, discoloration, dirt, and other foreign material. Sweep concrete paving not more than 2 days prior to date scheduled for Substantial Completion inspections.

3.05 PUMPING OF CONCRETE

- A. General: If the pumped concrete does not produce satisfactory end results, the CONTRACTOR shall discontinue the pumping operation and proceed with the placing of concrete using conventional methods.
- B. Pumping Equipment: The pumping equipment must have 2 cylinders and be designed to operate with one cylinder only in case the other one is not functioning. In lieu of this requirement, the CONTRACTOR may have a standby pump on the site during pumping.
- C. The minimum diameter of the hose (conduits) shall be 4-inches.
- D. Pumping equipment and hoses (conduits) that are not functioning properly, shall be replaced.
- E. Aluminum conduits for conveying the concrete will not be permitted.
- F. Proportioning: Minimum compressive strength, cement content, and maximum size of aggregates shall be as specified herein.
- G. Gradation of coarse aggregates shall conform to ASTM C 33 and shall be as close to the middle range as possible.
- H. Gradation of fine aggregate shall conform to ASTM C 33, with 15 to 30 percent passing the number 50 screen and 5 to 10 percent passing the number 100 screen. The fineness modulus of sand used shall not be over 3.00.
- I. Water and slump requirements shall conform to the requirements of this Section.
- J. Cement and admixtures shall conform to the requirements of this Section.
- K. Field Control: Concrete samples for slump per ASTM C 143 and test cylinders per ASTM C 31 and C 39.

3.06 TREATMENT OF SURFACE DEFECTS

- A. As soon as forms are removed, all exposed surfaces shall be carefully examined and any irregularities shall be immediately rubbed or ground in a satisfactory manner in order to secure a smooth, uniform, and continuous surface. Plastering or coating of surfaces to be smoothed will not be permitted. No repairs shall be made until after inspection by the ENGINEER. In no case will extensive patching of honeycombed concrete be permitted. Concrete containing minor voids, holes, honeycombing, or similar depression defects shall have them repaired as specified herein. Concrete containing extensive voids, holes, honeycombing, or similar depression defects, shall be completely removed and replaced.
 - 1. All repairs and replacements herein specified shall be promptly executed by the CONTRACTOR at its own expense.
- B. Defective surfaces to be repaired shall be cut back from trueline a minimum depth of 1/2-inch over the entire area. Feathered edges will not be permitted. Where chipping or cutting tools are not required in order to deepen the area properly, the surface shall be prepared for bonding by the removal of all laitance or soft material, and not less than 1/32-inch depth of the surface film from all hard portions, by means of an efficient sandblast. After cutting and sandblasting, the surface shall be wetted sufficiently in advance of shooting with shotcrete or with cement mortar so that while the repair material

is being applied, the surfaces under repair will remain moist, but not so wet as to overcome the suction upon which a good bond depends. The material used for repair purposes shall consist of a mixture of one sack of cement to 3 cubic feet of sand. For exposed walls, the cement shall contain such a proportion of Atlas white portland cement as is required to make the color of the patch match the color of the surrounding concrete.

- C. Holes left by tie-rod cones shall be reamed so as to leave the surfaces of the holes clean and rough. These holes then shall be repaired in an approved manner with non-shrink grout. Holes left by form-tying devices having a rectangular cross-section, and other imperfections having a depth greater than their least surface dimension, shall not be reamed but shall be repaired in an approved manner with non-shrink grout.
- D. All repairs shall be built up and shaped in such a manner that the completed work will conform to the requirements of this Section, as applicable, using approved methods which will not disturb the bond, cause sagging, or cause horizontal fractures. Surfaces of said repairs shall receive the same kind and amount of curing treatment as required for the concrete in the repaired section.
- E. Prior to filling any structure with water, all cracks that may have developed shall be repaired to the satisfaction of the ENGINEER. This repair method shall be done on the water bearing face of members. Prior to backfilling, faces of members in contact with fill, which are not covered with a waterproofing membrane, shall also have cracks repaired as specified herein.
- F. The finished surface shall be free from humps, sags, blemishes or other irregularities.

3.07 FIELD QUALITY CONTROL

- A. Correction of Mix Design for Failed Concrete Tests: If the compressive cylinder strength test for in place PCC yields test results below the specified 28-day PCC compressive strength and the Engineer determines a corrective change is necessary, the Contractor shall, at its own expense, make corrective changes in the mix proportions. The Engineer shall approve the changes in the mix proportions or PCC placement procedures, before any additional PCC is placed on the job.
- B. Flood Tests: BEFORE ACCEPTANCE, ALL NEW CONCRETE SHALL BE WATER TESTED TO ENSURE PROPER DRAINAGE AS DIRECTED BY THE INSPECTOR. THE CONTRACTOR SHALL PROVIDE WATER FOR THIS PURPOSE. THE FLOODING SHALL BE DONE BY WATER TANK TRUCK. DEPRESSIONS WHERE THE WATER PONDS TO A DEPTH OF MORE THAN 0.01 FOOT SHALL BE FILLED OR THE SLOPE CORRECTED TO PROVIDE PROPER DRAINAGE. THE EDGES OF THE FILL SHALL BE FEATHERED AND SMOOTHED SO THAT THE JOINT BETWEEN THE FILL AND THE ORIGINAL SURFACE IS INVISIBLE. PRACTICAL FIELD MEASUREMENT: 0.01 FOOT = TWO QUARTERS STACKED. NO STANDING WATER SHALL REMAIN AFTER 60 MINUTES ON A 70 DEGREE F (OR WARMER) DAY.

3.08 CARE AND REPAIR OF CONCRETE

- A. General: The CONTRACTOR shall protect all concrete against injury or damage from excessive heat, lack of moisture, overstress, or any other cause until final acceptance by the Owner. Particular care shall be taken to prevent the drying of concrete and to avoid roughening or otherwise damaging the surface. Any concrete found to be damaged, or which may have been originally defective, or which becomes defective at any time prior to the final acceptance of the completed work, or which departs from the established line or grade, or which, for any other reason, does not conform to the requirements of the Contract Documents, shall be satisfactorily repaired or removed and replaced with acceptable concrete at the CONTRACTOR'S expense.

- B. The contractor shall barricade and protect placed Portland Cement Concrete from all damage, marks, mars and/or graffiti. Any Portland Cement Concrete damaged, defaced, discolored or defective shall be replaced at the contractor's expense.

END OF SECTION 32 13 13

SECTION 32 12 36 SEAL COATS

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Surface sealer over new asphalt paved surfaces.

1.02 REFERENCES

- A. Conform to Section 203 and 302 of the Standard Specifications for Public Works Construction.
- B. Comply with International Slurry Surfacing Association (ISSA) performance guidelines.

1.03 SUBMITTALS

- A. Product Data: Submit manufacturer's product information and application procedures for bituminous surfacing.

1.04 QUALITY ASSURANCE

- A. Comply with the following as a minimum requirement: Standard Specifications Section 203-9, "SEALCOAT – ASPHALT BASED".
- B. Obtain materials from same source throughout.
- C. Schedule a pre-construction conference at jobsite in advance of beginning of Work. In existing areas to be seal coated and restriped, document existing striping to be duplicated before commencing seal coating work.
- D. Review and resolve conflicts involving requirements of specifications. Record discussions and furnish copies to all attendees.
- E. Beginning of Work means Contractor accepts all conditions.
- F. Agitate bulk materials during transport.

1.05 REGULATORY REQUIREMENTS

- A. Comply with local air quality management district regulations for emissions maximums.
- B. Maintain control of vehicular and pedestrian traffic during seal coating operations as required for other construction activities and in accordance with local traffic authorities having jurisdiction.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Seal Coat: The materials for sealcoat shall conform to Section 203-9 – "Sealcoat – Asphalt Based" of the Standard Specifications. Before incorporation in the Work, the Contractor shall submit a 2 Liter (2-quart) sample of undiluted seal coat at no cost to the Owner.

1. Seal Coat: Provide one of the following surface seals:

<u>Product Name</u>	<u>Manufacturer</u>
GuardTop	Vulcan Materials Company
Over Kote	Diversified Asphalt Product
Park Top	Western Colloid Products
Sure Seal	Asphalt Coating Engineering
MasterSeal	SealMaster Pavement Products & Equipment

- B. Crack Sealing: Crack sealant shall be CalSeal Modified Asphalt joint sealant as manufactured by Henry Inc, Crafcro Polyflex Type 3 or equal.

PART 3 - EXECUTION

3.01 REPAIRING AND SEALCOATING OF SURFACES

- A. Preparation of Surfaces:

1. Before placing the sealcoat, the pavement surface shall be cleaned by sweeping, flushing or other means necessary to removal all loose particles of paving, all dirt, and all other extraneous material. This shall include vegetation in pavement cracks and between pavement and curb/gutter. Prior to removal an approved herbicide, which leaves behind a visible blue marker dye, shall be sprayed where vegetation exists. Surface contaminates, grease or oil spots shall be cleaned to allow for proper adhesion.
2. Prior to applying sealcoat material, cracks wider then 1/8 inch shall be cleaned, treated with weed killer, and filled with an asphalt-based crack filler (large cracks may require several applications). For best quality, it is recommended that all broken asphalt be removed and patched with new asphalt. It is also suggested that extreme low spots be filled with new asphalt. New asphalt must cure 30 days before application of sealcoat.
3. Immediately before commencing the sealcoat operations, all surface metal utility covers (including survey monuments) shall be protected by thoroughly covering the surface with an appropriate adhesive and oiled or plastic paper. No adhesive material shall be permitted to cover, seal or fill the joint between the frame and cover of the structure. A vertical tab shall be placed on each cover for locating after the seal application is complete. The tab shall extend at least 3" above the existing pavement surface. Covers are to be uncovered and cleaned of asphalt emulsion material by the end of the same work day. Inspector shall inspect surfaces before the installation of seal coat.
4. For best results, the asphalt, just prior to being sealed, should be sprayed with a mist of water in an amount that will leave the surface damp but with no puddles or visible water. This procedure is critical when ambient temperature is hot with bright sunlight or when the pavement is excessively aged or porous.

5. A prime or tack coat may be necessary on surfaces that have weathered excessively or are dusted. The primer should be diluted with three parts clean, potable water and one part SS-1h emulsion and shall be applied at the rate of 0.05 gallon per square yard.
6. Install barricades as required to divert traffic from operations. Install temporary "no parking" signs and similar notices.

B. Application:

1. Sealcoat may be mixed with water to obtain desired consistency for job requirements to a maximum of 20% of the total volume. Care should be taken not to over dilute. Material after dilution shall be mixed with a mechanical agitator to maintain consistency and ease of application. Note that as the pavement increases in roughness, the amount of dilution should be decreased.
2. Sealcoat shall only be applied when the atmospheric temperature is greater than 55 degrees F and if rain is not forecast for the period of 24 hours after application.
3. The sealcoat material shall be applied in two applications. Unless otherwise specified, the total quantity applied (before dilution) shall be 50 gallons per 1,000 square feet.
4. Sealcoat material shall be applied using a truck-mounted tank or wheeled container in continuous parallel lines and spread by means of brooms or rubber-faced squeegees either by hand or machine and in such a manner as to eliminate all ridges, lap marks, and air pockets.
5. Hand tools shall be available in order to remove spillage. Ridges or bumps in the finished surface will not be permitted. Sealcoat material shall be homogeneous prior to spreading, with no visible separation of solids and liquids.
6. When the first coat has completely dried to the touch, apply the second coat. While misting is not normally required before second coat, surface should be clean with no foreign materials on it.

C. Drying Time:

1. Sealcoat should be allowed to dry 24 – 48 hours before permitting traffic. When asphalt is cold or in shade, or air temperature is below 75 degrees F, based on general weather, humidity and temperature conditions, drying time may need to be extended.

3.02 CLEAN UP

- A. Remove rubbish, debris and waste materials and legally dispose of off the Project site.
- B. Striping for parking or traffic flow should be done only after the sealcoat has thoroughly dried. It is recommended that a high quality water based Traffic Line Paint be used for best results.

3.03 PROTECTION

- A. Protect the Work of this section until Substantial Completion.

END OF SECTION 32 12 36

SECTION 32 9100 - SOIL PREPARATION

PART 1 GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Furnish components of the planting mediums.
 - 2. Testing and/or certifications of components
 - 3. Mixing of planting mediums.
 - 4. Transporting mediums as required.
 - 5. Weed Control
- B. Related Sections:
 - 1. Finish Grading - Section 31 22 15
 - 2. Sprinkler Irrigation System - Section 32 84 00
 - 3. Lawns and Grasses - Section 32 92 00
 - 4. Planting - Section 32 93 00

1.02 QUALITY ASSURANCE

- A. Certificates of Inspection: Certificates of inspection required for transportation shall accompany invoice for each shipment of materials. File copies of certificates with Landscape Architect after acceptance of material.
- B. Testing:
 - 1. Chemical and Physical - All soil components shall be tested by one of the following testing laboratories for conformity to the specifications:

Soil and Plant Laboratory, Incorporated
Post Office Box 153
Santa Clara, California 95052
(408) 243-0330

Harris Laboratories
624 Cypress Avenue
Sacramento, California 95814
(916) 444-4481
 - 2. Biological:
Soil Food Web, Inc.
1128 NE 2nd Street Suite 120
Corvallis, Oregon 97330
www.soilfoodweb.com
(541) 752-5066
 - 3. If herbicide contamination is suspected, then a radish/rye-grass growth trial must be performed.
 - 4. For delivered material, test one grab sample for each twenty five (25) cubic yards of bulk material delivered to the site.
 - 5. Testing will be at the expense of Contractor.

6. Deviations greater than plus or minus twenty (20%) percent from control data may be grounds for rejection of mixes tested. Non-conforming materials shall not be used. Materials which do not conform to standards specified herein shall be removed from the site.

1.03 SUBMITTALS: Furnish copies of manufacturers literature, certifications, sources, samples, or laboratory analytical data for the following items:

1. Existing soil testing data
2. Organic Amendments and Fertilizers
3. Planting Soil
4. Topsoil.
5. Sand.
6. Native Mulch (composted).
7. Compost.
8. Herbicides

PART 2 PRODUCTS

2.01 PLANTING SOIL:

A. Grading:

Sieve Size	Percent Passing Sieve
25.4 mm (1")	95-100
9.51 mm (3/8")	85-100
53 Micron (270 mesh)	10- 30

B. Chemistry - Suitability Considerations:

1. Salinity: Saturation Extract Conductivity (ECe x 103 @ 25 degrees C.) less than 2.2 mmhos/cm.
2. Sodium: Sodium Absorption Ratio (SAR) less than 9.0.
3. Boron: Saturation Extract Concentration less than 2.0 ppm.
4. Reaction: pH of Saturated Paste: 6 - 7.5.

C. Pests:

The population of any single species of plant pathogenic nematode: Fewer than 500 per pint of soil (confirm by biological testing).

D. Fertility Considerations:

Soil to contain sufficient quantities of available nitrogen, phosphorus, potassium, calcium, and magnesium to support normal plant growth. In the event of nutrient inadequacies, provisions shall be made to add required materials to overcome inadequacies prior to planting.

E. Source of above shall be approved and conformity of material shall be laboratory verified for each twenty five (25) cubic yards of material delivered to the site.

F. Percentage of Organic Matter: Min. 4-8%

G. Physical Soil Parameters

1. Clay: 5-25%
2. Silt: 25-50%
3. Sand: 25-50%

2.02 ON SITE MATERIAL:

- A. Specified backfill mixes shall consist of on-site material generally conforming to the requirements in this specification.
- B. Test on site topsoil from designated stockpile area or borrow site for conformity to this specification. Submit test to Landscape Architect for verification and alteration of components.

2.03 WOOD RESIDUALS:

- A. Source:
Shall be non-composted and/or stockpiled, and not have been chemically treated or dyed.

- B. Physical Properties - Grading:

U.S. Sieve Dry Weight Percent Passing

3/8"	100
1/4"	90 - 100
No. 8	70 - 100
No. 35	0 - 30

- C. Organic Content by Ash Analysis:

90 - 100 Percent Dry Weight

- D. Chemistry Range:

1. Saturation Extract Conductivity (ECc) Nil - 3.5

2. Reaction (pH) 6-8

- E. Salinity: Maximum saturation extract conductivity 3.5 millimhos per cm @ 25 degrees centigrade.

2.04 SAND:

- A. Physical Properties - Grading:

U.S. Sieve Percent Passing

No. 4	100
No. 10	95 - 100
No. 18	90 - 100
No. 35	65 - 100
No. 60	0 - 50
No. 140	0 - 20
No. 270	0 - 7

- B. Chemistry: Range:

1. Saturation Extract Conductivity (ECc) Nil - 3.0

2. Sodium Absorption Ratio (SAR) Nil - 6.0

3. Boron - ppm in saturation extract solution Nil - 3.0

4. Reaction (pH) 6.0 - 7.5

5. Available calcium - sodium acetate extractable - ppm dry weight Nil – 4000
6. Soluble-Salt Content: 1 to 2dS/m measured by electrical conductivity
- 7.

C. Coarse Sand – concrete sand

2.05 COMPOST:

Locally sourced when possible, made from recycled natural materials screened to 1" minus (for soil additive). On the Solvita compost maturity test score, must score a value of 5 or higher for tilling into the soil and be a minimum of 6 months old and fully composted. Supplied by the following or approved equal:

SoCal Mulch, Inc.
30115 Scott Road
Menifee, California 92584
(951)325-5355

Kellogg Garden Products
350 W. Sepulveda Blvd.
Carson, California 90745

American Soil & Stone
2121 San Joaquin Street, Bldg. A
Richmond, California 94804
(510) 292-3000

A. Chemical components:

1. pH - 6.0-8.0
2. Nitrogen – 30 ppm or higher
3. Phosphorus – 150 ppm or higher
4. Potassium – 400 ppm or higher
5. Calcium – 3000 ppm or higher
6. Magnesium – 250 ppm or higher
7. Salinity – 2500 ppm or lower
8. Zinc – 6 ppm or higher
9. Iron – 25 ppm or higher
10. Manganese – 16 ppm or higher
11. Copper – 0.4-2.0 ppm
12. Sodium – 1000 ppm or less
13. Sulfur – 25 ppm or higher
14. Boron – 2 ppm or higher

B. Biological components:

1. Bacteria – minimum of 150 micrograms per gram of soil of total bacteria
2. Fungus – minimum of 150 micrograms per gram of soil of total fungus
3. Protozoa
 - a. flagellates – 10,000 units per gram of soil
 - b. amoebae – 10,000 units per gram of soil
 - c. ciliates – 20 units per gram of soil

2.06 CHEMICAL ADDITIVES (OR EQUIVELANTS):

The following soil components listed may have a particular application specified within this Section. Some of the soil components included shall be applied at rates determined by the soil tests called for under other paragraphs of this Section or as a result of soil tests. Some

of the components may not be required by the soils tests. All additives shall be the slow release type.

- A. Ground Limestone: Agricultural limestone containing not less than eighty five (85%) percent of total carbonates, ground to such fineness that fifty (50%) percent will pass a 100 mesh sieve and ninety (90%) percent will pass a 20 mesh sieve.
- B. Dolomite Lime: Agricultural grade mineral soil conditioner containing thirty five (35%) percent minimum magnesium carbonate and forty nine (49%) percent minimum calcium carbonate, 100 percent passing #65 sieve. Kaiser Dolomite 65 AG or approved equal.
- C. Gypsum: Agricultural grade product containing eighty (80%) percent minimum calcium sulphate.
- D. Iron Sulphate (Ferric or Ferrous): Shall contain thirty (30%) to thirty five (35%) percent iron, thirty five (35%) to forty (40%) percent sulphur and be supplied by a commercial fertilizer supplier.
- E. Sulphate of Potash: Agricultural grade containing fifty (50%) percent to fifty three (53%) percent of water soluble potash.
- F. Single Superphosphate: Commercial product containing nineteen (19%) to twenty (20%) percent available phosphoric acid.
- G. Ammonium Sulphate: Commercial product containing approximately twenty one (21%) percent ammonia.
- H. Calcium Nitrate: Agricultural grade containing fifteen and one-half (15 1/2%) percent Nitrogen.
- I. I.B.D.U. (Iso Butyldiene Diurea): Commercial product containing thirty one (31%) percent Nitrogen.
- J. Soil Sulphur: Agricultural grade sulphur containing a minimum of ninety six (96%) percent sulphur.
- K. Iron Chelate Micronutrient: Sequestrene - 330 Fe; 0-0-0; ten (10%) percent Fe; Ciba-Geigy Company.

2.07 FERTILIZERS AND NUTRIENT AMENDMENTS: all 100% organic

- A. Fertilizer: MicroLife organic fertilizer as supplied by San Jacinto Environmental Supplies, Houston, Texas or approved equal.
- B. Minor and Trace Elements: Humates Plus 0-0-4 as supplied by San Jacinto Environmental Supplies, Houston, Texas or Green Sand as supplied by Nature's Way Resources, Inc. or approved equals.

PART 3 EXECUTION

PLANTING

3.01 LAWN AND NATIVE SEED AREAS – Hydromulch and Sod

- A. After finish grade approval and before laying sod or spreading seed apply:
 - 1. 2" layer of compost uniformly across area

2. 20# of MicroLife 6-2-4 fertilizer per 1,000 sq. ft.
 3. 10# of MicroLife humates plus 0-0-4 trace elements per 1,000 sq. ft.
 4. After laying sod or spreading seed, foliar spray the entire area with 8oz of MicroLife Super Seaweed mixed with a gal of water. Each gallon of mix to cover 1,000 sq. ft.
- B. Disk or till into the soil to a depth of 2"-4" until the amendments are fully incorporated before seeding and/or planting (See Section 32 92 00).
- 3.02 SHADED GROUNDCOVER AREAS
- A. After finish grade approval apply:
1. 1" layer of Compost uniformly across area
 2. 3" (in) Planting Soil
 3. 40# of MicroLife ultimate 8-4-6 fertilizer per 1,000 sq. ft.
 4. 10# of MicroLife humates plus 0-0-4 trace elements per 1,000 sq. ft.
- B. Disk or till into the soil to a depth of 4" until the amendments are fully incorporated before groundcover planting (See Section 32 92 00).
- 3.03 TREE PLANTING AREAS (Within Tree Excavation Pit)
- A. After finish grade approval before mulching apply:
1. Backfill with a 50/50 blend of existing topsoil and Planting Soil
 2. For every 15 gal. tree size, add 6 oz. MicroLife Ultimate 8-4-6
 3. 3 oz of JRM Mycorrhizal Tree Transplant
 4. 2 oz of MicroLife Super Seaweed mixed with a gal. of water. Use 2 gal. of mixed solution per 15-gal. tree size
- 3.04 SUNNY GROUNDCOVER AND PERENNIAL AREAS
- A. After finish grade approval apply:
1. 4"(in) Planting Soil
 2. 40# of MicroLife ultimate 8-4-6 fertilizer per 1,000 sq. ft.
 3. 10# of MicroGro Granular per 1,000 sq. ft.
 4. 2 oz of MicroLife Maximum Bloom 3-8-3 mixed with a gal. of water as a new plant/root stimulator. Water soak the area sufficiently to get uniform saturation.
- B. Disk or till into the soil to a depth of 6" until the amendments are fully incorporated before planting (See Section 32 93 00).
- 3.05 SHRUB PLANTING
- A. After finish grade approval before mulching apply:
1. 4"(in) Planting Soil
 2. 40# of MicroLife ultimate 8-4-6 fertilizer per 1,000 sq. ft.
- B. Disk or till into the soil to a depth of 6" until the amendments are fully incorporated before planting (See Section 32 93 00).
- 3.06 EXISTING TREES (12"+ cal.)
- A. Once a year treatment
1. 2 gal. of MicroLife Bio-Matrix 7-1-3
 2. 6 oz of JRM Mycorrhizal Injectables per 100 gal. of water

WEED CONTROL/TREATMENT

- A. All site locations to receive planting where weeds exist, shall be treated with post-emergent herbicide.
 - 1. Repeat treatment as required to ensure that no weeds are present at the beginning of work on the landscape planting of the Project.
- B. Weeds shall not be present at the date of inspection for Substantial Completion of the Project and at the conclusion of the maintenance and establishment period following acceptance of the Contractor's work.
- C. Post-emergent weed treatment includes:
 - 1. Removal of weeds and other undesirable ground cover vegetation in turf/grass and planting areas shall be accomplished a minimum of 14 days prior to soil preparation for planting operations.
 - 2. Care shall be taken not to affect existing trees, shrubs, and plants on and near the site.
- D. Pre-Emergent Herbicide treatment:
 - 1. Apply per manufacturers distribution rate prior to mulching and directly after mulching.
 - 2. Snapshot, Princep or Specticle are approved Pre-Emergents. Contractor to submit product for approval.

END OF SECTION

SECTION 32 9300 - PLANTING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Plants.
2. Tree stabilization.
3. Tree-watering devices.
4. Landscape edgings.
5. Landscape mulches and gravels

B. Related Requirements:

1. Section 32 9200 "Lawns and Grasses" for turf (lawn) and meadow planting, hydroseeding, and erosion-control materials.
2. Section 32 9100 "Soil Preparation"

1.2 COORDINATION

A. Coordination with Turf Areas (Lawns): Plant trees, shrubs, and other plants after finish grades are established and before planting turf areas unless otherwise indicated.

1. When planting trees, shrubs, and other plants after planting turf areas, protect turf areas, and promptly repair damage caused by planting operations.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Plant Materials: Include quantities, sizes, quality, and sources for plant materials.
2. Plant Photographs: Include color photographs in digital format of each required species and size of plant material as it will be furnished to Project. Take photographs from an angle depicting true size and condition of the typical plant to be furnished. Include a scale rod or other measuring device in each photograph. Identify each photograph with the full scientific name of the plant, plant size, and name of the growing nursery.
3. Irrigation inspection tube and cap materials.
4. Fertilizer tablets for tree installation

B. Samples for Verification: For each of the following:

1. Mulch: 1-quart volume of mulch required; in sealed plastic bags labeled with composition of materials by percentage of weight and source of mulch. Each Sample shall be typical of the lot of material to be furnished; provide an accurate representation of color, texture, and organic makeup.
2. Planting Soil Mix: 1-quart volume of mulch required; in sealed plastic bags labeled with composition of materials by percentage of weight and source of mulch. Each Sample

- shall be typical of the lot of material to be furnished; provide an accurate representation of color, texture, and organic makeup.
3. Weed Control Barrier: 12 by 12 inches.
 4. Edging Materials and Accessories: Manufacturer's standard size, to verify color selected.
 5. Tree Staking Materials and Accessories: post, hose, and webbing (sample of each)

1.4 QUALITY ASSURANCE

- A. Installer Qualifications: A qualified landscape installer whose work has resulted in successful establishment of plants.
1. Professional Membership: Installer shall be a member in good standing of either the Professional Landcare Network or the American Nursery and Landscape Association.
 2. Experience: Three years' experience in landscape installation in addition to requirements in Section 01 4000 "Quality Requirements."
 3. Installer's Field Supervision: Require Installer to maintain an experienced full-time supervisor on Project site when work is in progress.
 4. Personnel Certifications: Installer's field supervisor shall have certification in one of the following categories from the Professional Landcare Network:
 - a. Landscape Industry Certified Technician - Exterior.
 - b. Landscape Industry Certified Interior.
 - c. Landscape Industry Certified Horticultural Technician.
 5. Pesticide Applicator: State licensed, commercial.
- B. Provide quality, size, genus, species, and variety of plants indicated, complying with applicable requirements in ANSI Z60.1.
1. Selection of plants shall be made by Architect, who tags plants at their place of growth before they are prepared for transplanting.
- C. Plant Material Observation: Architect may observe plant material either at place of growth or at site before planting for compliance with requirements for genus, species, variety, cultivar, size, and quality. Architect may also observe trees and shrubs further for size and condition of balls and root systems, pests, disease symptoms, injuries, and latent defects and may reject unsatisfactory or defective material at any time during progress of work. Remove rejected trees or shrubs immediately from Project site.
1. Notify Architect of sources of planting materials seven days in advance of delivery to site.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Packaged Materials: Deliver packaged materials in original, unopened containers showing weight, certified analysis, name and address of manufacturer, and indication of compliance with state and Federal laws if applicable.
- B. Bulk Materials:
1. Do not dump or store bulk materials near structures, utilities, walkways and pavements, or on existing turf areas or plants.

2. Provide erosion-control measures to prevent erosion or displacement of bulk materials; discharge of soil-bearing water runoff; and airborne dust reaching adjacent properties, water conveyance systems, or walkways.
 3. Accompany each delivery of bulk materials with appropriate certificates.
- C. Do not prune trees and shrubs before delivery. Protect bark, branches, and root systems from sun scald, drying, wind burn, sweating, whipping, and other handling and tying damage. Do not bend or bind-tie trees or shrubs in such a manner as to destroy their natural shape. Provide protective covering of plants during shipping and delivery. Do not drop plants during delivery and handling.
- D. Handle planting stock by root ball.
- E. Store bulbs, corms, and tubers in a dry place at 60 to 65 deg F until planting.
- F. Apply antidesiccant to trees and shrubs using power spray to provide an adequate film over trunks (before wrapping), branches, stems, twigs, and foliage to protect during digging, handling, and transportation.
1. If deciduous trees or shrubs are moved in full leaf, spray with antidesiccant at nursery before moving and again two weeks after planting.
- G. Wrap trees and shrubs with burlap fabric over trunks, branches, stems, twigs, and foliage to protect from wind and other damage during digging, handling, and transportation.
- H. Deliver plants after preparations for planting have been completed and install immediately. If planting is delayed more than six hours after delivery, set plants and trees in their appropriate aspect (sun, filtered sun, or shade), protect from weather and mechanical damage, and keep roots moist.
1. Set balled stock on ground and cover ball with soil, peat moss, sawdust, or other acceptable material.
 2. Do not remove container-grown stock from containers before time of planting.
 3. Water root systems of plants stored on-site deeply and thoroughly with a fine-mist spray. Water as often as necessary to maintain root systems in a moist, but not overly wet condition.

1.6 FIELD CONDITIONS

- A. Field Measurements: Verify actual grade elevations, service and utility locations, irrigation system components, and dimensions of plantings and construction contiguous with new plantings by field measurements before proceeding with planting work.
- B. Weather Limitations: Proceed with planting only when existing and forecasted weather conditions permit planting to be performed when beneficial and optimum results may be obtained. Apply products during favorable weather conditions according to manufacturer's written instructions and warranty requirements.

1.7 WARRANTY

- A. Special Warranty: Installer agrees to repair or replace plantings and accessories that fail in materials, workmanship, or growth within specified warranty period.

1. Failures include, but are not limited to, the following:
 - a. Death and unsatisfactory growth, except for defects resulting from abuse, lack of adequate maintenance, or neglect by Owner.
2. Warranty Periods: From date of Substantial Completion.
 - a. Trees: 1 year.
 - b. Shrubs, Vines, Ornamental Grasses, Ground Covers, Biennials, Perennials, and Other Plants: 1 year
 - c. Sod: 1 year
 - d. Annuals: Three months.
3. Include the following remedial actions as a minimum:
 - a. Immediately remove dead plants and replace unless required to plant in the succeeding planting season.
 - b. Replace plants that are more than 25 percent dead or in an unhealthy condition at end of warranty period.
 - c. A limit of one replacement of each plant is required except for losses or replacements due to failure to comply with requirements.
 - d. Provide extended warranty for period equal to original warranty period, for replaced plant material.

PART 2 - PRODUCTS

2.1 PLANT MATERIAL

- A. General: Furnish nursery-grown plants true to genus, species, variety, cultivar, stem form, shearing, and other features indicated in Plant List, Plant Schedule, or Plant Legend indicated on Drawings and complying with ANSI Z60.1; and with healthy root systems developed by transplanting or root pruning. Provide well-shaped, fully branched, healthy, vigorous stock, densely foliated when in leaf and free of disease, pests, eggs, larvae, and defects such as knots, sun scald, injuries, abrasions, and disfigurement.
 1. Trees with damaged, crooked, or multiple leaders; tight vertical branches where bark is squeezed between two branches or between branch and trunk ("included bark"); crossing trunks; cut-off limbs more than 3/4 inch in diameter; or with stem girdling roots are unacceptable.
- B. Provide plants of sizes, grades, and ball or container sizes complying with ANSI Z60.1 for types and form of plants required. Plants of a larger size may be used if acceptable to Architect, with a proportionate increase in size of roots or balls.
- C. Root-Ball Depth: Furnish trees and shrubs with root balls measured from top of root ball, which begins at root flare according to ANSI Z60.1. Root flare shall be visible before planting.
- D. Annuals: Provide healthy, disease-free plants of species and variety shown or listed, with well-established root systems reaching to sides of the container to maintain a firm ball, but not with excessive root growth encircling the container. Provide only plants that are acclimated to outdoor conditions before delivery.

2.2 FERTILIZERS

- A. Trees: Ref 32 9100 "Soil Preparation" for fertilizer selection
- B. Shrub, groundcover, annuals and perennials: MicroLife all organic fertilizer as supplied by San Jacinto Environmental (713) 957-0909. Apply at mfg. max. recommended rates. Ref. Section 32 9100- "Soil Preparation"

2.3 MULCHES

- A. Mulch: Free from deleterious materials and suitable as a top dressing of trees and shrubs, consisting of one of the following:
 - 1. Type: Hardwood mulch
 - 2. Grind: 1.5"x2"max, Double Ground
 - 3. Color: Natural (Brown)
 - 4. Depth: 1.5" min 3.5" maximum
- B. Compost: Ref 32 9100 "Soil Preparation"
- C. Rock Mulch:
 - 1. Decomposed Granite (¼ Minus)
 - a. Size: ¼" Minus
 - b. Clean, hard, durable particles of fragments of decomposed granite, "Salado Rose" available from Alamo Stone, Stafford, Texas (281) 240-4600 or approved equal.
 - c. Free of clay lumps, organic material, and deleterious material.
 - 2. Seinna Cobbles
 - a. Size: 2"-4", 6"-12"
 - b. Available from Alamo Stone, Stafford, Texas (281) 240-4600 or approved equal.

2.4 WEED-CONTROL BARRIERS

- A. Nonwoven Geotextile Filter Fabric: Polypropylene or polyester fabric, 3 oz./sq. yd. minimum, composed of fibers formed into a stable network so that fibers retain their relative position. Fabric shall be inert to biological degradation and resist naturally encountered chemicals, alkalis, and acids.
- B. Miriafi 140 NL as manufactured by Nicolon Mirafi Group, Pendergrass, GA, (888) 795-0808 or approved equal.

2.5 PESTICIDES

- A. General: Pesticide registered and approved by the EPA, acceptable to authorities having jurisdiction, and of type recommended by manufacturer for each specific problem and as required for Project conditions and application. Do not use restricted pesticides unless authorized in writing by authorities having jurisdiction.
- B. Pre-Emergent Herbicide (Selective and Nonselective): Effective for controlling the germination or growth of weeds within planted areas at the soil level directly below the mulch layer.

- C. Post-Emergent Herbicide (Selective and Nonselective): Effective for controlling weed growth that has already germinated.

2.6 TREE-STABILIZATION MATERIALS

- A. Stakes and Guys:

Contractor shall use staking materials necessary to meet requirements of specifications, subject to approval:

1. Tree Stakes: 7' & 8' long steel T-post weighing 1.33 pounds per foot.
2. Paint for Stakes: **Pittsburgh Paint No. 515-5 Stonehenge Greige.**
3. Tie Webbing: Tree Tie Webbing by AM Leonard-Green

2.7 LANDSCAPE EDGINGS

- A. **Concrete Edging: Ref. Materials Schedule**
- B. **Steel Edging: Ref. Materials Schedule**
- C. **Aluminum Edging: Ref. Materials Schedule**
- D. **Bender Board Edging: Ref. Materials Schedule**

2.8 MISCELLANEOUS PRODUCTS

- A. Root Barrier: Black, molded, modular panels manufactured with 50 percent recycled polyethylene plastic with ultraviolet inhibitors, 85 mils thick, with vertical root deflecting ribs protruding 3/4 inch out from panel, and each panel 24 inches wide.
- B. Antidesiccant: Water-insoluble emulsion, permeable moisture retarder, film forming, for trees and shrubs. Deliver in original, sealed, and fully labeled containers and mix according to manufacturer's written instructions.
- C. Burlap: Non-synthetic, biodegradable.
- D. Planter Drainage Gravel: Washed, sound crushed stone or gravel complying with ASTM D 448 for Size No. 8.
- E. Planter Filter Fabric: Nonwoven geotextile manufactured for separation applications and made of polypropylene, polyolefin, or polyester fibers or combination of them.
- F. Mycorrhizal Fungi: Dry, granular inoculants containing at least 5300 spores per lb of vesicular-arbuscular mycorrhizal fungi and 95 million spores per lb of ectomycorrhizal fungi, 33 percent hydrogel, and a maximum of 5.5 percent inert material.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas to receive plants for compliance with requirements and conditions affecting installation and performance.
 - 1. Verify that no foreign or deleterious material or liquid such as paint, paint washout, concrete slurry, concrete layers or chunks, cement, plaster, oils, gasoline, diesel fuel, paint thinner, turpentine, tar, roofing compound, or acid has been deposited in soil within a planting area.
 - 2. Do not mix or place soils and soil amendments in frozen, wet, or muddy conditions.
 - 3. Suspend soil spreading, grading, and tilling operations during periods of excessive soil moisture until the moisture content reaches acceptable levels to attain the required results.
 - 4. Uniformly moisten excessively dry soil that is not workable, and which is too dusty.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.
- C. If contamination by foreign or deleterious material or liquid is present in soil within a planting area, remove the soil and contamination as directed by Architect and replace with new planting soil.

3.2 PREPARATION

- A. Protect structures, utilities, sidewalks, pavements, and other facilities and turf areas and existing plants from damage caused by planting operations.
- B. Install erosion-control measures to prevent erosion or displacement of soils and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways.
- C. Lay out individual tree and shrub locations and areas for multiple plantings. Stake locations, outline areas, adjust locations when requested, and obtain Architect's acceptance of layout before excavating or planting. Make minor adjustments as required.
- D. Lay out plants at locations directed by Architect. Stake locations of individual trees and shrubs and outline areas for multiple plantings.
- E. Apply antidesiccant to trees and shrubs using power spray to provide an adequate film over trunks (before wrapping), branches, stems, twigs, and foliage to protect during digging, handling, and transportation.
 - 1. If deciduous trees or shrubs are moved in full leaf, spray with antidesiccant at nursery before moving and again two weeks after planting.
- F. Wrap trees and shrubs with burlap fabric over trunks, branches, stems, twigs, and foliage to protect from wind and other damage during digging, handling, and transportation.

3.3 PLANTING AREA ESTABLISHMENT

- A. Loosen subgrade of planting areas to a minimum depth of 8 inches. Remove stones larger than 1 inch in any dimension and sticks, roots, rubbish, and other extraneous matter and legally dispose of them off Owner's property.
 - 1. Apply fertilizer directly to subgrade before loosening.
 - 2. Thoroughly blend planting soil off-site before spreading.
 - a. Delay mixing fertilizer with planting soil if planting will not proceed within a few days.
 - b. Mix lime with dry soil before mixing fertilizer.
 - 3. Spread planting soil to a depth indicated on the Drawings.
 - a. Spread approximately one-half the thickness of planting soil over loosened subgrade. Mix thoroughly into top 2 inches of subgrade. Spread remainder of planting soil.
- B. Finish Grading: Grade planting areas to a smooth, uniform surface plane with loose, uniformly fine texture. Roll and rake, remove ridges, and fill depressions to meet finish grades.
- C. Before planting, obtain Architect's acceptance of finish grading; restore planting areas if eroded or otherwise disturbed after finish grading.
- D. Application of Mycorrhizal Fungi: At time directed by Architect, broadcast dry product uniformly over prepared soil at maximum application rate recommended by manufacturer.

3.4 EXCAVATION FOR TREES AND SHRUBS

- A. Planting Pits and Trenches: Excavate circular planting pits with sides sloping inward at a 45-degree angle. Excavations with vertical sides are not acceptable. Trim perimeter of bottom leaving center area of bottom raised slightly to support root ball and assist in drainage away from center. Do not further disturb base. Ensure that root ball will sit on undisturbed base soil to prevent settling. Scarify sides of planting pit smeared or smoothed during excavation.
 - 1. Excavate at least 12 inches wider than root spread and deep enough to accommodate vertical roots for bare-root stock.
 - 2. Do not excavate deeper than depth of the root ball, measured from the root flare to the bottom of the root ball.
 - 3. If area under the plant was initially dug too deep, add soil to raise it to the correct level and thoroughly tamp the added soil to prevent settling.
 - 4. Maintain required angles of repose of adjacent materials as shown on the Drawings. Do not excavate subgrades of adjacent paving, structures, hardscapes, or other new or existing improvements.
 - 5. Maintain supervision of excavations during working hours.
 - 6. Keep excavations covered or otherwise protected when unattended by Installer's personnel.
 - 7. If drain tile is shown on Drawings or required under planting areas, excavate to top of porous backfill over tile.
- B. Follow Soil Preparation Execution. Ref. 03 9100

- C. Obstructions: Notify Architect if unexpected rock or obstructions detrimental to trees or shrubs are encountered in excavations.
 - 1. Hardpan Layer: Drill 6-inch- diameter holes, 24 inches apart, into free-draining strata or to a depth of 10 feet, whichever is less, and backfill with free-draining material.
- D. Drainage: Notify Architect if subsoil conditions evidence unexpected water seepage or retention in tree or shrub planting pits.
- E. Fill excavations with water and allow to percolate away before positioning trees and shrubs.

3.5 TREE, SHRUB, AND VINE PLANTING

- A. Before planting, verify that root flare is visible at top of root ball according to ANSI Z60.1. If root flare is not visible, remove soil in a level manner from the root ball to where the top-most root emerges from the trunk. After soil removal to expose the root flare, verify that root ball still meets size requirements.
- B. Remove stem girdling roots and kinked roots. Remove injured roots by cutting cleanly; do not break.
- C. Set balled and burlapped stock plumb and in center of planting pit or trench with root flare 2 inches above adjacent finish grades.
 - 1. Use Blended Planting Soil for backfill. Follow Soil Preparation Specification. Ref. 329100
 - 2. After placing some backfill around root ball to stabilize plant, carefully cut and remove burlap, rope, and wire baskets from tops of root balls and from sides, but do not remove from under root balls. Remove pallets, if any, before setting. Do not use planting stock if root ball is cracked or broken before or during planting operation.
 - 3. Backfill around root ball in layers, tamping to settle soil and eliminate voids and air pockets. When planting pit is approximately one-half filled, water thoroughly before placing remainder of backfill. Repeat watering until no more water is absorbed.
 - 4. Follow Soil Preparation Specification. Ref. 039100 for fertilization.
 - 5. Continue backfilling process. Water again after placing and tamping final layer of soil.
- D. Set balled and potted, and container-grown stock plumb and in center of planting pit or trench with root flare 2 inches above adjacent finish grades.
 - 1. Use Blended Planting Soil for backfill. Follow Soil Preparation Specification. Ref. 329100
 - 2. Carefully remove root ball from container without damaging root ball or plant.
 - 3. Backfill around root ball in layers, tamping to settle soil and eliminate voids and air pockets. When planting pit is approximately one-half filled, water thoroughly before placing remainder of backfill. Repeat watering until no more water is absorbed.
 - 4. Follow Soil Preparation Specification. Ref. 039100 for fertilization.
 - 5. Continue backfilling process. Water again after placing and tamping final layer of soil.

3.6 TREE, SHRUB, AND VINE PRUNING

- A. Remove only dead, dying, or broken branches. Do not prune for shape.
- B. Prune, thin, and shape trees, shrubs, and vines as directed by Architect.

- C. Prune, thin, and shape trees, shrubs, and vines according to standard professional horticultural and arboricultural practices. Unless otherwise indicated by Architect, do not cut tree leaders; remove only injured, dying, or dead branches from trees and shrubs; and prune to retain natural character.
- D. Do not apply pruning paint to wounds.

3.7 TREE STAKING

- A. Staking of trees is to be used by the Contractor, who will be responsible for material remaining plumb and straight for all given conditions through the guarantee period. Tree support shall be done as outlined on the following tables.
- B. Staking shall be completed immediately after planting. Plants shall stand plumb after staking.
- C. Stake all trees in accordance with the following table:

Tree	Stakes	Stake Size
15-45 Gal. and B&B under 3"	2	6 ft Post
65 Gal. and B&B 3"& larger	3	7 ft Post

- D. Locate first stake on prevailing windward side of tree and as close to the main trunk as is practical, avoiding root injury. Stakes shall be driven at least 18" into firm ground.
- E. Tie tree to stake using approved tree tie. Tie shall be located midway within tree crown or at a location approximately 2/3 of the overall height of the tree. Locate tie just above major side branch in order to deter slippage of tie.
- F. Locate second stake opposite first. Secure with one tie opposite upper tie at first stake.
- G. Auxiliary stem stakes shipped with trees shall be secured as above after shipping.

3.8 ROOT-BARRIER INSTALLATION

- A. Install root barrier where trees are planted within 60 inches of paving or other hardscape elements, such as walls, curbs, and walkways unless otherwise shown on Drawings. Deep Root 24-2 or approved eq.
- B. Align root barrier vertically and run it linearly along and adjacent to the paving or other hardscape elements to be protected from invasive roots.
- C. Install root barrier continuously for a distance of 60 inches in each direction from the tree trunk, for a total distance of 10 feet per tree. If trees are spaced closer, use a single continuous piece of root barrier.
 - 1. Position top of root barrier flush with finish grade.
 - 2. Overlap root barrier a minimum of 12 inches at joints.
 - 3. Do not distort or bend root barrier during construction activities.
 - 4. Do not install root barrier surrounding the root ball of tree.

3.9 GROUND COVER AND PERRENIAL PLANTING

- A. Set out and space ground cover and plants other than trees, shrubs, and vines as indicated on the Drawings
- B. Use planting soil for backfill. Follow soil preparation execution. Re. 329100
- C. Dig holes large enough to allow spreading of roots.
- D. For rooted cutting plants supplied in flats, plant each in a manner that will minimally disturb the root system but to a depth not less than two nodes.
- E. Work soil around roots to eliminate air pockets and leave a slight saucer indentation around plants to hold water.
- F. Water thoroughly after planting, taking care not to cover plant crowns with wet soil.
- G. Protect plants from hot sun and wind; remove protection if plants show evidence of recovery from transplanting shock.

3.10 PLANTING AREA MULCHING

- A. Mulch backfilled surfaces of planting areas and other areas indicated.
 - 1. Trees and Tree-like Shrubs in Turf Areas: As indicated on the Drawings or 3"depth
 - 2. Organic Mulch in Planting Areas: As indicated on the Drawings or 3"depth
 - 3. Mineral Mulch in Planting Areas: As indicated on the Drawings

3.11 PLANT MAINTENANCE

- A. Maintain plantings by pruning, cultivating, watering, weeding, fertilizing, mulching, restoring planting saucers, adjusting and repairing tree-stabilization devices, resetting to proper grades or vertical position, and performing other operations as required to establish healthy, viable plantings. Spray or treat as required to keep trees and shrubs free of insects and disease.
- B. Fill in as necessary soil subsidence that may occur because of settling or other processes. Replace mulch materials damaged or lost in areas of subsidence.
- C. Apply treatments as required to keep plant materials, planted areas, and soils free of pests and pathogens or disease. Use integrated pest management practices whenever possible to minimize the use of pesticides and reduce hazards. Treatments include physical controls such as hosing off foliage, mechanical controls such as traps, and biological control agents.
- D. Reference the Maintenance Specification 329400 for further information.

3.12 PESTICIDE APPLICATION

- A. Apply pesticides and other chemical products and biological control agents in accordance with authorities having jurisdiction and manufacturer's written recommendations. Coordinate applications with Owner's operations and others in proximity to the Work. Notify Owner before each application is performed.

- B. Pre-Emergent Herbicides (Selective and Non-Selective): Apply to tree, shrub, and ground-cover areas in accordance with manufacturer's written recommendations. Do not apply to seeded areas. Ref. 32 9100-Soil Preparation for clarifications.
- C. Post-Emergent Herbicides (Selective and Non-Selective): Apply only as necessary to treat already-germinated weeds and in accordance with manufacturer's written recommendations. Ref. 32 9100-Soil Preparation for clarifications.

3.13 CLEANUP AND PROTECTION

- A. During planting, keep adjacent paving and construction clean and work area in an orderly condition.
- B. Protect plants from damage due to landscape operations and operations of other contractors and trades. Maintain protection during installation and maintenance periods. Treat, repair, or replace damaged plantings.
- C. After installation and before Substantial Completion remove nursery tags, nursery stakes, tie tape, labels, wire, burlap, and other debris from plant material, planting areas, and Project site.

3.14 DISPOSAL

- A. Remove surplus soil and waste material including excess subsoil, unsuitable soil, trash, and debris and legally dispose of them off Owner's property.

3.15 DECOMPOSED GRANITE/ WASHED GRANITE GRAVEL

- A. Install soil separator per manufacturer's recommendations at locations indicated in the details on the drawings.
- B. Install decomposed granite to depth and elevations indicated on the Drawings.
- C. Place decomposed granite in two lifts, 2" each lift and compact.
- G. Compact lifts to 98% SPD (standard proctor density).

END OF SECTION

SECTION 32 9400 - LANDSCAPE GROUNDS MAINTENANCE FOR NINETY (90) DAYS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS: The Drawings, Division 0 and Division 1 apply to work under this Section.

1.2 SCOPE OF WORK:

A. Work included in Base Bid:

1. Monitoring adjustment and minor repair of the landscape irrigation system.
2. Mowing, edging and trimming of lawn areas.
3. Mowing of Love Grass and Native Grass Plantings
3. Pruning and trimming of plant materials.
4. Weed, cultivating and cleaning of planting beds, turf areas, and Native grass areas..
5. General site clean up; removal of trash and products of maintenance.
6. Applications of fertilizers, ant control, insecticides and herbicides.
7. Pruning and trimming of trees.
8. Mulching trees, shrubs, groundcovers and seasonal color.
9. Extra services as needed.

B. Work Not Included in Base Bid: (Extra Service)

1. Street cleaning - other than that required as a result of maintenance operations.
2. Replacement of plant material - other than that required under the one year warranty requirement.
3. Compost amendment application
4. Aerating lawn areas.
5. Overseeding with cool-season grasses.
6. Application of pre/post emergents.
7. Additional clean-up and/or plant material replacement relating to natural weather events including hurricanes, tornadoes, severe thunderstorms, major rain events causing flooding, freezing temperatures, ice/ice storms, extended periods of draught and snow.

1.3 EXTRA SERVICES:

The intent of the ninety day maintenance period is to provide a comprehensive maintenance program to include all required services, except those services specifically excluded, to perform the work for the stated time period.

1. All services not included in the list of Base Bid items shall be considered 'extra services" and will be charged for separately according to the nature of the item of work. The consent and authorization of the Owner's representative or their authorized representative must be obtained prior to the performance or installation of such "extra services" items and prior to purchase of any chargeable materials.
2. Such work may include replacement of dead plant materials other than what is already covered under the warranty period, major repairs of irrigation system, by-products of vandalism or other contracts or other site related work.
3. Application of pre/post emergents.
4. Authorized extra services work must be summarized weekly and submitted with receipts to the Owner's representative.

5. The Owner's representative is not bound by the specifications or contract to utilize the landscape maintenance contractor in the performance of "extra services" work.
6. The landscape maintenance contractor shall coordinate his activities with other contractors on the site so as to not hinder the performance of any work.
6. Authorized charges for extra work will be paid per the General Conditions of the Contract.

1.4 SUBSTITUTIONS:

- A. Specific reference to manufacturer's names and products specified in this Section are used as standards, but this implies no right to substitute other material or methods without written approval of the Owner's representative. Such permission must be secured without additional cost to Owner's representative.
- B. Installation of any approved substitution is Contractor's responsibility. Any changes required for installation of any approved substitution must be made to the satisfaction of and without additional cost to Owner's representative.

1.5 INTENT OF THE MAINTENANCE PROGRAM:

It is the intent of the maintenance program is to provide the Owner's representative with a project site that is attractive in appearance and keep all plant materials and lawns in a healthy and vigorous condition.

1.6 THE CONTRACT:

This Maintenance Contract is a period **ninety days**. The Contract can be terminated with cause.

1.7 CONTRACTORS PERFORMANCE:

The Contractor shall perform all work required once per week or as often as necessary to fulfill the spirit and intent of the Contract. The workmen shall be dressed in company uniforms and all required PPE (Personal Protective Equipment), and neat in appearance, perform their work in a professional manner, keep noise to a minimum and stage their work from a location on the site out of the way of the mainstream of the users. In general, the Contractor's presence on the site shall be as inconspicuous as possible.

1.8 COMMENCEMENT OF THE MAINTENANCE PERIOD:

This maintenance period shall become effective at the date of Substantial Completion.

1.9 NEGLECT AND VANDALISM:

1. Turf, shrubs, trees or plants that are damaged or killed due to contractors operations, negligence or chemicals shall be replaced at no expense to the Owner's representative. If plant damage or death is caused by conditions beyond the contractor's control, replacement shall be at the Owner's representative's expense.
2. Sprinklers or structures that are damaged due to the contractor's operations must be replaced by the contractor promptly. Likewise, damage to the irrigation system by others shall be corrected immediately by the contractor, at the Owner's representative's expense.

3. All water damage, either natural or man-made, resulting from contractor's neglect shall be corrected at the contractor's expense.
4. All damage to or thefts of landscaping and irrigation installations not caused or allowed by the contractor shall be corrected by the contractor at the Owner's expense upon receipt of written authorization to proceed.

1.12 EMERGENCIES:

1. The Contractor shall answer emergency or complaint calls within twelve (12) hours and corrective action shall be complete within twenty-four (24) hours.
2. The Contractor shall answer emergency calls regarding the Landscape Irrigation system failure or need of repair, and take corrective action within eight (8) hours. Such work, unless caused due to neglect on the part of the Landscape Maintenance Contractor, shall be considered "Extra Services".

1.13 JOB CONDITIONS:

- A. Contractor shall be familiar with all site conditions.

1.14 RESTRICTIONS:

- A. Do not use growth regulators or growth retardants or any chemicals that will have adverse effects on the organic fertilizers and soil conditioners utilized for this project.

PART 2 - PRODUCTS AND MACHINERY

2.1 MATERIALS:

Materials listed under this Section are expressly requested for use and does not prohibit or restrict the Contractor from providing other materials not listed in order to complete the work required herein.

1. Pre-Emergence Weed Control: Shall be Surflan A.S., Atrazine 4L or approved equal.
2. Post-Emergence Weed Control: Shall be Trimec Lawn Weed Killer, Sedge Hammer, Vantage, Image or approved equal.
3. Sufactant: Spreader Sticker shall be used with both pre and post emergence herbicides.
3. Herbicide: Shall be "Round Up", by Monsanto, St. Louis, Missouri.
4. Insecticide: Shall be "Astro Insecticide" as manufactured by FMC Corporation, Agricultural Products Group, 1735 Market Street, Philadelphia, PA 19103 (800.321.1362) or approved equal.
5. Fire Ant Control: Ortho Orthene Fire Ant Killer.
6. Compost: Made from recycled natural materials screened to 1" minus (for soil additive). On the Solvita compost maturity test score, must score a value of 5 or higher for tilling into the soil and be a minimum of 6 months old and fully composted. Supplied by Nature's Way Resources, Inc., Conroe, Texas or approved equal.
7. Fertilizer: FERTILIZERS AND NUTRIENT AMENDMENTS:

- A. Fertilizer: MicroLife Hybrid 20-0-5, MicroLife Ultimate 6-2-4, and MicroLife Humates Plus 0-0-4 as supplied by San Jacinto Environmental Supplies, Houston, Texas or other approved equal supplier.
 - B. Contractor shall keep all empty bags with certificates intact and submit them to the Owner's representative.
 - 1. Submission of empty fertilizer bags is required to verify operation has been performed as specified.
 - C. Humate Soil Conditioner: Vigoro modified humate, Earthgreen Menefee Humate, Humate International AG 16-35 or approved equal.
 - D. Aerated Compost Tea: Natures Own or approved equal.
8. Tree Deep Feeding Fertilizer: Shall be Aerated Compost Tea with mycorrhizal fungi manufactured by Natures Own, MicroGrow or approved equal
9. Fungicide: Shall be "Systemic Fungicide" with Benomyl by Greenlight Products, San Antonio, Texas 78217, and/or Cleary Chemical 3336 WP "Turf and Ornamental Fungicide.
10. Fertilizer for annuals/perennials:
- Nelson ColorStar Plus 19-13-6 with Fungicide
- Foliar spray Maximum Blooms 3-8-3 Organic liquid color fertilizer
11. Soil Drenching Material: Shall be "Sub Due 2E", by the Agricultural Division of Ciba-Geigy Corporation, Greensboro, North Carolina 27409.
12. Mulch: Shall be equal to that already in use at the site. Shredded hardwood bark for groundcover areas.
13. Tree Stakes and Guys: Shall match those in use at the site.

2.2 MACHINERY:

Machinery requirements listed under this Section are not intended to be restrictions of specific manufacturers or models unless so stated. Specific mention of manufacturers is intended as a guide to illustrate the final product of maintenance operations desired.

- 1. Lawn Mowers: Shall be of the rotary type in good working order, finely tuned to protect the lawn from excessive exhaust fumes. Blades shall be sharp to reduce shredding of the cut grass blades.
- 2. Lawn Edgers: Shall be of a rigid or flexible blade type that will produce a fine clean edge where lawns meet walkways, pavements or curbs.
- 3. Fertilizer Spreaders: Cyclone type spreader or equal. No visible underlapping of applications will be permitted.
- 4. Deep Root Feeder: Shall be the Ross type by Ross Daniels, Incorporated, Des Moines, Iowa 50265.
- 5. Pruning Tools: Shall be maintained in good working order, cutting edges shall be sharp. Disinfect all tools when used for the removal of diseased limbs.

PART 3 - EXECUTION

3.1 LANDSCAPE IRRIGATION SYSTEM:

The Contractor shall monitor and program the automatic controlling devices to proceed optimum moisture levels in all planted areas.

1. Irrigation cycles shall be set to take place prior to sunrise (usually 4:00 - 5:00 am) unless otherwise instructed by the Owner's representative, except during visits of grounds maintenance personnel; during such visits the irrigation system may be operated as desired by those personnel.
2. Do not program controllers operating on the same water meter to water during the same time period so as to prevent over-draft of water meters. Do not switch controller to "off" at any time, except as required for testing and for maintenance operations.
3. Complete sprinkler system servicing shall be performed as required to maintain sprinklers in correct operating condition, including all required labor. Monitor and inspect sprinklers once a month or upon request of the Owner's representative. This check shall include visual "inspection" of all accessible components of the irrigation system including but not limited to controllers, remote control valves, quick couplers and heads.
4. Adjust sprinklers to avoid damage to automobiles, signs and also adjust heads to keep water off the street and sidewalks. Make repairs and alterations to the sprinkling system and water lines. All sprinklers repairs such as cleaning of heads or breaks caused by the Contractor shall be the Contractor's responsibility.
5. Minor repairs: Contractor shall make necessary repairs under \$300.00 without Owner's representative's approval to maintain operation of the system.
6. Replacement materials throughout the system shall be as specified in Section 02810.

3.2 TREES MAINTENANCE:

- A. Contractor shall maintain staking and guying of trees at all times and shall be responsible for any damage to trees or plant materials caused by chafing or breakage of foliage or limbs coming in contact with stakes or ties. Replace broken plant stakes and ties and bent stakes as needed. If ties are too tight, they must be replaced or adjusted. If stakes are not needed, remove.
- B. Trees that may require guys, stakes or special care during the winter winds and rains shall receive the required care prior to the time of rains and high winds to insure that no damage results to the plant material.
- C. All suckers shall be continually removed from trees.

3.3 SEASONAL AND PERENNIAL FLOWERS:

- A. The maintenance contractor shall continually maintain seasonal flower beds in all contract areas.
- B. Complete weeding, trimming, edging, and cultivation of all flower beds as required to keep the beds free of weeds, to promote growth and maintain neat, orderly appearance. As flowers cover open soil, cultivating shall be discontinued.
- C. Maintenance shall include:
 1. Pinching of blooms and pruning of dead or damaged foliage.

2. Fertilize in alternate months with organic fertilizer. (RE: PART 2)
 3. Apply supplemental organic fertilizer to keep each type of seasonal flower performing at its optimum level.
 4. Spraying or dusting for disease or insect control as a preventive or corrective measure.
 5. Seasonal Color Change out: seasonal color change out after the initial planting (Extra Service) by the installing contractor.
- D. Fertilizer for annuals/perennials: Add ColorStar Plus 19-13-6 with Fungicide at the manufacturers recommended rate and feeding schedule. Foliar spray Maximum Blooms 3-8-3 Organic liquid color fertilizer (6 ounces per 1000 sq ft) & Garlic Oil (1 ounce per 1000 sq ft) mixed together with water and sprayed every 30 days.
- 3.4 HEDGE MAINTENANCE:
- A. Edge, weed, fertilize and cultivate all hedge beds in accordance with Schedule.
 - B. Pruning of shrubs should create a uniformly dense plant, trapezoid in shape. Height as approved by Owner's representative. Selectively thin and tip back annually. Prune to enhance natural branching effect of plants. Do not change shape of shrubs by pruning.
- 3.5 GROUNDCOVER BEDS:
- A. Complete weeding, trimming, edging, and cultivating of all groundcover as required to keep the beds free of weeds, to promote growth and maintain neat, orderly appearance. As groundcovers cover open soil, cultivating shall be discontinued.
 - B. Groundcover beds bordering on paved surfaces must be edged as needed to retain a neat edge. Do not trim vertically so as to expose stems and thatch.
 - C. Fertilize all groundcovers with complete commercial fertilizer four times per year. (Extra Service)
 - D. Replant all damaged or thin areas in groundcover beds at direction of the Owner's representative, at proper spacing.
 - E. Slopes of 2:1 ratio, or steeper, shall not be cultivated due to erosion nuisance, unless otherwise instructed to cultivate by the Owner's representative.
- 3.6 TURF MAINTENANCE:
- A. Mowing: During periods of mild weather, mow at one and one-half (1 1/2") inches but during hot weather, the cut should be not lower than two (2") inches from the soil. Regular weekly mowing is required. Never scalp the lawn or cut more than one half the existing top growth in one mowing. Remove or catch the clippings, never allowing clippings to remain on lawn surface more than four (4) hours.

Allow grass to grow up to but not over sprinkler heads. Trim grass around heads with a circular sprinkler head trimmer. DO NOT USE LINE TRIM AROUND SPRINKLER HEADS.
 - B. Watering: Provide a regular, deep watering program. The established turf should not be kept wet but should dry out somewhat between waterings. A twice weekly watering is good under regular conditions, but if it is hot or windy, water more often. In very hot weather, a fast watering with fine spray will cool the turf zone and can supplement the regular, deeper watering program. In shaded areas caused by trees or shrubs, water more frequently because of the competition for soil moisture. If lawn wilts (shows grey-brown) water more frequently.

C. Lawn Fertilizer: Analysis based upon soil sample.

March 1	MicroLife Hybird 20-0-5 applied at manufacturer's maximum recommended rate.
May 25	MicroLife Humates Plus 0-0-4 at manufacturer's maximum recommended rate.
July 18	Same as the March application.
October 11	MicroLife (6-2-4) at manufacturer's maximum recommended rate.

D. Weed Control: Contractor shall use extreme care in the use of chemicals for weed control. Before such applications are made, the turf should be well established and in a vigorous condition. Broadleaf weeds such as malva, dandelion and plantain can be controlled with applications of selective and recommended herbicides. Always follow label directions fully and carefully; wash sprayer carefully after using herbicides.

E. Insects: Control insects with regular applications of commercial insecticides at the manufacturer's recommended rate. Spray for insects once a month from mid-spring through summer as a preventative measure.

F. Diseases: When they first appear, spray for diseases with an approved commercial fungicide strictly according to the manufacturer's recommendations.

3.7 NATIVE GRASSES MAINTENANCE

- A. Native grass mixes – Twice annually on or about June 1st and January 1st
- B. Above grasses shall be mowed to a 6" height.

3.8 CONTROL OF NOXIOUS WEEDS (Johnson Grass, Nut Grass, Poison Ivy, and other Noxious Weeds.)

- A. Noxious weeds shall be killed by using "Round Up" or other spray as approved by Owner's representative. Spray only foliage of grass to be eradicated, as this spray will kill any plant that it contacts.
- B. Irrigation to sprayed area should remain "off" for a period of three days following spray application. Repeat spray as required to kill completely.
- C. Apply pre/post-emergent weed killer as per manufacturer's recommendation as required by the "Schedule" and approved by Client prior to application.
- C. Weeds 30" or taller shall be removed/eradicated in Native Grass zones.

3.9 USE OF HERBICIDES, INSECTICIDES, AND STERILANTS:

- A. The Contractor is hereby granted permission to use such herbicides, insecticides, and sterilants as it may find necessary and advantageous in its grounds maintenance activities. Herbicides, insecticides, and sterilants, must be used responsibly and in conformance with Federal, State, and Local laws and regulations. The Contractor assumes all liability for damage and/or injury resulting from accident or misuse of these products and/or equipment. The Owner's representative retains the right to prohibit the use of any herbicide, insecticide, and sterilant that he may judge to be undesirable for any reason.
- B. Products leaving an undesirable residue or odor (i.e., weed oil) shall not be used.

- C. The Owner's representative shall be notified prior to application and advised of any danger associated with the use of these products (i.e., to avoid personal contact with sprayed areas, etc.).
- D. Apply insecticides as needed to protect all plant materials from damage. The insect control program shall include slugs and snails and advance preventive spraying for twig borers. The Contractor shall be responsible for the choosing of chemicals and insecticides he uses and shall be accountable for any misuse of same.
- E. Apply the proper fungicide, herbicide and pesticides for the control of pests, weeds and plant diseases or treat cuts on exposed surfaces of trees or shrubs for disease and pest control on turf, plants and trees.

3.10 GENERAL CLEAN UP:

- A. The Contractor shall dispose of all waste materials or refuse from his operations legally off the property except where agreement is reached with the Owner's representative.
- B. All plant growth shall be prevented in any cracks in walks or within paved areas.
- C. Leaves, papers, grass clippings or other debris shall be removed at least weekly or at each visit from all areas.
- D. Trash receptacles shall be checked regularly and emptied, and trash removed from the site frequently enough so that trash never overflows the receptacles. Trash receptacles shall be lined with black plastic bags which shall be emptied and removed from the site daily.

PART 4.00 - SCHEDULE

4.1 SCHEDULE:

The Schedule as included herein shall govern the work. Should the Contractor require an alteration of the Schedule, contact the Owner's representative.

JANUARY: WEEKS 1, 2, 3, 4

TURF

The turf shall be watered as needed. Turf shall be raked during the latter part of the month, to remove thatch. Mow turf for the first time in week 4.

TREES, SHRUBS, AND VINES

Trees shall be pruned except flowering trees and flowering shrubs which shall be pruned after flowering. Do not change shape of tree, prune to enhance shape. Pre-emergent herbicides shall be applied if approved by Client. Weed beds as required.

FEBRUARY: WEEKS 1, 2, 3, 4

TURF

The turf shall be watered as needed. Turf shall be raked during the latter part of the month, to remove thatch. Mow turf weeks 2 and 4.

TREES, SHRUBS, AND VINES

Continue pruning trees. Apply tree fertilizer to established trees. Deep root feeding is method to use during this period. Iron and other elements shall be applied if needed. Fertilize acid loving plants as called out under "Material Used". Do not fertilize flowering shrubs until blooming is completed.

MARCH: WEEKS 1,2

TURF

Turf shall be mowed in week two. Mowing shall not remove more than one-quarter (1/4") inch off existing height. First application of fertilizer (Microlife Hybrid 20-0-5) shall be applied at manufacturer's maximum recommended rate. Water thoroughly after applying fertilizer. Mow first; then fertilize.

TREES, SHRUBS, AND VINES

Check Plants for adequate watering to prevent any winter damage. Water if necessary. Prune dead wood as required. Continue to weed beds.

Mulch shall be placed in all beds, a two (2") inch to three (3") inch layer over existing mulch if mulch is not adequate. Dead vines should be removed. Flowering plants should be fertilized only after blooming.

MARCH: WEEKS 3, 4

TURF

Mow as required; still only one-quarter (1/4") inch off existing growth. Water as required. Weed control should be continued. Replace any winter damaged sod at this time.

TREES, SHRUBS, AND VINES

Inspect evergreens for insects and diseases, spray as required. Spray for borers. Continue to weed beds. Fertilize trees and flowering shrubs if they have buds. Application should be 10-8-4 at a rate of ten (10) pounds per 1,000 square feet. Acid loving plants should be given special attention as called out in "Material Used".

APRIL: WEEKS 1, 2, 3, 4

TURF

Mowing should be continued; begin cutting one and one-half (1 1/2") inches to two (2") inches above grade. Water as required.

TREES, SHRUBS, AND VINES

Flowering plants should be through flowering and ready to be pruned and fertilized, if not already completed. Prune remaining dead wood from trees, shrubs, and vines, retaining natural shape. Continually remove all suckers on base of trees.

MAY: WEEKS 1, 2

TURF

Mowing shall continue once a week. During this period, it is important to note the soil moisture. Grasses may have been actively growing for about two and one-half (2 1/2) months, and need to be watered thoroughly.

TREES, SHRUBS, AND VINES

Inspect evergreens for mites and borers and spray as required. Inspect plants for scale insects and spray as required. Inspect flowering trees for powdery mildew and apply fungicide as required. Apply herbicide to shrub beds as required, using the same materials as in early spring. Weed beds as required. Water established trees at a rate of two (2") inches per week.

MAY: WEEKS 3, 4

TURF

Mow as required. Second application of fertilizer (Microlife Humates 0-0-4) shall be applied at manufacturer's maximum recommended rate. Water thoroughly after applying fertilizer. Mow first; then fertilize. Particular attention shall be directed to the amount of water applied to turf.

TREES, SHRUBS, AND VINES

Continue to check plants for pests and control as required. Water any established plants as needed. Pruning shall cease until Fall. Apply fertilizer to acid loving plants again.

JUNE: WEEKS 1, 2, 3, 4

Mulching trees, shrubs, groundcovers and seasonal color.

NATIVE GRASSES

Native grasses and love grass shall be mowed.

TURF

Mowing shall continue once per week. As the temperature rises, the mower should be raised one-half (1/2") inch to one (1") inch higher to maintain a good thick stand of grass. Inspect lawn for disease and inspect pests; apply fungicide only if necessary. Be alert for brown patch, Bermuda decline and chinch bugs in Bermuda sod. Watch Bermuda for bare spots and underwatered areas.

TREES, SHRUBS, AND VINES

Maintain adequate moisture for newly planted trees, shrubs, and vines. Water any established plants as needed. Do not fertilize any wood plants until cooler weather. Continue to check plants for pests and control as required. Weed beds as required.

JULY: WEEKS 1, 2, 3, 4

TURF

Mow weekly, maintain previous months height. Avoid watering in the middle of the day. Check turf for disease again, especially chinch bugs. Third application of fertilizer (Microlife Hybrid 20-0-5) should be applied at manufacturer's maximum recommended rate. Apply recommended controls as necessary.

TREES, SHRUBS, AND VINES

Maintain adequate moisture for newly planted trees, shrubs, and vines. Water any established plants as needed. Do not fertilize any woody plants until cooler weather. Continue to check plants for pests and control as required. Weed beds as required.

AUGUST: WEEKS 1, 2, 3, 4

TURF

Mow weekly. Continue to irrigate as needed to keep turf from being stressed by lack of water. Inspect lawn for diseases. Apply necessary chemicals if needed; use caution.

TREES, SHRUBS, AND VINES

Continue to check trees, shrubs, and vines for adequate moisture around rootballs. No pruning shall be done during this period. Check all trees, shrubs, and vines for possible disease and insects, spray if necessary. Second application of fertilizer should be spread at manufacturer's maximum recommended rate.

SEPTEMBER: WEEKS 1, 2

TURF

Mow weekly. At this time lower mower to one and one-quarter (1 1/4") inches to one and one-half (1 1/2") inches. Irrigate as needed.

TREES, SHRUBS, AND VINES

Maintain adequate moisture for newly planted trees, shrubs, and vines. Water any established plants as needed. Root feed trees again. Acid type fertilizer and iron should be applied to trees, shrubs, and vines.

SEPTEMBER: WEEKS 3, 4

TURF

Mow weekly. Watch turf for diseases, apply chemicals as required.

TREES, SHRUBS, AND VINES

Maintain adequate soil moisture for all trees, shrubs, and vines. Prune only if necessary. Continue to check for any pests or disease, apply chemicals as required.

OCTOBER: WEEKS 1, 2, 3, 4

TURF

Mow weeks 1, 2 and 4. Watering can be reduced at this time. Continue to check for diseases. Fourth application of fertilizer (MicroLife 6-2-4) shall be applied at manufacturer's maximum recommended rate. Mow first; then fertilize. Water thoroughly after applying fertilizer. Turf should be thick and healthy for winter.

months. Overseed with annual rye grass at the rate of four (4) pounds per 1,000 square feet (only if requested by the Owner).

TREES, SHRUBS, AND VINES

Check trees for proper fertilization. Apply necessary elements, if inadequate. Pruning can be started lightly at this time. Weed beds as required. A two (2") inch layer of mulch shall be added on top of existing mulch.

NOVEMBER: WEEKS 1, 2, 3, 4

TURF

Mow weeks 2 and 4. Water less at this time.

TREES, SHRUBS, AND VINES

Examine plants for pests and spray as required. Do not use pesticides unless necessary. Weed beds as required.

DECEMBER: WEEKS 1, 2, 3, 4

NATIVE GRASSES

Native grasses and love grass shall be mowed.

TURF

Last mowing shall be performed during first 2nd week of month. Rake leaves as required.

TREES, SHRUBS, AND VINES

Remove leaves from beds. Weed beds as required. Check plants for diseases, spray as required.

END OF SECTION

SECTION 33 10 00 WATER UTILITIES

WATER SERVICE NOTE: WATER SERVICE MUST BE MAINTAINED TO ALL USERS WITHIN THE CONSTRUCTION AREA AT ALL TIMES. IF THE PRIMARY SOURCE OF WATER IS INTERRUPTED, A TEMPORARY SECONDARY SOURCE SHALL BE SUPPLIED BY THE CONTRACTOR, APPROVED BY THE LOCAL WATER DEPARTMENT. ANY EXPENDITURES INCIDENTAL THERETO SHALL BE BORNE BY THE CONTRACTOR. THE WATER SHALL BE SAFE FOR DRINKING IN ACCORDANCE WITH PUBLIC HEALTH SERVICE DRINKING WATER STANDARDS.

PART 1 - GENERAL

1.01 SUMMARY

- A. This section describes general requirements, products, and methods of execution relating to domestic water and fire water systems. Unless otherwise noted, this section does not apply to irrigation water systems and water systems inside of buildings.
- B. Contractor shall furnish all labor, materials, services, testing, transportation and equipment necessary for the completion of all plumbing and piping and including the demolition and removal of certain equipment, piping and appurtenances all as required and as indicated on drawings and specified herein. Work materials and equipment not indicated or specified which is necessary for the complete and proper operation of the work of this Section in accordance with the true intent and meaning of the contract documents shall be provided and incorporated at no additional cost to the Owner.
- C. Section Includes:
 - 1. Piping and specialties for underground domestic water and fire water outside the building.
 - 2. Trenching Requirements: Conform to the requirements of Section 31 20 00 – Earth Moving.
 - 3. Hydrostatic Pressure, Leakage & Disinfection Testing.

1.02 SUBMITTALS

- A. Product Data: Manufacturer's catalog data for materials. Include technical data for piping, gaskets, joints and couplings, gate valves, ball valves, valve boxes, fire hydrants, tracer wire, detectable warning tape, sand bedding, concrete thrust block mix design, and mechanical joint restraints
- B. Certificates: Certificates attesting that tests set forth in referenced publications have been performed and the performance requirements have been satisfied.

1.03 LICENSES, PERMITS & FEES

- A. The Contractor installing the water lines shall have a Class "C-34", "C-36" or Engineering "A" Contractors license valid in the State of California.
- B. The Contractor shall obtain all necessary permits, licenses, or agreements required by any legally constituted agency, pay for all fees and give all necessary notices required for the construction of the work. The Owner shall reimburse the contractor for all necessary permits or inspection fees by any legally constituted agency.

1.04 QUALITY ASSURANCE

- A. California Plumbing Code, CPC, 2022 Edition.
- B. Comply with NFPA 24, "Standard for the Installation of Private Fire Service Mains and Their Appurtenances," 2022 Edition for materials, installations, tests, flushing, and valve and hydrant supervision.
- C. Comply with NFPA 13, "Standard for the Installation of Sprinkler Systems," 2022 Edition for materials, installations, tests, flushing, and valve and hydrant supervision.
- D. Comply with NFPA 70, "National Electrical Code," for electrical connections between wiring and electrically operated devices.
- E. Comply with the following as a minimum requirement:
 - 1. ANSI:
 - a. ANSI B16.18 Cast Copper Alloy Solder Joint Pressure Fittings.
 - b. ANSI B18.5.2.1M Metric Round Head Short Square Neck Bolts.
 - 2. ASTM:
 - a. ASTM A 47 Ferric Malleable Iron Castings.
 - b. ASTM A 48 Gray Iron Castings.
 - c. ASTM A 53 Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless.
 - d. ASTM A 307 Carbon Steel bolts and Studs, 60,000 psi Tensile Strength.
 - e. ASTM A 563 Ductile Iron Castings.
 - f. ASTM A 563 Carbon and Alloy Steel Nuts.
 - g. ASTM B 61 Steam or Valve Bronze Castings.
 - h. ASTM B 62 Composition Bronze or Ounce Metal Castings.
 - i. ASTM B 88 Seamless Copper Water Tube.
 - j. ASTM C 94 Ready-Mixed Concrete.
 - k. ASTM D 1527 Acrylonitrile-Butadiene-Styrene (ABS) Plastic Pipe, Schedules 40 and 80.
 - l. ASTM D 1785 Poly Vinyl Chloride (PVC) Plastic Pipe, Schedules 40, 80 and 120.
 - m. ASTM D 2235 Solvent Cement for ABS Plastic Pipe, and Fittings.
 - n. ASTM D 2241 PVC Plastic Pipe Fittings, Schedule 40.
 - o. ASTM D 2282 ABS Plastic Pipe.
 - p. ASTM D 2466 PVC Plastic Pipe Fittings, Schedule 40.
 - q. ASTM D 2468 ABS Plastic Pipe Fittings, Schedule 40.

- r. ASTM D 2564 PVC Plastic Piping Systems.
 - s. ASTM D 2774 Underground Installation of Thermoplastic Pressure Piping.
 - t. ASTM D 2855 Making Solvent-Cemented Joints with PVC Pipe and Fittings.
 - u. ASTM D 3139 Joints Pressure Pipes Using Flexible Elastomeric Seals.
 - v. ASTM F 402 Safe Handling Of Solvent Cements, Primer and Cleaners Used for Joining Thermoplastic Pipes and Fittings.
 - w. ASTM F 477 Elastomeric Seals for Joining Plastic Pipes.
3. American Water Works Association (AWWA) Standards:
- a. AWWA C104/A21.4 Cement-Mortar Lining For Ductile-Iron Pipe and Fittings For Water
 - b. AWWA C110/A21.10 Ductile-Iron and Gray-Iron Fittings, 3 inches through 48 inches, for Water and Other Liquids.
 - c. AWWA C111/A21.11 Rubber-Gasket Joints for Ductile-Iron pressure Pipe and Fittings.
 - d. ASTM C151/A21.51-96 Ductile-Iron Pipe, centrifugally cast, for water 3 inches through 64 inches.
 - e. AWWA C153/A21.53 Ductile-Iron Compact Fittings, 3 inches through 16 inches, for Water and Other Liquids.
 - f. AWWA C500 Gate Valves for Water and Sewerage Systems.
 - g. AWWA C503 Wet- Barrel Fire Hydrants.
 - h. AWWA C508 Swing-Check Valves for Waterworks Service, 2 inches through 24 inches NPS.
 - i. AWWA C509 Resilient-Seated Gate Valves for Water and Sewerage Systems.
 - j. AWWA C511 Reduced-Pressure Principal Backflow-Prevention Assembly.
 - k. AWWA C600 Installation of Ductile-Iron Water Mains and Their Appurtenances.
 - l. AWWA C651 Disinfecting Water Mains.
 - m. AWWA C800 Underground Service Line valves and Fittings.
 - n. AWWA C900 PVC Pressure Pipe, 4 inches through 12 inches, for Water Distribution.
 - o. AWWA M23 PVC Pipe - Design and Installation.
4. Manufacturers Standardization Society (MSS) of the Valve and Fittings Industry:

- a. MSS-SP-80 Bronze Gate, Globe, Angle and Check Valves.
- b. MSS-SP-73 Silver Brazing Joints for Wrought and Cast Solder-Joint Fittings.
- 5. Uni-Bell PVC Pipe Association (UBPPA):
 - a. UBPPA UNI-PUB-9 Installation of PVC Pressure Pipe.
 - b. UBPPA UNI-B-13 Standard Performance Specification on joined restrained devices for use with Poly Vinyl Chloride (PVC) Pipe.
- 6. Underwriters Laboratories Inc. (UL):
 - a. UL 246 Hydrants for Fire-Protection Service.
 - b. UL 262 Gate Valves for Fire-Protection Service.
 - c. UL 312 Check Valves for Fire-Protection Service.
 - d. UL 789 Indicator Posts for Fire-Protection Service.
- F. The work provided herein shall conform to and be in accordance with the Contract Plans, General Conditions/Specifications and Special Provisions, as well as the Standard Specifications for Public Works Construction ("Green Book"), 2021 Edition, adopted by the Southern California Chapter, American Public Works Association; herein referred to as the "Standard Specifications".

1.05 SEQUENCING AND SCHEDULING

- A. Coordinate with other utility work.

1.06 PRODUCT HANDLING

- A. Store items above ground on platforms, skids or other approved supports.
- B. Deliver piping with factory-applied end-caps. Maintain end-caps through shipping, storage, and handling to prevent pipe-end damage and to prevent entrance of dirt, debris, and moisture.
- C. Store plastic piping protected from direct sunlight. Support to prevent sagging and bending.
- D. Handling: Use sling to handle valves and fire hydrants whose size requires handling by crane or lift. Rig valves to avoid damage to exposed valve parts. Do not use hand wheels or stems as lifting or rigging pongs.
- E. Protect coating and linings on pipes, fittings and accessories from damage. Do not drag pipe to trench. Repair coatings or linings damaged.

1.07 DISPOSAL OF REMOVED MATERIALS INCLUDING ASBESTOS-CEMENT PIPE

- A. All removed materials, except those indicated on the plans or described herein to remain the property of the Owner, shall become the property of the Contractor and shall be disposed in accordance with local, state, and federal laws. Should any of those materials be considered as hazardous the Contractor shall provide the Owners Inspector with paper custody trail documentation of the disposal.

- B. Asbestos – Cement (A-C) Pipe Removal and Disposal: The plans for the project may indicate that existing asbestos-cement pipe is to be removed from the ground. Where so indicated the Contractor shall excavate with care, expose the pipeline and remove the A-C pipe to the nearest joint. Should the plans not call out the removal of the A-C pipe and A-C pipe is encountered, the Contractor shall obtain approval from the Inspector as to whether or not the A-C pipe is to be removed or can be left in place. Cutting of the pipe shall only be done if absolutely there is no other way to expose the length of pipe to the nearest joint that be separated and the Inspector approves the cutting of the pipe. Cutting of the pipe shall be done with a mechanical saw with a pressure water source to dampen the pipe and the dust from the cutting. To remove a coupling, the coupling may have to be broken in the trench. The pipe once removed from the trench may be broken for handling. The breaking shall be done within a plastic bagging or sheeting material to minimize the release of asbestos fibers into the atmosphere. Once removed and broken, if necessary, the A-C material shall be bagged and disposed of legally with the Inspector to be given a copy of all Contractor paperwork as to the legal disposal of the material. If the A-C pipe section(s) are removed intact the pipe can be removed by the Contractor from the project site and become the property and responsibility of the Contractor.

1.08 DRAWINGS

- A. Because of the small scale drawings, it is not possible to indicate all offsets, fittings and accessories which may be required. The Contractor shall carefully investigate the conditions surrounding installation of his work, furnishing the necessary piping, fittings, valves, and other devices which may be required to complete the installation.
- B. The general arrangement indicated on the drawings shall be followed as closely as possible. Coordinate with the Architectural, Structural, Mechanical and Electrical Drawings prior to installation of piping fixtures and equipment to verify adequate space available for installation of the work shown. In the event a field condition arises which makes it impossible to install the work as indicated, submit, in writing, the proposed departures to the Architect for his acceptance. Only when Architect's acceptance is given, in writing, shall Contractor proceed with installation of the work.
- C. In case of a difference in the specifications or drawings, or between the specifications and the drawings or in the drawings, the Contractor shall figure the most expensive alternate and after award of contract, shall secure direction from the Architect.

1.09 PROTECTION

- A. All work, equipment and materials shall be protected at all times. Contractor shall make good all damage caused either directly or indirectly by his own workmen. Contractor shall also protect his own work from damage. He shall close all pipe openings with caps or plugs during installation. He shall protect all his equipment and materials against dirt, water, chemical and mechanical injury. Upon completion, all work shall be thoroughly cleaned and delivered in a new condition.
- B. Contractor shall be held responsible for all damage to equipment and materials until he has received written notice from the Architect or Engineer that his work has been accepted.

1.10 LOCATIONS

- A. The locations of apparatus, piping and equipment indicated on the drawings are approximate. Piping and equipment shall be installed in such a manner as to avoid all obstruction, preserve headroom, and keep openings and passages clear. The locations of and mounting heights of all fixtures shall be coordinated with the architectural plans and room elevations.

- B. Clearances and Openings: Contractor shall cooperate and coordinate his work with all other trades to avoid conflict and permit for a neat and orderly appearance of the entire installation. The Contractor shall, in advance of the work, furnish instructions to the General Contractor as to his requirements for equipment and material installation of any kind, whether or not specifically mentioned on drawings or in the specifications, and shall include recesses, chases in walls, and all required openings in the structure. Should furnishing this information be neglected, delayed or incorrect and additional cuttings are found to be required, the cost of the same shall be charged to this Contractor.

1.11 INSPECTION

- A. Notice shall be given to the School District Inspector at least 48 hours before starting construction.
- B. Contractor shall not allow or cause any of his work to be covered up before it has been duly inspected, tested and approved by the Owner, Architect or any other authorized inspectors having legal jurisdiction over his work. Should he fail to observe the above, he shall uncover the work and, after it has been inspected, tested and approved, recover it at his own expense.
- C. Inspection of the work shall not relieve the contractor of any obligations to complete the work as prescribed by the standard specifications. Any known defective work shall be corrected before testing or final inspection will be permitted. Unsuitable materials may be rejected even if these materials have been previously overlooked by the Inspector.
- D. The Owner shall have the authority to suspend the work completely or in part for such time as it may deem necessary if the contractor fails to carry out instructions given by the Owner, or to perform any required provisions of the plans and specifications. The contractor shall immediately comply with a written order of the Owner to suspend the work completely or in part. The work shall be resumed when improper methods or defective work are corrected as ordered and approved in writing by the Owner.

1.12 SUBSTITUTIONS

- A. The Contractor assumes full responsibility that alternate manufacturers, items and procedures will meet the job requirements and is responsible for cost of redesign and of modifications to this and other parts of work caused by alternate items furnished under work in this Section. In view of these responsibilities, it is the purpose of these specifications to establish procedures which ensure that the Contractor has considered all the ramifications of proposed alternates before submitting them for review. Submittals which do not comply with the requirements of these specifications or which indicate proposed alternates were selected without proper regard to the requirements of the job, will not be approved. No more than one proposed alternate will be considered for each item.
- B. This Contractor is responsible to provide sufficient information to allow the Engineer to analyze any proposed alternate. If inadequate information is provided, the proposal will not be approved and resubmittal will not be allowed.
- C. The Architect or his authorized representative shall be the sole judge as to the quality and suitability of proposed alternate equipment, fixtures or materials and decisions of the Architect or that of his representative shall be final and conclusive.

1.13 RECORD DRAWINGS

- A. Contractor shall provide and keep up-to-date a complete "as-built" record set of redline prints which shall show every change from the original drawings and the exact "as-built"

locations and sizes of the work provided under this Section of the specifications. This set shall include locations, dimensions, depth of buried piping, cleanouts, shut-off valves, sewer invert locations, plugged wyes, tees, etc. On completion of the work, the Contractor shall incorporate all as-built information on a set of reproducible tracings provided by the Architect and this set of reproducibles shall be delivered to the Architect.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Pipe:

1. Water Distribution Main (pipe size 4 inches and larger).
 - a. Ductile Iron Pipe (DIP): Pressure Class 350 pipe conforming to AWWA/ANSI C151/A21.5, cement-mortar lining conforming to AWWA/ANSI C104/A21.4, with standard thickness per AWWA/ANSI C150/A21.50. U.S. Pipe, American Cast Iron Pipe Company (ACIPCO), or approved equivalent.
 - b. Polyvinyl Chloride Pipe (PVC): Pressure Class 235, DR 18, spigot and gasket bell end, conforming to AWWA C900, with equivalent cast-iron pipe outer diameter (O.D.). Acceptable manufacturers: J-M Manufacturing Blue Brute, Vinyl Tech, Diamond Plastic, PW Pipe, or approved equal.
2. 3 inches and smaller - Schedule 80 PVC: Poly Vinyl Chloride (PVC) Plastic Pipe, Schedule 80, meeting ASTM D 1785 standards.
3. Microtunneling Pipe shall be High density polyethylene pipe (HDPE): Pipe and fitting system shall be pressure class 335 (DR7). Material shall meet AWWA C906, ASTM F714, CELL CLASS PER ASTM D3350, PPI LISTED MATERIAL (TR-4) PE 3608/4710, AND ANSI/NSF-14. Installer shall be certified by manufacturer for HDPE pipe and joint installation. Manufacturer: ISCO, JM Eagle or equal.

B. Fittings:

1. Butt Fusion HDPE Fittings shall meet the following requirement: Molded fittings shall comply with the requirements of ASTM D 3261. All fabricated elbows, tees, reducing tees and end caps shall be produced and meet the requirements of ASTM F2206. Socket fittings shall meet ASTM D 2683. Installer shall be certified by manufacturer for this type of joint installation. Manufacturer: ISCO, JM Eagle or equal.
2. All fittings for Iron Pipe Size pipe shall be manufactured in one piece of injection molded PVC compound meeting ASTM D1784. Fittings shall be Class 315 and conform to requirements of SDR 13.5. Fittings shall be designed to withstand a minimum of 630 psi quick burst pressure at 73 degrees F., tested in accordance with ASTM D1599.
3. Poly Vinyl Chloride (PVC) Water fittings shall conform to ASTM D 2467 "Socket-Type" PVC Plastic Type Fittings, Schedule 80.
4. Brass Fittings: Bronze and brass 250 psi, screwed, A.S.A. B 16.17 and F S WW-P-460.

5. Ductile Iron: Ductile iron fittings shall be supplied in accordance with AWWA Standard C110, Ductile-Iron and Gray-Iron Fittings, 3 In. Through 48 In. for Water and Other Liquids", or AWWA Standard C153, "Ductile Iron Compact Fittings, 3 In. Through 24 In for Water Service". All fittings shall have mechanical joints unless otherwise specified on Construction Plans.
 - a. Mechanical joints shall conform to the requirements of AWWA Standard C111, "Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings."
 - b. Flanged fittings shall conform to the requirements of AWWA Standard C110 or C153. Flanges shall be drilled to ANSI B16.1, 125 lb standard bolt template. The 250 lb. Flanges, when required, shall be drilled to ANSI B16.1, 250 lb. standard bolt template.
 - c. Where restrained joints are indicated on the plans, push-on "Tyton" joints shall be restrained with "Field-Lok" gaskets as manufactured by U.S. Pipe or approved equal.
 - d. Ductile iron pipe fittings shall be manufactured or supplied by American Ductile Iron Pipe (a division of American Cast Iron Pipe Company, Birmingham, Alabama), U.S. Pipe & Foundry Company, Tyler Pipe/Union Foundry, Griffin Pipe Products Company, Sigma Corporation, Star Pipe Products Co., or approved equal.
- C. Gaskets for Ductile Iron Pipe:
 1. Gaskets for Ductile Iron Pipe: Gaskets for flanged joints shall be full faced, cut from 1/8 inch thick Nitrile Rubber (Buna-N), bolt holes pre-punched, conforming to the requirements of ANSI /ASME B16.2.1. Gaskets shall be manufactured or supplied by Tripac Fasteners, Long Beach Industrial Gaskets, or approved equal.
- D. PVC & Mechanical Pipe Couplings, Joints and Jointing Materials:
 1. All couplings shall be manufactured from the same materials and in compliance with the specifications set forth herein before for PVC pipe.
 2. Pipe joints on plastic pipe 3-inch and under shall be solvent cement joints conforming to ASTM D 2564, primer according to ASTM F 656. Solvent and primer shall not be more than one year old.
 3. PVC C-900 Pipe: joints shall be integral, bell and spigot gasketed joints.
 - a. Provide each PVC C-900 Pipe joint connection with an elastomeric gasket suitable for the bell or coupling installation.
 - b. An elastomeric gasket shall be designed with a retainer ring which "locks" the gasket into integral bell groove and shall be installed at the point of manufacturer. Gasket shall be in conformance with ASTM F477.
 - c. Gaskets for push on joints and compression type joints or mechanical joints for connections between pipes and metal fittings, valves, and other accessories shall be as specified in AWWA C111/A21.11.
 - d. Solvent weld joints are NOT PERMITTED.

4. Joints between pipe and metal fittings, valves, and other accessories shall be mechanical joints as specified in AWWA C111/A21.11 unless otherwise noted on Construction Documents.
- E. Lining and Coating for Ductile Iron & Fittings:
1. The interior of all ductile iron pipe and fittings shall be factory cement mortar lined in accordance with AWWA Standard C104. Lining materials shall conform to ASTM C-150, Type II.
 2. All buried ductile iron pipe and fittings shall have a factory applied bituminous coating of not less than 1 mil in thickness as specified in AWWA C151. The coating shall be free from blisters and holes; shall adhere to the metal surface at ambient temperatures encountered in the field.
 3. Cement mortar lining and bituminous coating of pipe or fittings in the field is not permitted.
- F. Bolts and Nuts for Mechanical Joints, Flanged Fittings, Flexible Couplings & Restraint Devices:
1. All bolts and studs shall be Type 316 Stainless Steel per ASTM A193 Grade B8M, project ends of bolts $\frac{1}{4}$ to $\frac{3}{8}$ inch beyond nut.
 2. All nuts and washers shall be Type 316 Stainless Steel per ASTM A194 Grade 8M, provide 1 washer per nut.
 3. All exposed flanges and other metal surfaces and all damaged coatings shall be coated after assembly with a mastic, Minnesota Mining and Manufacturing EC 244, Koppers Bitumastic (Super-Tank) 505, or an approved equal.
 4. Stainless steel parts shall not be coated except for the threaded portion, which will be assembled with a liberal coat of anti-seize compound.
 5. All bolts shall be lubricated with anti-seize compound.
- G. Gate Valves:
1. Gate valves 2" or smaller: Valves shall be Class 200 WSP/WOG, stainless steel body and trim, threaded ends, inserted bonnet, solid disc.
 - a. Approved ball valve manufacturer / model:
 - 1) Red-White Valve Corporation #882.
 2. Gate valves 2½" or larger: Resilient seated gate valves shall be ductile iron and coated with a fusion bonded epoxy. Gate valves shall have non-rising stems (NRS) and shall be manufactured to meet or exceed the requirements of AWWA Standard C509, with fully encapsulated disk. The following parts of the valve shall be made of ductile iron: bonnet, body, yoke, wrench nut, O-ring packing plate or seal plate, gland follower, and gate. Omit valve handle and furnish with 2-inch operating unit.
 - a. Approved gate valve manufacturer / model:
 - 1) American AVK Series 25
 - 2) American Flow Control Series 2500

- 3) Clow F-6100
 - 4) Kennedy 4571
 - 5) Mueller A-2360
 - 6) M & H Valve Company
- b. All gate valves shall be provided with a stem extension if depth of valve nut exceeds 3 feet. All valve extensions shall be centered in the valve well by use of a guide and shall operate freely without binding after installation. All valves shall open by turning the wrench nut left (counter-clockwise).
 - c. Gate valves must be U.L. Listed & FM approved: minimum of 200psi.
 - d. All gate valves shall be wrapped with 3 layers of 8-mil polyethylene.
- H. Valve Boxes, Risers and Lids for Buried Valves:
1. Valve boxes and cover shall be as shown on Construction Documents.
 2. Valve riser material shall be 10-inch Schedule 80 PVC, or 10-inch SDR 35 PVC pipe
 3. Paint domestic water valve box lids on school property with 2 coats of blue enamel.
 4. Paint fire system valve box lids on school property with 2 coats of red enamel.
 5. Valve boxes shall be marked "WATER" embossed above surface.
- I. Thrust Restraining Materials: All non-microtunneled pipe bends and tees 2.5" and greater shall be restrained from movement by either the use of concrete thrust blocks or mechanical joint restraints. Restraint systems to be used on PVC C-900 pipe shall meet or exceed A.S.T.M. Standard F1674-96, "Standard Test Methods for Joint Restraint Products for Use with PVC Pipe," or the latest revision thereof. Restraint systems used on ductile pipe shall meet or exceed U.L. Standard 194. Underwriter Laboratories (U.L.) and/or Factory Mutual (FM) certifications are required on all restraint systems. All mechanical restraint devices shall be wrapped with 3 layers of 8-mil polyethylene after assembly. Thrust blocks are not required on microtunneled pipe.
1. Mechanical Joint Fittings:
 - a. Restrainer mechanism shall be integrated into the design of the follower gland. As the mechanism is activated, multiple wedging action shall be imparted against the pipe increasing its resistance as internal pressure increases. After burial of the restraining mechanism, joint flexibility shall be maintained. The actuating bolt shall be threaded into the restraining wedge and have a 1-1/4" across the flats hex head. The actuating bolt system shall have a torque-limiting head designed to break off at preset torque levels, thus insuring proper action of the restraining device. After removal of the torque-limiting head, a 1 1/4" hex head shall remain to facilitate the removal and re-assembly of the gland. Glands shall be manufactured of high strength ductile iron in accordance with ASTM A536, Grade 65-45-12 requirements. Wedge mechanisms shall be heat-treated ductile iron, hardened to at least 370 BHN hardness. The restraining mechanism shall have a pressure rating equal to that of the

pipe on which it is used and shall have a safety factor of at least 2:1. The restraining gland shall conform to the requirements of ASTM F 1674, and UNI-B-13-94, "Recommended Performance Specification For Joint Restraint Devices For Use With Polyvinyl Chloride (PVC) Pipe."

- b. The following qualified product list identifies specified manufacturers models approved for installation in this water distribution system:

<u>Manufacturer</u>	<u>PVC C-900 Pipe</u>	<u>Ductile Iron Pipe</u>
EBBA Iron Sales, In	2000 PV	Megalug 1100
Romac Industries, In	Romagrip PVC	Romagrip DI
Star Pipe Products	Stargrip Series 4000	StargripSeries 3000
Uni-Flange Corporation	Series 1500	Series 1400

2. Bell and Spigot Harness:

- a. Restraint Devices for bell and spigot joints of PVC Pipe shall consist of split restraint rings, one installed on the spigot, connected to one installed on the pipe barrel behind the bell. The restraint devices shall incorporate a series of machined serrations (not "as cast") on the inside diameter to provide positive restraint, exact fit, 360° contact and support of the pipe wall. Restraint Devices shall be of ductile iron, ASTM A536, Grade 65-45-12 and connecting rods shall be of high strength, low alloy material in accordance with ANSI / AWWA C111/A21.11 unless specified as stainless steel in these specifications.
- b. All Restraint Devices shall have a water working pressure rating equivalent to the full rated pressure of the PVC Pipe they are installed on, with a minimum 2:1 safety factor in any nominal pipe size. In addition, they shall meet or exceed the requirements of Uni-B-13-94, "Recommended Performance Specification For Joint Restraint Devices For Use With Polyvinyl Chloride (PVC) Pipe." Notarized certification from the manufacturer of the restraint device shall be provided with submittals.
- c. The following qualified product list identifies specified manufacturers models approved for installation in this water distribution system:

<u>Manufacturer</u>	<u>PVC C-900 Pipe</u>	<u>Ductile Iron Pipe</u>
EBBA Iron Sales, In	1600 Series	1700 Series
Romac Industries, In	611 Series	611 Series
Star Pipe Products	1100 Series	Not Approved
Uni-Flange Corporation	Series 1390	Not Approved

3. Push-On Pipe Bells & Plain End Pipe: Where restrained joints are indicated on the Construction Drawings for ductile iron pipe, push-on joints shall be restrained with "Field-Lok 350" gaskets as manufactured by U.S. Pipe or approved equal. "TR-Flex" restrained joint pipe as manufactured by U.S. Pipe or approved equal is also an acceptable option for restrain of push-on joints. Restrained push-on joint pipe and fittings shall be capable of being deflected after assembly.

4. Flange Adapters:

- a. Flange Adapters shall be manufactured from ductile iron per ASTM A536, Grade 65-42-12 and shall have bolt circles and bolt holes to meet ANSI B16.1 – Class 125 or Class 250 if required and shown on plans.

- b. The following qualified product list identifies specified manufacturers models approved for installation in this water distribution system:

<u>Manufacturer</u>	<u>PVC C-900 Pipe</u>	<u>Ductile Iron Pipe</u>
EBBA Iron Sales, In	2100 Series	2100 Series
Romac Industries, In	Not Approved	Field Flange
Star Pipe Products	Not Approved	Series 200
Uni-Flange Corporation	Not Approved	Series 200/400/420

5. Concrete: Concrete for thrust blocks shall conform to Concrete Class 520-C-2500. If thrust block is to be disturbed or backfill is to be placed prior to developing its required strength, additional mechanical thrust restraining devices approved by the Civil Engineer shall be installed.
- J. Tracer Wire for Nonmetallic Pipes: Tracer wires shall be electrically continuous #14 soft drawn copper wire, Type TW, blue plastic covered for potable water system and red for fire water system. Provide in sufficient length to be continuous over each installed section of nonmetallic pipe.
- K. Polyethylene Encasement Film Wrap: All ductile iron pipe and fittings buried underground shall be protected with plastic film wrap in accordance with AWWA C105 "American National Standard for Polyethylene Encasement for Ductile-Iron Pipe Systems" and be a minimum thickness of 0.008 in. (8 mils). All joints between plastic tubes shall be taped and secured with general purpose polyethylene tape, 2 inches wide and 10 mils thick (Scotchrap No. 50, Plicoflex No. 340, Protecto Wrap No. 200, Polyken No. 900, or approved equal).
- L. Sleeve-type Flexible Transition & Flanged Couplings:
1. Sleeve-type couplings shall be in accordance with ANSI/AWWA C219 - Standard for Bolted Sleeve-type couplings for Plain-End Pipe, and shall be of stainless steel or ductile iron with stainless steel bolts, without pipe stop, and 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 12 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 cold-expanded 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.
 2. 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.
 3. The gaskets shall be immune to attack by impurities normally found in water or wastewater. All gaskets shall meet the requirements of ASTM D2000 - Classification System for Rubber Products in Automotive applications, AA709Z, meeting Suffix B13 Grade 3. All gaskets shall be compatible with the piping service and fluid utilized.
 4. Bolts, nuts, & washers for couplings shall meet the requirements listed in Section 2.1K, herein. All cast components shall be fusion bonded epoxy coated per AWWA C213. After installation couplings shall be wrapped with 8-mil

polyethylene wrap per AWWA C-105 and section 2.1M requirements listed herein.

5. 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.
6. All sleeve-type couplings on pressure lines shall be harnessed unless thrust restraint is provided by other means. Harnesses shall be in accordance with the AWWA M11 standard, or as indicated.
7. The following qualified product list identifies specified manufacturers models approved for:

Straight & Transition Couplings

Romac Industries, Inc.:	Style "501"
Ford Meter Box Co.:	Style "FC1" or "FC2A"
Smith-Blair:	400 Series
JCM Industries:	200 Series
Dresser	Style 62 or 162

Flanged Coupling Adapters

Romac Industries, Inc.:	Style "FCA 501" or "FC400"
Ford Meter Box Co.:	Style "FFCA"
JCM Industries:	300 Series
Smith-Blair:	Style "913"
Dresser	Style 227

M. Fire Hydrants

1. See detail F5 on C7.1 for requirements.
2. Paint hydrant OSHA Safety Red.

PART 3 - EXECUTION

3.01 CLEARANCES OF WATER LINE

- A. Buildings: 3 feet.
- B. Parallel to Sewer Line:
 1. Water lines 4 inches or less in diameter shall not be installed in a common trench with the building sanitary drain unless the bottom of the water line is at least 12 inches above the top of the building sanitary drain or where the water line is installed on a solid shelf excavated on one side of the common trench with a minimum clear horizontal distance of 12 inches from the building sanitary drain.
 2. Water mains larger than 4 inches in diameter shall be separated from the Project site sanitary sewer, receiving more than one building sanitary drain or acid pipeline, in accordance with the requirement of the State of California, Human and Welfare Agency, Department of Health Services.
- C. Crossing Sewer Line:

1. A water main shall be separated from sanitary sewer in accordance with the requirements of the State of California Administrative Code, Title 22, Section 64630(e)(2), unless modified herein.
2. Install water main a minimum of 12 inches clear, above or below a sanitary sewer.
3. A water main greater than 4 inches in diameter, crossing under a sanitary sewer line, shall be installed with all their joints located at least 10 feet away from each side of the sanitary sewer line.
4. A water main greater than 4 inches in diameter, crossing over a sanitary sewer line, shall be installed with all their joints located at least 5 feet away from each side of the sanitary sewer line.

3.02 LAYING OF PVC PRESSURE PIPE

- A. Installations of pipe, bends, and fittings shall be in accordance with Section 3.3 for ductile iron bends and fittings and AWWA C-605, "Underground Installation of (PVC) Pressure Pipe and Fittings for Water" and/or the Uni-bell guideline UNI-PUB-9, "Installation Guide for PVC Pressure Pipe". PVC bends and fittings are not allowed. The Uni-Bell Handbook of PVC Pipe-Design and Construction shall be used for details of pipe installation practice except as follows and where noted otherwise on plans. Longitudinal bending of pipe sections is prohibited. Any directional change shall be accomplished through manufacturer approved 1 degree deflection of push on joints, 5 degree deflection with Certainteed – couplings, or ductile iron bends capable of withstanding 250 psi loads. A number 14 gauge, solid, soft drawn insulated copper tracer wire is required for PVC pipe installation. The tracer wire shall be wrapped around the pipe at 10-foot intervals and brought up inside each valve can to within 6 inches of the valve cover.
- B. Acceptable line and grade for piping: The pipe shall be laid true to the line and grade shown on the plans within acceptable tolerances. The tolerance on grade is 1 inch. The tolerance on line is 2 inches.
- C. A number 14 gauge, solid, soft drawn insulated copper tracer wire is required for PVC pipe installation on lines 2" and greater. The tracer wire shall be wrapped around the pipe at 10-foot intervals and brought up inside each valve can to within 6 inches of the valve cover.
- D. Every precaution shall be taken to prevent foreign material from entering the pipe while it is being placed in the trench. If the pipe-laying crew cannot put the pipe into the trench and in place without getting soil into it, the Engineer may require that before lowering the pipe into the trench, a temporary plug be placed over each end and left there until the connection is to be made to the adjacent pipe. During the laying operations, no debris, tools, clothing or other materials shall be left in the pipe.
- E. At times when pipe laying is not in progress, the open ends of pipe shall be closed by watertight plug or other means approved by the Inspector. This provision shall apply during the lunch-hour breaks as well as overnight. If water is in the trench, the seal shall remain in place until the trench is pumped completely dry.
- F. The cutting of pipe for inserting tees, fittings or closure pieces shall be done in a neat workmanlike manner without damage to the pipe or cement lining and so as to leave a smooth end at right angles to the axis of the pipe. The beveled end of any PVC pipe shall be cut off before the pipe is inserted into a mechanical joint bend or fitting. No pipe shall be laid in water or when, in the opinion of the Engineer, trench conditions are unsuitable.

- G. Should structural difficulties or Work of other trades prevent the running of pipes or the setting of equipment as indicated by Drawings, the necessary deviation will be allowed by the District's Inspector.
- H. All water piping shall be adequately supported. Burred ends shall be reamed to the full bore of the pipe or tube. Change in direction shall be made by the appropriate use of fittings. All piping, equipment, appurtenances and devices shall be installed in conformity with the provisions and intent of the California Plumbing Code.
- I. Install piping under streets and other obstructions that cannot be disturbed, by tunneling, jacking, or combination of both.
- J. When connecting plastic pipe to copper, brass, or steel material, provide a schedule 80 PVC nipple.
- K. Cure welded joints at least 15 minutes before moving or handling, and at least 24 hours before applying pressure to system, unless otherwise recommended by joint solvent manufacturer.
- L. Field inspection for plastic pipe and fittings shall follow section 306-1.2.12, Standard Specifications for Public Works Construction, 2015 edition.

3.03 LAYING OF DUCTILE IRON PIPE

- A. Acceptable line and grade for piping: The pipe shall be laid true to the line and grade shown on the plans within acceptable tolerances. The tolerance on grade is 1 inch. The tolerance on line is 2 inches. Grade shall be measured along the pipe invert.
- B. Installations of pipe and fittings shall be in accordance with AWWA Standard C600, "Installation of Ductile-Iron Water Mains and Their Appurtenances" and the pipe manufacturer's installation manual. The DIPRA Publication "Guide for the Installation of Ductile Iron Water Mains" shall be used for details of pipe installation practice except as follows and where noted otherwise on plans. Maximum deflection per joint for 8-inch thru 12-inch pipe is 3 degrees; minimum laying radius for 18 feet pipe lengths is 345 feet. Maximum deflection per joint for 16-inch pipe is 2 degrees; minimum laying radius for 18 feet pipe lengths is 520 feet.
- C. Every precaution shall be taken to prevent foreign material from entering the pipe while it is being placed in the trench. If the pipe-laying crew cannot put the pipe into the trench and in place without getting soil into it, the Engineer may require that before lowering the pipe into the trench, a temporary plug be placed over each end and left there until the connection is to be made to the adjacent pipe. During the laying operations, no debris, tools, clothing or other materials shall be left in the pipe.
- D. At times when pipe laying is not in progress, the open ends of pipe shall be closed by watertight plug or other means approved by the Engineer. This provision shall apply during the lunch-hour breaks as well as overnight. If water is in the trench, the seal shall remain in place until the trench is pumped completely dry.
- E. The cutting of pipe for inserting tees, fittings or closure pieces shall be done in a neat workmanlike manner without damage to the pipe or cement lining and so as to leave a smooth end at right angles to the axis of the pipe. No pipe shall be laid in water or when, in the option of the Engineer trench conditions are unsuitable. Field welding of Ductile Iron Pipe for repair or for joining is prohibited.

- F. Until thrust blocks and supports are poured, fittings shall be temporarily supported by placing wooden skids under the bells so that the pipe is not subjected to the weight of the fitting.
- G. Fittings shall be supported independently of the pipe.

3.04 MICROTUNNELING PIPE INSTALLATION

- A. Microtunneling shall comply with S.S.P.W.C. (Green Book 2021 Edition) section 308.
- B. ALL HDPE PIPE AND FITTINGS SHALL BE CUT, JOINED, AND INSTALLED IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS. JOINING, AND LAYING OF POLYETHYLENE PIPE SHALL BE ACCOMPLISHED BY PERSONNEL EXPERIENCED AND CERTIFIED IN WORKING WITH POLYETHYLENE PIPE SYSTEMS.
- C. ALL HDPE PIPE SHALL BE JOINED TO ITSELF BY THE HEAT FUSION PROCESS WHICH PRODUCES HOMOGENEOUS, SEAL, LEAK TIGHT JOINTS. TIE-INS BETWEEN SECTIONS OF HDPE PIPE SHALL BE MADE BY BUTT FUSION WHENEVER POSSIBLE.
- D. THE PIPE SHALL BE JOINED BY THE BUTT FUSION PROCEDURE OUTLINED IN ASTM F 2620 OR PPI TR-33. A RECORD OR CERTIFICATE OF TRAINING FOR THE FUSION OPERATOR MUST BE PROVIDED THAT DOCUMENTS TRAINING TO THE FUNDAMENTALS OF ASTM F 2620.
- E. THE EMPLOYER OF THE FUSION MACHINE OPERATOR IS RESPONSIBLE FOR THE FUSION JOINT QUALITY OF THE FUSION WELD MADE BY THAT INDIVIDUAL. THE EMPLOYER IS RESPONSIBLE FOR DOCUMENTING ALL TRAINING AND QUALIFICATION RECORDS FOR THAT INDIVIDUAL, INCLUDING COMPLIANCE TO ANY CODE REQUIREMENTS FOR FUSION/BONDER OPERATORS.
- F. ALL HDPE FUSION EQUIPMENT OPERATORS SHALL BE QUALIFIED TO THE PROCEDURE USED TO PERFORM PIPE JOINING. FUSION EQUIPMENT OPERATORS SHALL HAVE CURRENT, FORMAL TRAINING ON ALL FUSION EQUIPMENT EMPLOYED ON THE PROJECT APPROVED BY MANUFACTURER. TRAINING RECEIVED MORE THAN TWO YEARS PRIOR TO OPERATION WITH NO EVIDENCE OF ACTIVITY WITHIN THE PAST 6 MONTHS SHALL NOT BE CONSIDERED CURRENT.

3.05 CONNECTIONS TO EXISTING UTILITIES

- A. All tie-in locations shall be excavated a minimum of TWO (2) working days in advance of final connection to expose the affected portions of existing pipelines and to allow time for the necessary measurements, assembling of materials and equipment, and assuring that all pre-assembled piping and fittings will be compatible with the existing main.
- B. Changes or delays caused by the Contractor's failure to perform "Potholing" and interference location work shall not be eligible for extra work, compensation, or time extension.
- C. The Contractor shall immediately notify the District Inspector in writing, upon learning of the existence or location of any utility facility omitted from or shown incorrectly on the contract drawings, or improperly marked or otherwise indicated. The Contractor shall provide full details as to depth, location, size and function of the utility in writing to the IOR and note it on the "as-built" plans.

- D. The Contractor shall furnish and place the necessary protection around a utility when protection is called for on the contract drawings, visible to the Contractor, or marked as such. The Contractor shall install the utility protection at no additional expense to the Owner.

3.06 VALVES

- A. Water valves shall be installed at locations shown on the Construction Drawing, or as directed by the Inspector. Valves shall be set plumb, and shall be stabilized and supported separately from the pipeline. Information regarding size, type, make, and number of turns to close shall be supplied to the Utility. All valves shall be covered with a valve box assembly. Valve boxes shall be plumb, centered over the valve nut, and supported separately from the valve body. Valve boxes shall be lowered to below paving grade level prior to street paving, and after final grade has been established by the final grade. In any event, Contractor shall ensure that all valve boxes will provide access to the operation of the valve by the Utilities' personnel. Valve boxes shall be flagged or barricaded during construction to divert traffic around their location.
- B. Wrap buried valves, 2-½ inches and larger, with two layers of 8-mil polyethylene wrap per AWWA C105.
- C. All exposed flanges and other metal surfaces and all damaged coatings shall be coated after assembly with a mastic, Minnesota Mining and Manufacturing EC 244, Koppers Bitumastic (Super-Tank) 505, or an approved equal.
- D. Stainless steel parts shall not be coated except for the threaded portion, which will be assembled with a liberal coat of anti-seize compound.

3.07 PROTECTION OF METAL SURFACES

- A. All exposed surfaces of the valves, flanges, bolts, nuts, tie-rods, turn buckles, etc. in contact with the earth and backfill materials shall be coated with a minimum of 30 mils of bitumastic coating prior to backfilling. In addition to this bitumastic coating, all iron or steel surfaces such as valves, flanges, bolts, nuts, couplings, shall be encased in 8 mil polyethylene wrapping in accordance with AWWA C105 "American National Standard for Polyethylene Encasement for Ductile-Iron Pipe Systems".

3.08 ELECTROLYSIS PREVENTION

- A. Insulating (dielectric) couplings or 6-inch long brass nipples shall be installed at locations specified or as required. Dielectric insulators shall be provided to insulate dissimilar metal to metal contact. Flanges shall be provided with a complete insulating component consisting of gasket bolt sleeves and bolt washers. Dielectric insulators shall be installed at locations indicated or as required.
- B. Where steel or cast iron below grade connects to copper or brass piping above grade, the transition from steel or cast iron pipe to copper or brass pipe shall be installed in an above grade accessible location.
- C. Underground dielectric connections shall be in accessible yard boxes.
- D. Above ground dielectric connections shall be exposed.

3.09 PIPELINE FLUSHING & HYDROSTATIC TESTING

- A. General Requirements

1. Hydrostatic testing and disinfecting (chlorination and flushing) of newly laid or repaired pipelines and appurtenances must be completed before the pipelines can be connected to the existing water distribution system. Pipelines and appurtenances shall remain isolated from the existing water distribution system during hydrostatic testing and disinfecting.
 2. All services, air release valves, and other appurtenances connected to the newly laid pipeline shall be pressure tested and disinfected at the same time as that of the pipeline. Care shall be taken to expel all air from the pipeline and services during any filling operation.
- B. Temporary Piping and Appurtenances for Flushing, Testing, and Disinfecting
1. The Contractor and/or subcontractor shall supply all temporary piping, corporation and curb stops, test plates, bulkheads, plugs, pipe end caps, valves, fittings, calibrated meters, equipment, labor and method necessary for pressure testing, chlorinating, and flushing of the newly laid pipeline. The Contractor shall also provide any temporary piping, backflow devices, and appurtenances needed to carry potable water to the section of pipeline being flushed, pressure tested, or disinfected.
 2. Corporation and curb stop taps used for flushing, pressure testing, and disinfecting shall comply with service tap requirements for ductile iron pipe. Unless specified otherwise, the tap shall be made at the top of pipe.
- C. Private fire service mains and lead-in connections to system risers shall be flushed thoroughly before connection is made to building system piping in order to remove foreign materials that might have entered the main during the course of the installation or that might have been present in existing piping. The minimum rate of flow shall be not less than the water demand rate of the system, which is determined by the system design, or not less than that necessary to provide a velocity of 10 ft/s, whichever is greater. For all systems, the flushing operations shall be continued for a sufficient time to ensure thorough cleaning. The General Contractor & District Inspector shall be present during the flushing.
- D. It is the responsibility of the Contractor to dispose of the flushed water from the project area. The Contractor shall take all precautions necessary in providing for adequate drainage from the site. The disposal of water is described later in this Section.
1. Underground fire mains shall be flushed at the flow rates specified below per N.F.P.A. 24 10.10.2.1.3 according to the maximum pipe size in the line. While conducting the flushing operation, the Contractor shall exercise care that the water does not create any damage. The Contractor shall be responsible for any damage caused by this operation.

Flow required to produce a velocity of 10 ft per second in pipes:

4" – 390 GPM	8" – 1560 GPM
6" – 880 GPM	10" - 2440 GPM

3.10 HYDROSTATIC (PRESSURE) TESTING FOR (PRIVATE) FIRE PROTECTION SYSTEM

- A. The Contractor shall hire a licensed independent subcontractor to conduct the required hydrostatic testing of newly laid pipelines. Unless specified differently on the plans or as supplemented herein, hydrostatic testing shall comply with NFPA 24, "Installation of Private Fire Service Mains and Their Appurtenances," 2022 Edition. After completion of the hydrostatic testing, the sub-contractor shall fill out the certificate shown in Figure

10.10.1, N.F.P.A. 24, 2022 Edition, located at the end of this specification. The General Contractor & Inspector shall be present during the testing.

B. Preparation for the Hydrostatic Test

1. All concrete anchor and thrust blocks associated with sections of the pipelines to be tested, shall have cured for a minimum time of 72 hours prior to any flushing or pressurizing of the pipeline. Restrained joints or other methods of pipe support may be used to reduce this time if approved by the Inspector.
2. The Contractor shall flush the pipeline with potable water to remove dirt and debris. Flushing and disposal of water is discussed elsewhere in this Section.
3. The amount of pipeline footage to be tested at one time shall be determined by the Inspector and shall not exceed 1,000 feet in length. Test plates (bulkheads), corporation stops, and other temporary facilities required for testing purposes shall be installed at the Contractor's expense. Testing against valves is not permitted unless approved by the Inspector.
4. Each hydrant and control valve shall be fully opened and closed under system water pressure to ensure proper operation.

C. Procedures for Hydrostatic Testing

1. Each section of pipeline and all fire hydrants, services, and appurtenances connected thereto, shall be subjected to the hydrostatic test. The pipeline shall be filled with potable water. Care shall be exercised to see that provisions are made for the escape of air at high points and ends of laterals. Contractor shall see that all combination air release valves are open and operating. After the line has been completely filled, it shall be allowed to stand at 40 psi minimum pressure for a sufficient length of time to permit the escape of any pockets of air and allow the mortar lining to absorb the maximum moisture. During this time, all visible pipe, fittings and joints shall be inspected for leakage.
2. All new private fire service mains shall be tested hydrostatically at not less than 200 psi pressure for two hours or at 50 psi in excess of the maximum static pressure when the maximum static pressure is in excess of 150 psi.

D. Repetition of Hydrostatic Test

1. If the leakage in the section of pipeline being tested exceeds the maximum allowable rate specified herein, such section will be considered defective. The plumbing contractor shall determine the points of leakage and make the necessary repairs at his expense. The subcontractor will then conduct another hydrostatic test. This procedure shall be continued until the leakage falls below the allowed maximum.
2. The amount of leakage in buried piping shall be measured at the specified test pressure by pumping from a calibrated container. For new pipe, the amount of leakage at the joints shall not exceed two quarts per hour (1.89L/h) per 100 gaskets or joints irrespective of pipe diameter.
3. The amount of allowable leakage shall be permitted to be increased by one fluid ounce per inch valve diameter per hour (30 ml / 25 mm/h) for each metal seated valve isolating the test section.
4. Tests shall be made by the contractor in the presence of the authority having jurisdiction or the representative of the owner. Contractor shall fill out the

certificate shown in Figure 10.10.1, N.F.P.A. 24, 2022 Edition, located at the end of this specification.

E. After Satisfactory Hydrostatic Test

1. All valves shall be tested for leak proof tightness after the pipeline hydrostatic test with the test pressure on one side of the valve and atmospheric pressure on the other side.
2. Regardless of the hydrostatic test results, the Contractor shall repair all detectable leaks.

3.11 HYDROSTATIC (PRESSURE) TESTING FOR DOMESTIC WATER SYSTEM ON SCHOOL PROPERTY

- A. After completion of the hydrostatic testing, the subcontractor shall provide a signed copy of all test results to the Inspector. The Contractor and Inspector shall be present during the testing.
- B. Test PVC plastic water system in accordance with UBPPA UNI-B-3 for pressure and leakage. The amount of leakage from PVC piping shall not exceed the amounts given in UBPPA UNI-B-3, except that no leakage is permitted for joints installed with sleeve type mechanical couplings.
- C. Test water service lines in accordance with applicable requirements of AWWA C 600. No leakage is permitted
- D. Pressure testing: Before pressure test, fill portion of piping being tested with water for a minimum of 24 hours. Provide hydrostatic pressure of 50 psi greater than the maximum working pressure of tested system. Provide and maintain hydrostatic test pressure for at least 2 hours to ensure no leakage of any portion of piping or appurtenances under pressure test.
- E. Repetition of Hydrostatic Test: If the leakage in the section of pipeline being tested exceeds the maximum allowable rate specified above, such section will be considered defective. The Contractor shall determine the points of leakage and make the necessary repairs at his expense. The subcontractor will then conduct another hydrostatic test. This procedure shall be continued until the leakage falls below the allowed maximum.
- F. After Satisfactory Hydrostatic Test:
 1. All valves shall be tested for leak proof tightness after the pipeline hydrostatic test with the test pressure on one side of the valve and atmospheric pressure on the other side.
 2. After test sections have successfully met the hydrostatic test requirements to the satisfaction of the Inspector, the entire pipeline or each test section shall be filled or shall remain filled with potable water until the pipeline is disinfected. Test plates, corporation stops, and other test facilities shall remain in place if needed for disinfecting or removed as directed by Inspector.
 3. Regardless of the hydrostatic test results, the Contractor shall repair all detectable leaks.

3.12 DISINFECTION PROCEDURES

- A. Fire mains, on private property, from the backflow device to the building fire riser and / or fire hydrant do **NOT** need to be disinfected.

- B. All potable water lines MUST be disinfected per the following requirements.
- C. The Contractor shall supply all materials, labor, equipment and methods necessary to disinfect the water main. The Contractor shall hire a State certified laboratory to perform the required bacteriological tests for the newly laid pipelines.
- D. Preparation for Disinfecting Pipelines: Contractor shall tightly shut off every service connection served by the pipeline being disinfected at the curb stop before water is applied to the pipeline. Care should be taken to expel all air from the main and services during the filling operation.
- E. Inject solution of liquid chlorine or sodium hypochlorite and water containing at least 50 PPM of free chlorine into a system in a manner to ensure that entire system is completely filled with solution. During this procedure operate valves and test outlets for residual chlorine. Continue injection until outlets indicate at least 59 PPM of free chlorine.
- F. After injection, isolate system and hold solution in retention for a period of at least 8 hours. Perform tests for residual chlorine after retention. If such tests indicate less than 50 PPM of residual chlorine, repeat entire procedure. After satisfactory sterilization has been verified, flush entire system until all traces of chlorine have been removed or until chlorine content is no greater than in existing water supply.

3.13 DISPOSAL OF TEST WATER

- A. The disposal of all water used in flushing, hydrostatic testing, and disinfecting the sections of pipeline shall be the sole responsibility of the Contractor. The disposal of water shall, in all cases, be carried out in strict observance of the water pollution control requirements of the California Regional Water Quality Control Board.
- B. The Contractor shall obtain an NPDES permit and comply with that permit in his discharge of test water.
- C. The Contractor shall apply a reducing agent to the solution to neutralize residual chlorine or chloramines remaining in the water. Additionally, the flow of water from the sections of pipeline shall be controlled to prevent erosion of surrounding soil, damage to vegetation, altering of ecological conditions in the area, and damage to any construction or maintenance activity occurring in any ditch or storm drain downstream of discharge.

3.14 CONNECTING TO EXISTING DISTRIBUTION SYSTEM

- A. After all hydrostatic tests and disinfecting has been completed and demonstrated to comply with the Specifications, the Contractor shall connect newly laid pipeline to the existing distribution system.
- B. Where connections are to be made to an existing potable water system, swab or spray the interior surfaces of all pipe and fittings used in making the connections with a five (5) percent or greater hypochlorite solution as directed by the Inspector.
- C. As soon as the connection is completed, thorough flushing is required until all discolored water is removed.

3.15 REMOVAL OF TEMPORARY PIPING AND APPURTENANCES

- A. After the newly laid section of pipeline has been approved by the Inspector for connection to the existing distribution system, the Contractor shall disconnect and remove all temporary piping, fittings, test plates, backflow devices, and other appurtenances used for pressure testing, chlorinating, and flushing.

- B. Contractor shall remove and replace all stops used for testing and disinfecting of the pipeline with stainless steel repair clamps.

3.16 CLEANING

- A. Remove rubbish, debris, and waste materials and legally dispose of off the Project site.

3.17 PROTECTION

- A. Protect the Work of this section until Substantial Completion.

3.18 CONTRACTOR'S MATERIAL & TEST CERTIFICATE FOR PRIVATE FIRE SERVICE MAINS

Contractor's Material and Test Certificate for Underground Piping			
PROCEDURE Upon completion of work, inspection and tests shall be made by the contractor's representative and witnessed by an owner's representative. All defects shall be corrected and system left in service before contractor's personnel finally leave the job. A certificate shall be filled out and signed by both representatives. Copies shall be prepared for approving authorities, owners, and contractor. It is understood the owner's representative's signature in no way prejudices any claim against contractor for faulty material, poor workmanship, or failure to comply with approving authority's requirements or local ordinances.			
Property name			Date
Property address			
Plans	Accepted by approving authorities (names)		
	Address		
	Installation conforms to accepted plans <input type="checkbox"/> Yes <input type="checkbox"/> No		
	Equipment used is approved <input type="checkbox"/> Yes <input type="checkbox"/> No If no, state deviations		
Instructions	Has person in charge of fire equipment been instructed as to location of control valves and care and maintenance of this new equipment? <input type="checkbox"/> Yes <input type="checkbox"/> No If no, explain		
	Have copies of appropriate instructions and care and maintenance charts been provided to the owner or owner's representative? <input type="checkbox"/> Yes <input type="checkbox"/> No If no, explain		
Location	Supplies buildings		
Underground pipes and joints	Pipe types and class		Type joint
	Pipe conforms to _____ standard <input type="checkbox"/> Yes <input type="checkbox"/> No		
	Fittings conform to _____ standard <input type="checkbox"/> Yes <input type="checkbox"/> No		
	If no, explain		
Test description	Joints needing anchorage clamped, strapped, or blocked in accordance with _____ standard <input type="checkbox"/> Yes <input type="checkbox"/> No If no, explain		
	Flushing: Flow the required rate until water is verified to be clear of debris at outlets such as hydrants and blow-offs. Flush at one of the flow rates as specified in 10.10.2.1.3. Hydrostatic: All piping and attached appurtenances subjected to system working pressure shall be hydrostatically tested at 200 psi (13.8 bar) or 50 psi (3.4 bar) in excess of the system working pressure, whichever is greater, and shall maintain that pressure ± 5 psi (0.34 bar) for 2 hours. Hydrostatic Testing Allowance: Where additional water is added to the system to maintain the test pressures required by 10.10.2.2.1, the amount of water shall be measured and shall not exceed the limits of the following equation (for metric equation, see 10.10.2.2.6): $L = \frac{SD\sqrt{P}}{148,000}$ L = testing allowance (makeup water), in gallons per hour (lpm) S = length of pipe tested, in feet (m) D = nominal diameter of the pipe, in inches (mm) P = average test pressure during the hydrostatic test, in pounds per square inch (gauge) (bar)		
Flushing tests	New underground piping flushed according to _____ standard by (company) <input type="checkbox"/> Yes <input type="checkbox"/> No If no, explain		
	How flushing flow was obtained <input type="checkbox"/> Public water <input type="checkbox"/> Tank or reservoir <input type="checkbox"/> Fire pump		Through what type opening <input type="checkbox"/> Hydrant butt <input type="checkbox"/> Open pipe
	Lead-ins flushed according to _____ standard by (company) <input type="checkbox"/> Yes <input type="checkbox"/> No If no, explain		
	How flushing flow was obtained <input type="checkbox"/> Public water <input type="checkbox"/> Tank or reservoir <input type="checkbox"/> Fire pump		Through what type opening <input type="checkbox"/> Y connection to flange and spigot <input type="checkbox"/> Open pipe

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FIGURE 10.10.1 Sample of Contractor's Material and Test Certificate for Underground Piping.

Hydrostatic test	All new underground piping hydrostatically tested at _____ psi (bar) for _____ hours		Joints covered <input type="checkbox"/> Yes <input type="checkbox"/> No	
Leakage test	Total amount of leakage measured _____ gallons (liters) _____ hours			
	Allowable leakage _____ gallons (liters) _____ hours			
Forward flow test of backflow preventer	Forward flow test performed in accordance with 10.10.2.5.2: <input type="checkbox"/> Yes <input type="checkbox"/> No			
Hydrants	Number installed	Type and make	All operate satisfactorily <input type="checkbox"/> Yes <input type="checkbox"/> No	
Control valves	Water control valves left wide open If no, state reason			<input type="checkbox"/> Yes <input type="checkbox"/> No
	Hose threads of fire department connections and hydrants interchangeable with those of fire department answering alarm			<input type="checkbox"/> Yes <input type="checkbox"/> No
Remarks	Date left in service			
Signatures	Name of installing contractor			
	Tests witnessed by			
	For property owner (signed)	Title	Date	
	For installing contractor (signed)	Title	Date	
Additional explanation and notes				
<p>© 2018 National Fire Protection Association</p> <p>NFPA 24 (p. 2 of 2)</p>				

▲ FIGURE 10.10.1 *Continued*

END OF SECTION 33 10 00

SECTION 33 30 00 SITE SANITARY SEWER

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Supply and installation of sanitary sewer system from building wall perimeter, unless noted otherwise, to site sanitary sewer point of connection as shown on Construction Documents.
- B. Sewage bypass and pumping plan.
- C. Spill prevention & emergency response plan.
- D. Closed-circuit television inspection of sewer laterals.
- E. Contractor shall furnish all labor, materials, services, testing, transportation and equipment necessary for the completion of all piping and including the demolition and removal of certain equipment, piping and appurtenances all as required and as indicated on drawings and specified herein. Work materials and equipment not indicated or specified which is necessary for the complete and proper operation of the work of this Section in accordance with the true intent and meaning of the contract documents shall be provided and incorporated at no additional cost to the Owner.

1.2 RELATED SECTIONS

- A. Trenching Requirements: Conform to the requirements of Section 31 20 00 – Earthwork.

1.3 SUBMITTALS

- A. Product Data:
 - 1. Manufacturer's Catalog data for materials. Include technical data for pipe, gaskets, joints, couplings, manhole, manhole frame and cover, cleanout yard box with lid, sand bedding, tracer wire and detectable warning tape.
- B. Closeout Submittal: Submit three DVD's of Closed-circuit television inspections performed. Include the following information:
 - 1. 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.
 - 2. 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.
 - 3. Inspection Log: Provide written report including:
 - a. Date and time of inspection.
 - b. Name Project, Contractor, and operator name.
 - c. Location, material and size of pipe.

d. Description of defects found, if any.

C. Certificates:

1. Submit manufacturer's certified statement that the pipe has been manufactured and tested in accordance with the applicable requirements of the California Plumbing Code, ASTM, & The Standard Specifications for Public Works Construction.

1.4 LICENSES, PERMITS & FEES

- A. The Contractor shall have a Class "C-34" or Engineering "A" Contractors license valid in the State of California.

1.5 DISPOSAL OF REMOVED MATERIALS INCLUDING ASBESTOS-CEMENT PIPE

- A. All removed materials, except those indicated on the plans or described herein to remain the property of the Owner, shall become the property of the Contractor and shall be disposed in accordance with local, state, and federal laws. Should any of those materials be considered as hazardous the Contractor shall provide the Owners Inspector with paper custody trail documentation of the disposal.
- B. Asbestos – Cement (A-C) Pipe Removal and Disposal: The plans for the project may indicate that existing asbestos-cement pipe is to be removed from the ground. Where so indicated the Contractor shall excavate with care, expose the pipeline and remove the A-C pipe to the nearest joint. Should the plans not call out the removal of the A-C pipe and A-C pipe is encountered, the Contractor shall obtain approval from the Inspector as to whether or not the A-C pipe is to be removed or can be left in place. Cutting of the pipe shall only be done if absolutely there is no other way to expose the length of pipe to the nearest joint that be separated and the Inspector approves the cutting of the pipe. Cutting of the pipe shall be done with a mechanical saw with a pressure water source to dampen the pipe and the dust from the cutting. To remove a coupling, the coupling may have to be broken in the trench. The pipe once removed from the trench may be broken for handling. The breaking shall be done within a plastic bagging or sheeting material to minimize the release of asbestos fibers into the atmosphere. Once removed and broken, if necessary, the A-C material shall be bagged and disposed of legally with the Inspector to be given a copy of all Contractor paperwork as to the legal disposal of the material. If the A-C pipe section(s) are removed intact the pipe can be removed by the Contractor from the project site and become the property and responsibility of the Contractor.

1.6 DRAWINGS

- A. Because of the small scale drawings, it is not possible to indicate all offsets, fittings and accessories which may be required. The Contractor shall carefully investigate the conditions surrounding installation of his work, furnishing the necessary piping, fittings, traps, and other devices which may be required to complete the installation.
- B. The general arrangement indicated on the drawings shall be followed as closely as possible. Coordinate with the Architectural, Structural, Mechanical and Electrical Drawings prior to installation of piping fixtures and equipment to verify adequate space available for installation of the work shown. In the event a field condition arises which makes it impossible to install the work as indicated, submit, in writing, the proposed departures to the Architect for his acceptance. Only when Architect's acceptance is given, in writing, shall Contractor proceed with installation of the work.

- C. In case of a difference in the specifications or drawings, or between the specifications and the drawings or in the drawings, the Contractor shall figure the most expensive alternate and after award of contract, shall secure direction from the Architect.

1.7 EXAMINATION OF PREMISES

- A. Before bidding on this work, Contractors shall make a careful examination of the premises and shall thoroughly familiarize themselves with the requirements of the contract. By the act of submitting a proposal for the work included in this contract, the Contractor shall be deemed to have made such study and examination, and that he is familiar with and accepts all conditions of the site.

1.8 PROTECTION

- A. All work, equipment and materials shall be protected at all times. Contractor shall make good all damage caused either directly or indirectly by his own workmen. Contractor shall also protect his own work from damage. He shall close all pipe openings with caps or plugs during installation. He shall protect all his equipment and materials against dirt, water, chemical and mechanical injury. Upon completion, all work shall be thoroughly cleaned and delivered in a new condition.
- B. Contractor shall be held responsible for all damage to equipment and materials until he has received written notice from the Architect or Engineer that his work has been accepted.

1.9 LOCATIONS

- A. The locations of apparatus, piping and equipment indicated on the drawings are approximate. Piping and equipment shall be installed in such a manner as to avoid all obstruction, preserve headroom, and keep openings and passages clear. The locations of and mounting heights of all fixtures shall be coordinated with the architectural plans and room elevations.
- B. Clearances and Openings: Contractor shall cooperate and coordinate his work with all other trades to avoid conflict and permit for a neat and orderly appearance of the entire installation. The Contractor shall, in advance of the work, furnish instructions to the General Contractor as to his requirements for equipment and material installation of any kind, whether or not specifically mentioned on drawings or in the specifications, and shall include recesses, chases in walls, and all required openings in the structure. Should furnishing this information be neglected, delayed or incorrect and additional cuttings are found to be required, the cost of the same shall be charged to this Contractor.

1.10 SUBSTITUTIONS

- A. The Contractor assumes full responsibility that alternate manufacturers, items and procedures will meet the job requirements and is responsible for cost of redesign and of modifications to this and other parts of work caused by alternate items furnished under work in this Section. In view of these responsibilities, it is the purpose of these specifications to establish procedures which ensure that the Contractor has considered all the ramifications of proposed alternates before submitting them for review. Submittals which do not comply with the requirements of these specifications or which indicate proposed alternates were selected without proper regard to the requirements of the job, will not be approved. No more than one proposed alternate will be considered for each item.
- B. This Contractor is responsible to provide sufficient information to allow the Engineer to analyze any proposed alternate. If inadequate information is provided, the proposal will not be approved and resubmittal will not be allowed.

- C. The Architect or his authorized representative shall be the sole judge as to the quality and suitability of proposed alternate equipment, fixtures or materials and decisions of the Architect or that of his representative shall be final and conclusive.

1.11 RECORD DRAWINGS

- A. Contractor shall provide and keep up-to-date a complete "as-built" record set of redline prints which shall show every change from the original drawings and the exact "as-built" locations and sizes of the work provided under this Section of the specifications. This set shall include locations, dimensions, depth of buried piping, cleanouts, manholes, sewer invert locations, plugged wyes, tees, etc. On completion of the work, the Contractor shall incorporate all as-built information on a set of reproducible tracings provided by the Architect and this set of reproducibles shall be delivered to the Architect.

1.12 QUALITY ASSURANCE

- A. Comply with the following as a minimum requirement:
 - 1. System Description: Grades and elevations are to be established with reference to the benchmarks referenced on the Plans.
 - 2. The work provided herein shall conform to and be in accordance with the Contract Plans, General Conditions/Specifications and Special Provisions, as well as the Standard Specifications for Public Works Construction ("Green Book"), 2021 Edition, adopted by the Southern California Chapter, American Public Works Association; herein referred to as the "Standard Specifications".
 - 3. California Plumbing Code, CPC, 2022 Edition, Chapter 7.
 - 4. California Administrative Code, Title 22, Section 64630(e)(2).
 - 5. Underwriters Laboratories.
 - 6. American Society of Testing Materials.

1.13 INSPECTION

- A. Notice shall be given to the Owner's Inspector at least 48 hours before starting construction.
- B. Contractor shall not allow or cause any of his work to be covered up before it has been duly inspected, tested and approved by the Owner, Architect or any other authorized inspectors having legal jurisdiction over his work. Should he fail to observe the above, he shall uncover the work and, after it has been inspected, tested and approved, recover it at his own expense.
- C. Inspection of the work shall not relieve the contractor of any obligations to complete the work as prescribed by the standard specifications. Any known defective work shall be corrected before testing or final inspection will be permitted. Unsuitable materials may be rejected even if these materials have been previously overlooked by the Inspector.
- D. The Owner shall have the authority to suspend the work completely or in part for such time as it may deem necessary if the contractor fails to carry out instructions given by the Owner, or to perform any required provisions of the plans and specifications. The contractor shall immediately comply with a written order of the Owner to suspend the work completely or in part. The work shall be resumed when improper methods or defective work are corrected as ordered and approved in writing by the Owner.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Pipeline:

1. Project site sanitary sewer.

- a. PVC Sewer Pipe, ASTM D-3034, SDR-35. The pipe will have a permanently installed reinforced rubber ring gasket in an integral bell joint. PVC Sewer Fittings SDR-35 shall be manufactured in accordance with ASTM Standards D-3034 and F-1336 or F-679. The PVC material shall have a minimum cell classification of 12454-B, 12454-C or 12364-C as defined in ASTM D-1784. Manufactured by J-M, Certainteed, Vinyl Tech, Diamond Plastics Corp, Pacific Western Plastics or approved equal.
- b. High density polyethylene pipe (HDPE): Pipe and fitting system shall be pressure class 250 (DR9). Material shall meet AWWA C906, ASTM F714, CELL CLASS PER ASTM D3350, PPI LISTED MATERIAL (TR-4) PE 3608/4710, AND ANSI/NSF-14. Installer shall be certified by manufacturer for HDPE pipe and joint installation. Manufacturer: ISCO, JM Eagle or equal.
 - 1) Butt Fusion HDPE Fittings shall meet the following requirement: Molded fittings shall comply with the requirements of ASTM D 3261. All fabricated elbows, tees, reducing tees and end caps shall be produced and meet the requirements of ASTM F2206. Socket fittings shall meet ASTM D 2683. Installer shall be certified by manufacturer for this type of joint installation. Manufacturer: ISCO, JM Eagle or equal.
- c. Acrylonitrile-Butadiene-Styrene Schedule 40 plastic drainpipe and fittings meeting the requirements of ASTM D 2661 and D 3311. Provide ABS solvent cement for piping and joint connections and install in accordance with IAMPO Standards IS 5, 9, and UPC Section 718.
- d. Vitrified Clay Pipe (VCP): VCP and fitting shall conform to ASTM C700, Extra Strength.

B. Cleanout Assemblies: Cleanout plug shall be line size.

- 1. See detail S1 on C7.1 for requirements.

C. Manhole Brick Mortar, Grout, and Plaster: Conform to Standard Specifications for Public Works Construction, Section 202 - Masonry Materials.

D. Metal Covers, Frames and Accessories:

- 1. Conform to Section 206 – Miscellaneous Metal Items of the Standard Specifications for Public Works Construction.
- 2. Metal Covers and Frames: Vandal-resistant design.

3. Hot-dip galvanize all steel parts after fabrication and prior to assembly in accordance with Section 210 – Paint and Protective Coating of the Standard Specifications for Public Works Construction.
- E. Bedding Materials: Conform to the requirements of Section 31 20 00 – Earthwork.
- F. Manholes
 1. Construct sewer manholes per standard plans for public works construction standard plan (2021 Edition) No. 200-4, with 30" manhole frame and solid cover with bituminous paint finish.
 2. Manhole Channels: Factory or field formed from concrete. Portland cement design mix, 4000 psi minimum, with 0.45 maximum water/cementitious materials ratio. Include channels in manholes.

PART 3 - EXECUTION

3.1 PIPELINE INSTALLATION

- A. Install pipeline in a practical alignment and uniform slope to the point of connection as indicated on the plans. Prior to trench excavation, verify size, material, depth, and location of the point of connection. Notify Civil Engineer if point of connection elevation is different than that shown on construction drawings as it may affect the design of the system.
- B. No pipe shall be laid until the Geotechnical Project Manager inspects and approves the conditions of the bottom of the trench.
- C. Pipe laying shall proceed "up grade" with the spigot section of the bell-and-spigot pipe pointing in the direction of the flow.
- D. Each section of pipe shall be laid true to line and grade and in such a manner as to form an close concentric joint with the adjoining pipe and to prevent sudden offsets in the flow line.
- E. Where invert elevations are indicated, run pipe at a uniform slope between inverts shown.
- F. Join pipes and fittings as recommended by the manufacturer.
- G. All sewer lines & cleanouts shall be staked by a licensed surveyor if slope of grade is less than 2% and a complete set of cut sheets shall be supplied to the Inspector. All construction staking shall be installed and verified for grade and alignment prior to the start of construction.
- H. Refer to ASTM D 2321-00 "Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications" or Uni-Bell PVC Pipe Association UNI-PUB-6 "Installation Guide for PVC Solid-Wall Sewer Pipe" for installation information.
- I. Pipe shall not be laid when the condition of the trench or the weather is unsuitable.
- J. The interior of the sewer pipe shall be kept clean of dirt and debris at all times. When work is not in progress, open ends of pipe and fittings shall be plugged.
- K. Where clearing after laying is difficult because of small pipe size, a suitable swab or squeegee shall be kept in the pipe and bulled forward past every joint immediately after joining has been completed.

3.2 MICROTUNNELING PIPE INSTALLATION

- A. Microtunneling shall comply with S.S.P.W.C. (Green Book 2021 Edition) section 308.
- B. ALL HDPE PIPE AND FITTINGS SHALL BE CUT, JOINED, AND INSTALLED IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS. JOINING, AND LAYING OF POLYETHYLENE PIPE SHALL BE ACCOMPLISHED BY PERSONNEL EXPERIENCED AND CERTIFIED IN WORKING WITH POLYETHYLENE PIPE SYSTEMS.
- C. ALL HDPE PIPE SHALL BE JOINED TO ITSELF BY THE HEAT FUSION PROCESS WHICH PRODUCES HOMOGENEOUS, SEAL, LEAK TIGHT JOINTS. TIE-INS BETWEEN SECTIONS OF HDPE PIPE SHALL BE MADE BY BUTT FUSION WHENEVER POSSIBLE.
- D. THE PIPE SHALL BE JOINED BY THE BUTT FUSION PROCEDURE OUTLINED IN ASTM F 2620 OR PPI TR-33. A RECORD OR CERTIFICATE OF TRAINING FOR THE FUSION OPERATOR MUST BE PROVIDED THAT DOCUMENTS TRAINING TO THE FUNDAMENTALS OF ASTM F 2620.
- E. THE EMPLOYER OF THE FUSION MACHINE OPERATOR IS RESPONSIBLE FOR THE FUSION JOINT QUALITY OF THE FUSION WELD MADE BY THAT INDIVIDUAL. THE EMPLOYER IS RESPONSIBLE FOR DOCUMENTING ALL TRAINING AND QUALIFICATION RECORDS FOR THAT INDIVIDUAL, INCLUDING COMPLIANCE TO ANY CODE REQUIREMENTS FOR FUSION/BONDER OPERATORS.
- F. ALL HDPE FUSION EQUIPMENT OPERATORS SHALL BE QUALIFIED TO THE PROCEDURE USED TO PERFORM PIPE JOINING. FUSION EQUIPMENT OPERATORS SHALL HAVE CURRENT, FORMAL TRAINING ON ALL FUSION EQUIPMENT EMPLOYED ON THE PROJECT APPROVED BY MANUFACTURER. TRAINING RECEIVED MORE THAN TWO YEARS PRIOR TO OPERATION WITH NO EVIDENCE OF ACTIVITY WITHIN THE PAST 6 MONTHS SHALL NOT BE CONSIDERED CURRENT.

3.3 CLEARANCES OF SANITARY PIPELINE

- A. Buildings or Structures - 2 feet.
- B. Parallel to Water Line:
 - 1. Building sanitary drain, (that which starts from the building perimeter to existing site sewer) shall not be laid in a common trench with the water line unless the bottom of the water line shall be at least 12 inch above the top of the sewer pipeline.
 - 2. In addition, the water pipe shall be placed on a solid shelf excavated on one side of the common trench with a minimum clear horizontal distance of 12 inch sewer or drain line.
 - 3. Site sanitary sewer (receiving more than one building sanitary drain or acid pipeline) shall be separated from the water line in accordance with the requirements of the State of California, Human and Welfare Agency, Department of Health Services.
- C. Crossing Water Line:
 - 1. Building sanitary drain shall be installed a minimum of 12 inches below the potable water line
 - 2. Site sanitary sewer shall be separated from the water main in accordance with the requirements of the State of California Administrative Code, Title 22, Section 64630(e)(2).

3.4 CLEANOUTS

- A. In general, provide cleanouts at the upper terminal for each sanitary pipeline, at intervals not exceeding 100 feet in straight run and any fraction thereof and for each aggregate horizontal change in direction exceeding 135 degrees. See construction drawings for locations.
- B. Install required cleanouts before horizontal pipelines are covered.
- C. In paved areas, extend cleanouts flush with finish grade.
- D. In unpaved areas, install cleanouts in yard boxes 4 inches below the yard box cover.
- E. In traffic areas, install countersunk cleanout plugs where raised heads protrude.

3.5 MANHOLES

- A. Channels: Concrete invert, formed to same width as connected piping, with height of vertical sides to three-fourths of pipe diameter. Form curved channels with smooth, uniform radius and slope. Invert Slope: 1 percent through manhole.

3.6 PIPE REMOVAL

- A. All existing underground sewer pipe and cleanouts, within the limits of new sewer pipe trenching shown on the plans, shall be removed from the site by the Contractor.
- B. Sewer lines which are to remain as abandoned, but have had pipe cut and removed, shall be capped.

3.7 SEWAGE BYPASS AND PUMPING PLAN

- A. The flow of sewage shall not be interrupted. Should the Contractor disrupt the operation of existing sanitary sewer facilities, or should disruption be necessary for performance of the work, the Contractor shall bypass the sewage flow around the work. Sewage shall be conveyed in closed conduits and disposed of in a sanitary sewer system. Sewage shall not be permitted to flow in trenches nor be covered by backfill.
- B. Whenever sewage bypass and pumping is required the Contractor shall submit a working drawing detailing his proposed plan of sewage bypass and pumping to the Owner.
- C. The plan shall indicate the locations and capacities of all pumps, sumps, suction and discharge lines. Equipment and piping shall be sized to handle the peak flow of the section of sewer line to be bypassed and pumped. Bypass piping, when crossing areas subject to traffic loads, shall be constructed in trenches with adequate cover and otherwise protected from damage due to traffic. Lay-flat hose or aluminum piping with an adequate casing and/or traffic plates may be allowed if so approved by the Engineer. Bypass pump suction and discharge lines that extend into manholes shall be rigid hose or hard pipe. Lay-flat hose will not be allowed to extend into manholes. The Contractor shall provide a backup bypass pumping system in case of malfunction. The backup bypass system shall provide 100 percent standby capability, and be in place and ready for immediate use. Each standby pump shall be a complete unit with its own suction and discharge piping. In addition to the backup system, the Contractor shall furnish and operate vacuum trucks when required to accomplish the work.
- D. Prior to the full operation of the bypass system, the Contractor shall demonstrate, to the satisfaction of the Engineer and Inspector, that both the primary and backup bypass systems

are fully functional and adequate, and shall certify the same, in writing, to the Engineer in a manner acceptable to the Engineer.

- E. The Contractor shall provide one dedicated fuel tank for every single pump/generator, if fuel/generator driven pumps are used. The Contractor shall provide a fuel level indicator outside each fuel tank. The Contractor shall continuously (while in use) monitor the fuel level in the tanks and ensure that the fuel level does not drop below a level equivalent to two (2) hours of continuous bypass system operation. The Contractor shall take the necessary measures to ensure the fuel supply is protected against contamination. This includes, but is not limited to, fuel line water traps, fuel line filters, and protecting fuel stores from precipitation.
- F. The Contractor shall provide an emergency standby power generator, if electric power driven pumps are used.
- G. The Contractor shall continuously (while in use) monitor the operation of the bypass system and all impacted facilities. The Contractor shall submit, as part of their bypass plan, their monitoring procedure and frequency and shall maintain a log of the monitoring in a manner acceptable to the Engineer and Inspector.
- H. The Contractor shall continuously monitor the flow levels downstream and upstream of the bypass to detect any possible failure that may cause a sewage backup and/or spill, and shall include the means and methods of monitoring the flow in their Spill Response Plan.
- I. The Contractor shall routinely inspect and maintain the bypass system, including the backup system. The Contractor shall submit as part of their bypass plans their maintenance procedures and frequency and shall maintain a log of all pertinent inspection, maintenance and repair records in a manner acceptable to the Engineer and Inspector.
- J. All costs associated with sewer bypass requirements listed above shall be included in the Bid Item "Sewer Bypass System". If such Bid Item is not included in the Bid Form, include all costs associated with sewer bypass in the cost of other related bid items of work.

3.8 SPILL PREVENTION & EMERGENCY RESPONSE PLAN

- A. The Contractor shall prepare and submit a spill prevention and emergency response plan. The plan shall address implementation of measures to prevent sewage spills, procedures for spill control and containment, notifications, emergency response, cleanup, and spill and damage reporting.
- B. The Contractor shall be in full charge and be responsible for the Jobsite, the construction work of this contract, and subject to the directions of the Engineer or the Inspector. The Contractor shall observe and comply with all Federal, State, and local laws, ordinances, codes, orders, and regulations which in any manner affect the conduct of the work, specifically as it relates to sewage spills. The Contractor shall be fully responsible for preventing sewage spillage, containing any sewage spillage, recovery and legal disposal of any spilled sewage, any and all fines, penalties, claims and liability arising from negligently causing a sewage spillage and any violation of any law, ordinance, code, order, or regulation as a result of the spillage.
- C. The plan shall account for all storm drain systems and water courses within the vicinity of the work which could be affected by a sewage spill. Catch basins that could receive spilled sewage shall be identified. These catch basins shall be sealed prior to operating the bypass and pumping system. The Contractor shall remove all material used to seal the catch basins when the bypass and pumping system operations are complete.

- D. The Contractor shall be fully responsible for containing any sewage spillage, preventing any sewage from reaching a watercourse, recovery and legal disposal of any spilled sewage, any fines or penalties associated with the sewage spill imposed upon by the Agency and/or the Contractor by jurisdictional regulatory agencies, and any other expenses or liabilities related to the sewage spill.
- E. The Contractor shall exercise care not to damage existing public and campus improvements, interrupt existing services and/or facility operations that may cause a sewage spill. Any reasonably anticipated utility and/or improvement damaged by the Contractor shall be immediately repaired at the Contractor's expense. If construction operations damage an existing utility or damage or interrupt an existing service resulting in a sewage spill, the Contractor shall immediately notify the Owner. Before the start of construction, the Contractor shall request and obtain from the Owner an emergency roster of designated Owner representatives with their respective phone numbers, pager numbers, and cellular phone numbers. The Contractor shall take all measures necessary to prevent further damage or service interruption to an impacted utility or service. The Contractor is responsible for any resulting sewage spill(s).

3.9 PROTECTION

- A. Where new building sewers are to be connected into a sewer line which is in active use, the CONTRACTOR shall call for such protection as is necessary to prevent construction debris from being washed into the active sewers. Plugged inlets or other suitable protection shall be called for in the active manhole before beginning manhole modifications or tract sewer cleaning.

3.10 CLOSED-CIRCUIT TELEVISION INSPECTION

- A. Coordinate with owners inspector time and date of inspection. Project Inspector shall be present during the CCTV inspection.
- B. Clean laterals by hydraulic jet.
- C. Perform internal closed-circuit television inspection of lateral from the building to the campus mainline. Record sewer in its entirety with no breaks or interruptions. Move camera at a speed no greater than 30 feet per minute, stopping for a minimum of ten seconds to record pipe connections, defects, and points of interest.
- D. Maintain technical quality, sharp focus and distortion free picture. Pan, tilt, and rotate as necessary to best view and evaluate connections, defects and points of interest.
- E. Closed-circuit Television Equipment: As a minimum equipment shall include:
 - 1. Television camera specially designed for pipe inspections, and operative in 100 percent humidity conditions.
 - 2. Camera and television monitor capable of producing minimum 470H-line resolution color video picture.
 - 3. Camera capable to inspect laterals as small as three inches up to 70 feet from sewer mainline.
 - 4. Camera lighting shall be suitable to allow clear picture of inner wall at least ten feet in front.
- F. Defective Work:

1. New Laterals: Defective Work found shall be repaired at Contractor's expense. Perform a new closed-circuit television inspection at no cost to owner.
2. Existing Laterals:
 - a. If roots, sludge, or sediment material or other defect not related to the Work of this project impedes inspection, withdraw camera, restart inspection from opposite end and notify Owner of defects found.
3. If obstruction or stoppage was caused by Work related to this project, remove obstruction at no cost to Owner. Perform a new closed-circuit television inspection at Contractor's expense.

3.11 HYDROSTATIC TESTING OF SEWER MANHOLES

- A. Manholes shall be hydrostatically tested for leakage after installation, but prior to being backfilled. Prior to hydrostatic testing, manholes shall be visually inspected for leaks. Leaks or cracks shall be repaired prior to hydrostatic testing. Pipes entering the manhole shall be sealed at a point outside the manhole walls so as to include testing of the pipe/manhole joints. The manhole shall be filled with water to a level 2 inches below the top of the frame. Safety lines shall be secured to all plugs. After a period of at least one hour and when the water level has stabilized, the manhole shall be refilled and the water level shall be checked. The water level shall again be checked after a period of 4 hours. If the water level is reduced by more than 1/4-inch, the leakage shall be considered excessive, and the manhole shall be repaired and retested. The exterior of the manhole shall be inspected during this period for visible evidence of leakage. Moisture, sweating, or beads of water on the exterior of the manhole shall not be considered leakage, but any water running across the surface will be considered leakage and the manhole shall be repaired.

3.12 TESTING OF SEWER PIPE

- A. After installation of sewer pipe, testing shall be performed. The piping of the sewer system shall be tested with water or air except that plastic pipe shall not be tested with air. Contractor to follow guidelines set forth by the California Plumbing Code section 712.0 Testing.

3.13 CLEANUP

- A. Remove rubbish, debris, and waste materials and legally dispose of off the Project site.

END OF SECTION 33 30 00

SECTION 33 40 00 STORM DRAINAGE

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Contractor shall furnish all labor, materials, services, testing, transportation and equipment necessary for the completion of all piping and including the demolition and removal of certain equipment, piping and appurtenances all as required and as indicated on drawings and specified herein. Work materials and equipment not indicated or specified which is necessary for the complete and proper operation of the work of this Section in accordance with the true intent and meaning of the contract documents shall be provided and incorporated at no additional cost to the Owner.
- B. Supply and installation of underground storm drain system within the owner's property as shown on the construction documents.

1.2 SUBMITTALS

- A. Product Data: Manufacturer's catalog data for all required materials. Include technical data for pipe, drain inlets, catch basins, grates, information concerning gaskets, joints and couplings, sand bedding, tracer wire and detectable warning tape.
- B. Contractor is responsible for providing shoring plans to the Inspector for approval prior to construction. Excavation shall have sheeting, shoring and bracing conforming to CAL/OSHA requirements. Lateral pressures for design of sheeting, shoring and bracing shall be based on type of soil exposed, groundwater conditions, surcharge loads adjacent to the excavation and type of shoring that will be used.

1.3 RELATED SECTIONS

- A. Trenching Requirements: Conform to the requirements of Section 31 20 00 – Earthwork.

1.4 LICENSES, PERMITS & FEES

- A. The Contractor shall have a Class "C-34", "C-36", "C-42" or Engineering "A" Contractors license valid in the State of California.
- B. The Contractor shall obtain all necessary permits, licenses, or agreements required by any legally constituted agency, pay for all fees and give all necessary notices required for the construction of the work.
- C. The Owner shall reimburse the contractor for all necessary permits or inspection fees by any legally constituted agency.

1.5 QUALITY ASSURANCE

- A. The work provided herein shall conform to and be in accordance with the Contract Plans, General Conditions/Specifications and Special Provisions, as well as the Standard Specifications for Public Works Construction ("Green Book"), 2021 Edition, adopted by the Southern California Chapter, American Public Works Association; herein referred to as the "Standard Specifications".

1.6 PROTECTION

- A. All work, equipment and materials shall be protected at all times. Contractor shall make good all damage caused either directly or indirectly by his own workmen. Contractor shall also protect his own work from damage. He shall close all pipe openings with caps or plugs during installation. He shall protect all his equipment and materials against dirt, water, chemical and mechanical injury. Upon completion, all work shall be thoroughly cleaned and delivered in a new condition.
- B. Contractor shall be held responsible for all damage to equipment and materials until he has received written notice from the Architect or Engineer that his work has been accepted.

1.7 SEQUENCING AND SCHEDULING

- A. Coordinate with other utility work.

1.8 DISPOSAL OF REMOVED MATERIALS

- A. All removed materials, except those indicated on the plans or described herein to remain the property of the Owner, shall become the property of the Contractor and shall be disposed in accordance with local, state, and federal laws. Should any of those materials be considered as hazardous the Contractor shall provide the Owners Inspector with paper custody trail documentation of the disposal.

1.9 SUBSTITUTIONS

- A. The Contractor assumes full responsibility that alternate manufacturers, items and procedures will meet the job requirements and is responsible for cost of redesign and of modifications to this and other parts of work caused by alternate items furnished under work in this Section. In view of these responsibilities, it is the purpose of these specifications to establish procedures which ensure that the Contractor has considered all the ramifications of proposed alternates before submitting them for review. Submittals which do not comply with the requirements of these specifications or which indicate proposed alternates were selected without proper regard to the requirements of the job, will not be approved. No more than one proposed alternate will be considered for each item.
- B. This Contractor is responsible to provide sufficient information to allow the Engineer to analyze any proposed alternate. If inadequate information is provided, the proposal will not be approved and resubmittal will not be allowed.
- C. The Architect or his authorized representative shall be the sole judge as to the quality and suitability of proposed alternate equipment, fixtures or materials and decisions of the Architect or that of his representative shall be final and conclusive.

1.10 RECORD DRAWINGS

- A. Contractor shall provide and keep up-to-date a complete "as-built" record set of redline prints which shall show every change from the original drawings and the exact "as-built" locations and sizes of the work provided under this Section of the specifications. This set shall include locations, dimensions, depth of buried piping, pipe invert locations, drain basins, etc. On completion of the work, the Contractor shall incorporate all as-built information on a set of reproducible tracings provided by the Architect and this set of reproducibles shall be delivered to the Architect.

1.11 INSPECTION OF WORK

- A. Contractor shall not allow or cause any of his work to be covered up before it has been duly inspected, tested and approved by the Owner or any other authorized inspectors having legal jurisdiction over his work. Should he fail to observe the above, he shall uncover the work and, after it has been inspected, tested and approved, recover it at his own expense.

- B. Inspection of the work shall not relieve the contractor of any obligations to complete the work as prescribed by the standard specifications. Any known defective work shall be corrected before testing or final inspection will be permitted. Unsuitable materials may be rejected even if these materials have been previously overlooked by the Inspector.
- C. The Owner shall have the authority to suspend the work completely or in part for such time as it may deem necessary if the contractor fails to carry out instructions given by the Owner, or to perform any required provisions of the plans and specifications. The contractor shall immediately comply with a written order of the Owner to suspend the work completely or in part. The work shall be resumed when improper methods or defective work are corrected as ordered and approved in writing by the Owner.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Solid Wall Piping Materials
 - 1. Poly Vinyl Chloride (PVC) Sewer Pipe, ASTM D-3034, SDR-35 (Sizes 4" – 15"). The pipe will have a permanently installed reinforced rubber ring gasket in an integral bell joint. PVC Sewer Fittings SDR-35 shall be manufactured in accordance with ASTM Standards D-3034 and F-1336 or F-679. The PVC material shall have a minimum cell classification of 12454-B, 12454-C or 12364-C as defined in ASTM D-1784. Approved manufacturers: Charlotte pipe and foundry, Harvel Plastics Inc., JM Eagle, Spears Manufacturing Company, or equal.
 - 2. Poly Vinyl Chloride (PVC) Sewer Pipe, ASTM F679, PS46 (Size 18"). The pipe will have a permanently installed reinforced rubber ring gasket in an integral bell joint. PVC Sewer Fittings PS46 shall be manufactured in accordance with ASTM Standards ASTM F679. Approved manufacturers: Charlotte pipe and foundry, Harvel Plastics Inc., JM Eagle, Spears Manufacturing Company, or equal.
 - 3. N-12 WT (water-tight) IB Pipe, manufactured by Advanced Drainage Systems, Inc (ADS), Goldflo pipe by Prinsco, or approved equal: High density polyethylene corrugated pipe (HDPE) with an integrally formed smooth interior and annular exterior corrugations. Pipe shall be joined with the N-12 WT IB joint meeting the requirements of AASHTO AASHTO M294 or ASTM F2306.
 - 4. Cast iron soil, hubless, with stainless steel-banded hubless couplings. No-hub cast iron soil pipe and fittings shall conform to ASTM A 888 and/or standard specifications 301 of the Cast Iron Soil Pipe Institute. No-hub joints shall conform to specification 310 of the Cast Iron Soil Pipe Institute and/or ASTM C 1277. Joints shall be installed according to manufacturer's recommendations. Manufactured by American Foundry, Mission Rubber Company, Tyler, or equal.
 - 5. Poly Vinyl Chloride (PVC) Plastic Pipe, Schedule 40, meeting ASTM D 1785 standards. Fittings shall conform to ASTM D 2467 "Socket-Type PVC Plastic Type Fittings, Schedule 40.
- B. Pre-Cast Concrete Catch Basins:
 - 1. Jensen Precast
 - 2. Eisel Enterprises Inc
 - 3. J&R Concrete Products
 - 4. Approved Equal

- C. Grates & Covers:
 - 1. All grates and covers must be vandal proof / bolt down type.
 - 2. A.D.A. - Where noted on the plans install A.D.A. grates on catch basins. A maximum spacing between grating bars in accessible path of travel is 1/2 inch in the direction of travel, or 1/2 inch in either direction when the path of travel is not limited to one direction.
 - 3. Heel Proof - Where noted on the plans install heel proof grates on catch basins requiring a maximum 1/4 inch opening.
- D. Steel Reinforcing Bars: ASTM A 615 deformed grade 40 billet steel, plain finish, unless otherwise specified on Construction Document.
- E. Concrete, Mortar and Related Materials: Conform to Section 32 13 13: Concrete Paving.
- F. Manhole Brick Mortar, Grout, and Plaster: Conform to Standard Specifications for Public Works Construction, Section 202 - Masonry Materials.
- G. Paint and Protective Coatings
 - 1. All storm drain hardware, including frames and covers, grates, protection bars, steps, etc., shall be protected from corrosion. Storm drain hardware made of cast iron shall be protected by painting with, or dipping in, a commercial grade asphalt paint. Storm drain hardware made of steel shall be galvanized.
 - 2. Hot-dip galvanize steel parts after fabrication and before installation, in accordance with Section 210 - Paint and Protective Coating of the Standard Specifications for Public Works Construction.

PART 3 - EXECUTION

3.1 PIPELINE INSTALLATION

- A. Existing utilities: Locate existing underground utilities in all areas of work prior to excavation or commencement of work. If utilities are to remain in place provide adequate means of protection during trenching operations.
- B. Install pipeline in a practical alignment and uniform slope to the point of connection as indicated on Construction Document. Prior to trench excavation, verify size, material, depth, and location of the point of connection. Notify Civil Engineer if point of connection elevation is different than that shown on construction drawing as it may affect the design of the system.
- C. Excavating, trenching, and backfilling are specified in Section 31 20 00 – Earthwork.
- D. No pipe shall be laid until the Geotechnical Project Manager inspects and approves the conditions of the bottom of the trench.
- E. All storm drain pipelines, trench drains, catch basins and drain inlets shall be staked by a licensed surveyor if slope of grade is less than 2% and a complete set of cut sheets shall be supplied to the Inspector. All construction staking shall be installed and verified for grade and alignment prior to the start of construction.
- F. General Locations and Arrangements: Drawing plans and details indicate general location and arrangement of underground storm drainage piping. Location and arrangement of piping layout take design considerations into account. Install piping as indicated, to extent practical.

- G. Use proper size increasers, reducers, and couplings where different sizes or materials of pipes and fittings are connected. Reducing size of piping in direction of flow is prohibited.
- H. Make connections to existing piping and underground structures so finished work complies as nearly as practical with requirements specified for new work.
- I. The cutting of pipe for inserting tees, fittings or closure pieces shall be done in a neat workmanlike manner without damage to the pipe or cement lining and so as to leave a smooth end at right angles to the axis of the pipe. No pipe shall be laid in water or when, in the option of the Engineer trench conditions are unsuitable.
- J. Every precaution shall be taken to prevent foreign material from entering the pipe while it is being placed in the trench. If the pipe-laying crew cannot put the pipe into the trench and in place without getting soil into it, the Engineer may require that before lowering the pipe into the trench, a temporary plug be placed over each end and left there until the connection is to be made to the adjacent pipe. During the laying operations, no debris, tools, clothing or other materials shall be left in the pipe.
- K. At times when pipe laying is not in progress, the open ends of pipe shall be closed by watertight plug or other means approved by the Engineer. This provision shall apply during the lunch-hour breaks as well as overnight. If water is in the trench, the seal shall remain in place until the trench is pumped completely dry.
- L. All grates, frames and covers for drain inlets, catch basins & trench drains shall be locked down to prevent theft after final construction.

3.2 FIELD INSPECTION FOR PIPE & FITTINGS

- A. Television Inspection: The entire length of all new storm drain pipe 6" AND GREATER shall be inspected using Closed-Circuit Television (CCTV) equipment. The inspection shall be conducted after the line has been successfully installed, covered with bedding material, and prior to paving. The inspection shall be conducted in the presence of the Inspector. All labor and equipment necessary to conduct the CCTV inspection shall be furnished by the Contractor. CCTV inspection shall be per the following.
 - 1. Record the inspection using a four-head, VHS format, video cassette recorder in standard play mode. Deliver the original videotapes, audio commentary, log sheets, and reports to the I.O.R. at the close of the each working day. As desired, the Contractor may produce duplicates for his own use. At the option of the Contractor, or request of the Owner, the video recordings may be converted to MPEG format and copied onto a DVD compatible with Microsoft software.
 - 2. CCTV Equipment: Camera: Remote-controlled, focus from 6" to infinity. Resolution at 450 lines per inch, minimum. During the reinstatement of laterals, only use "rotating lens" or "pan and tilt" cameras. Footage counter: Accurate within $\pm 1\%$. Include the real time counter measurement as a caption on the recorded tape. Use maintenance hole stations and maintenance hole numbers as references. Television monitor: Color, minimum 460 lines per inch resolution. Lighting: Adequate to fully illuminate the pipeline and positioned to not produce glare. Mobility: Capable of steadily traveling with or against the flow. The maximum speed while inspecting and recording is 9 m per minute (30 feet per minute).
 - 3. Quality of CCTV Inspection Record: The recorded video image must clearly show the full circumference of the pipeline, in focus, with adequate lighting to see detail, with uniform and steady travel, and depicting the date and time of inspection, footage of travel, street, project title and pipe size. At laterals, service connections and pipe defects, provide a closer, more detailed examination and document the orientation, location and size. The written records

must further describe those laterals, service connections and pipe defects and index them to their location on the video record.

4. Introduce water into the upstream end of the pipe for the required length of time such that the water flow leaving the pipe at the downstream end equals the flow entering the upstream end of the pipe. Discontinue water flow and perform the CCTV inspection of the pipe.
5. If debris is encountered, retrieve the CCTV unit, re-clean the pipeline and resume CCTV inspection. Pipe will be considered acceptable when the video camera records no ponding of water (except in joint recesses) within the pipe, no breaks in the pipe and no openings or breaks at the joints, and the pipe is clean and free of dirt and debris. Remove and replace, or readjust to grade, any pipe failing to meet the acceptable video requirements.
6. At the completion of the video inspection, one copy of the tapes shall be turned over to the I.O.R.
7. Defects requiring correction include the following:
 - 1) Alignment: Less than full diameter of inside of pipe is visible between structures.
 - 2) Crushed, broken, cracked, or otherwise damaged piping.
 - 3) Exfiltration: Water leakage from or around piping.
 - 4) Infiltration: Water leakage into piping.
 - b. Replace defective piping using new materials, and repeat inspections until defects are within allowances specified.
 - c. Re-inspect and repeat procedure until results are satisfactory.

END OF SECTION 33 40 00

APPENDIX D

COMMUNITY WORKFORCE AGREEMENT ATTACHMENTS

COMMUNITY WORKFORCE AGREEMENT
CORE EMPLOYEES LIST
PRE-JOB CONFERENCE FORM

COMMUNITY WORKFORCE AGREEMENT

BY AND BETWEEN

THE CITY OF IRVINE

AND

LOS ANGELES/ORANGE COUNTIES

BUILDING AND CONSTRUCTION TRADES COUNCIL

AND THE SIGNATORY CRAFT COUNCILS AND UNIONS

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CITY OF IRVINE
COMMUNITY WORKFORCE AGREEMENT

This Community Workforce Agreement (“**Agreement**”) is entered into effective as of November 1, 2023, by and between the City of Irvine, a municipal corporation (“**City**”), the Los Angeles/Orange Counties Building and Construction Trades Council (“**Trades Council**”), and the signatory craft councils and local unions signing this Agreement (collectively, the “**Union**” or “**Unions**”). This Agreement establishes certain labor relations policies and procedures for the City, the Contractors awarded contracts for Project Work and for the crafts persons employed by the Contractors and represented by the Unions engaged in the Project Work as more fully described below. The City, Trades Council and Unions are hereinafter referred to herein, as the context may require, as “**Party**” or “**Parties**.”

It is understood by the Parties that for the duration of this Agreement, it shall be the policy of the City for all Project Work (as defined in Section 2.2.) to be contracted exclusively to Contractors who agree to execute and be bound by the terms of this Agreement, directly or through the Letter of Assent (a form of which is attached as **Attachment A**), and to require each of their subcontractors, of whatever tier, to become so bound; provided, however, that this obligation shall be fully discharged by including a provision in City’s agreements with Contractors that requires execution of the Letter of Assent by each of Contractors subcontractors. The City shall include, directly or by incorporation by reference, the requirements of this Agreement in the advertisement of and/or specifications for each and every contract for Project Work to be awarded by the City.

It is further understood that the City shall administer and enforce the obligations of this Agreement to ensure that the benefits envisioned from it flow to all Parties, the Contractors and crafts persons working under it, and the residents of the City. The City shall therefore designate a “CWA Administrator,” either from its own staff or an independent contractor. The CWA Administrator will be charged with responding to inquiries about the CWA, to serve as the City’s liaison for Contractors and other persons related to the CWA, to monitor compliance with this Agreement; and to assist, as the authorized representative of the City, in developing and implementing the programs referenced herein.

ARTICLE 1
DEFINITIONS

Section 1.1 “**Agreement**” or “**CWA**” means this Community Workforce Agreement.

Section 1.2 “**Apprentice**” means those craft employees indentured and participating in a Joint Labor/Management Apprenticeship Program approved by the State of California, Department of Industrial Relations, Division of Apprenticeship Standards.

Section 1.3 “**City Residents**” means individuals residing in those U. S. Postal Service zip codes which overlap all of the City of Irvine, as set forth in “**Attachment B**” attached hereto.

Section 1.4
into by the City, for the construction of Project Work as specified in Section 2.2.

Section 1.5 “**Contractor**” means any individual firm, partnership or corporation, or combination thereof, including joint ventures, which is an independent business enterprise and which has entered into a Construction Contract with the City or any of its contractors or any of the City's or contractor's subcontractors of any tier, with respect to the performance of any non-excluded Project Work under contract terms and conditions approved by the City and which incorporate this Agreement.

Section 1.6 “**City**” means the City of Irvine.

Section 1.7 “**CWA Administrator**” means the City’s authorized representative who will be the liaison between the City, Contractors, and the Unions. The CWA Administrator is charged with responding to inquiries about the CWA and, in the City’s sole discretion, reasonably monitoring compliance with the CWA.

Section 1.8 “**Joint Labor/Management Apprenticeship Program**” means a joint Union and Contractor administered apprenticeship program certified by the State of California, Department of Industrial Relations, Division of Apprenticeship Standards.

Section 1.9 “**Letter of Assent**” means the document that each Contractor (of any tier) must sign and submit to the City and the Trades Council, before beginning any non-excluded Project Work, which formally binds such Contractor(s) to adherence to all the forms, requirements and conditions of this Agreement. The approved form of the Letter of Assent is attached hereto as “**Attachment A**.”

Section 1.10 “**Master Labor Agreements**” means the local collective bargaining agreements of the signatory Unions having jurisdiction over the Project Work and which have signed this Agreement.

Section 1.11 “**Project**”, “**Project Work**”, “**City Project**”, or “**City Project Work**” means the demolition and construction work to be performed on City property or within easements secured by the City consisting of the construction of public works, pursuant to a Construction Contract entered into by the City.

Section 1.12 “**Specialty Contract**” means a contract for Project Work let by the City with a specialty contractor which is either limited to a particular single trade or craft or limited to a singular scope of work (*i.e.*, installing a toilet.)

Section 1.13 “**Specialty Contractor**” means a contractor which is either limited to a particular single trade or craft or limited to a singular scope of work (*i.e.*, installing a toilet.)

Section 1.14 “**Steward**” means a person designated by a signatory Union pursuant to perform the functions defined in Section 4.2.

Section 1.15 “**Subscription Agreement**” means the contract between a Contractor and a Union’s Labor/Management Trust Fund(s) that allows the Contractor to make the appropriate fringe benefit contributions in accordance with the terms of the Master Labor Agreements.

Section 1.16 “**Veteran**” means a veteran as defined in Title 38, Section 101(2) of the United States Code as the same may be amended or re-codified from time to time.

ARTICLE 2 SCOPE OF THE AGREEMENT

Section 2.1 General. This Agreement shall apply to all of the City Project Work performed by those Contractor(s) of whatever tier that have contracts awarded for such work.

Section 2.2 Specific. Project Work covered by this Agreement is defined and limited to:

2.2.1 All construction and major rehabilitation work pursuant to prime multi-trade Construction Contracts that exceed five hundred thousand dollars (\$500,000) and all subcontracts flowing from those prime multi-trade Construction Contracts; and

2.2.2 All prime Specialty Contracts, that exceed one hundred fifty thousand dollars (\$150,000) and all subcontracts flowing from those prime Specialty Contracts; and

2.2.3 The thresholds set forth in sections 2.2.1 and 2.2.2 shall also apply to work contracted for, in whole or in part, by the City to be performed at the Great Park (such as the planned amphitheater project); and

2.2.4 The City may, at any time and at its sole discretion, determine to build additional buildings, facilities, and other projects under this Agreement which are not otherwise covered as Project Work.

2.2.5 This Agreement is not intended to apply to and shall not apply to any work performed at any time prior to the effective date of this Agreement, or after the expiration or termination of this Agreement, except as otherwise provided herein. This Agreement shall in no way limit the City's right to terminate, modify or rescind any Construction Contract and/or any related subcontract or agreement. Should the City terminate, modify, or rescind any contract or agreement for construction that does not fall within the scope of this Agreement and thereafter, during the term of this Agreement, authorize that work be commenced on any contract for such construction (where such work qualifies as Project Work under Sections 2.2.1 through 2.2.4), such contract for construction shall be performed under the terms of this Agreement.

Section 2.3 Bundling of Contracts.

2.3.1 The City, in its sole discretion, may seek to group (or "bundle") for bidding, contracts not meeting the threshold of Section 2.2 above, in which case, if the bundled contracts exceed the thresholds under Sections 2.2.1 through 2.2.4, such bundled contracts shall be within the scope of this Agreement. Small contracts for like types of work, scheduled to be undertaken at the same facility or on the same project site, and within the same timeframe, will be considered for such bundling, consistent with economies of scale, and the purposes of this Agreement; and

2.3.2 Project Work will not be intentionally split, divided or otherwise separated for contract award purposes to avoid application of this Agreement.

Section 2.4 Applicability. This Agreement shall not apply to any work of any Contractor other than that on Project Work specifically covered by this Agreement.

Section 2.5 Exclusions. Items specifically excluded from the scope of this Agreement include the following:

2.5.1 Work of non-manual employees, including but not limited to: superintendents; teachers; supervisors (except those covered by Master Labor Agreements above the level of general foreman); staff engineers; timekeepers; mail carriers; clerks; office workers; messengers; guards; safety personnel; emergency medical and first aid technicians; and other professional, engineering, executive, administrative, supervisory and management employees;

2.5.2 Equipment and machinery owned or controlled and operated by the City;

2.5.3 All off-site manufacture and handling of materials, equipment or machinery; provided, however, that lay down or storage areas for equipment or material and manufacturing (prefabrication) sites, dedicated solely to the Project, and the movement of materials or goods between such locations and a Project site are within the scope of this Agreement;

2.5.4 All work performed by City employees and/or the CWA Administrator;

2.5.5 All work performed by design teams (including, but not limited to architects engineers and master planners), or any other consultants for the City (including, but not limited to, project managers and construction managers and their employees where not engaged in Project Work) and their sub-consultants; employees of professional service organizations, not performing manual labor within the scope of this Agreement; provided, however, that it is understood and agreed that surveyors, building/construction inspectors and field soils and materials testers (collectively, "Inspectors") are a covered craft under the Agreement. This inclusion applies to the scope of work defined in the State of California Wage Determination for said crafts. This shall also specifically include such work where it is referred to by utilization of such terms as "quality control" or "quality assurance." Every Inspector performing under a professional services agreement or a construction contract shall be bound to all applicable requirements of this Agreement. Project Work as defined by this Agreement shall be performed pursuant to the terms and conditions of this Agreement regardless of the manner in which the work was awarded

2.5.6 Any work performed near, or leading to a Project site and undertaken by state, county or other governmental bodies, or their contractors; or by public utilities, or their contractors; and/or by adjacent third party landowners; and/or by the City or its Contractors (for work which is not within the scope of this Agreement);

2.5.7 Off-site maintenance of leased equipment and on-site supervision of such off-site maintenance;

2.5.8 Work by employees of a manufacturer or vendor supervising the work of Craft employees under this Agreement, necessary to maintain such manufacturer's or vendor's warranty(ies) or guaranty(ies);

2.5.9 Non-construction support services contracted by the City, City consultants, the CWA Administrator, or Contractors in connection with a Project;

2.5.10 Off-site laboratory work for testing.

2.5.11 Any otherwise qualifying Project Work for which the City receives funding or assistance from any Federal, State, local or other public entity for the Construction Contract, if a requirement, condition or other term of receiving that funding or assistance, at the time of the awarding of the contract, is that the City not require, bidders, contractors, or other persons or entities to enter into an agreement with one or more labor organizations. The City agrees that it will make reasonable efforts to establish the enforcement of this Agreement with any governmental agency or granting authority.

Section 2.6 Awarding of Contracts for Project Work.

2.6.1 The City and/or the Contractors, as appropriate, have the absolute right to award contracts or subcontracts on Project Work to any Contractor notwithstanding the existence or non-existence of any agreements between such Contractor and any Union parties, provided only that such Contractor is ready, willing, and able to execute and comply with this Agreement should such Contractor be awarded work covered by this Agreement.

2.6.2 It is agreed that all Contractors of whatever tier, who have been awarded Project Work contracts, shall be required to accept and be bound to the terms and conditions of this Agreement, and shall evidence their acceptance by the execution of the Letter of Assent, prior to the commencement of any Project Work. At the time that any Contractor enters into a subcontract with any subcontractor of any tier providing for the performance of the construction contract, the Contractor shall provide a copy of this Agreement to said subcontractor and shall require the subcontractor, as a part of accepting the award of a construction subcontract, to agree in writing in the form of a Letter of Assent to be bound by each and every provision of this Agreement prior to the commencement of work on the Project. No Contractor or subcontractor shall commence Project Work without having first provided a copy of the Letter of Assent as executed by it to the CWA Administrator and to the Trades Council before the commencement of Project Work.

Section 2.7 Master Labor Agreements.

2.7.1 The provisions of this Agreement, including the Master Labor Agreements as such may be changed from time-to-time and which also are incorporated herein by reference, shall apply to Project Work. This Agreement is not intended to supersede such Master Labor Agreements between any of the Contractors performing construction work on the Project and a Union signatory thereto except to the extent the provisions of this Agreement are inconsistent with such Master Labor Agreements, in which event the provisions of this Agreement shall apply. However, such does not apply to work performed under the National Cooling Tower Agreement, the National Stack Agreement, the National Transit Division Agreement (NTD), work within the jurisdiction of the International Union of Elevator Constructors, and all instrument calibration and loop checking work performed under the terms of the UA/IBEW Joint National Agreement for Instrument and Control Systems Technicians except that Articles 7, 8, and 10 of this Agreement dealing with Strikes, Work Stoppages and Lock-Outs, Work Assignments and Jurisdictional Disputes, and Settlement of Grievances and Disputes shall apply to such work. Where a subject is covered by the provisions of a Master Labor Agreement and not in conflict with the provisions of this Agreement, the provisions of the Master Labor Agreement shall apply. It is specifically agreed that no later agreement shall be deemed to have precedence over this Agreement unless signed by all parties signatory hereto who are then currently employed or represented at the Project. Any

dispute as to the applicable source between this Agreement and any Master Labor Agreements for determining the wages, hours of working conditions of employees on this Project shall be resolved under the procedures established in Article 10.

2.7.2 It is understood that this Agreement, together with the referenced Master Labor Agreements, constitutes a self-contained, stand-alone agreement and by virtue of having become bound to this Agreement, the Contractor will not be obligated to sign any other local, area or national collective bargaining agreement as a condition of performing work within the scope of this Agreement (provided, however, that the Contractor may be required to sign a uniformly applied, non-discriminatory Subscription Agreement at the request of the trustees or administrator of a trust fund established pursuant to Section 302 of the Labor Management Relations Act, and to which such Contractor is bound to make contributions under this Agreement, provided that such Subscription Agreement does not purport to bind the Contractor beyond the terms and conditions of this Agreement and/or expand its obligation to make contributions pursuant thereto). It shall be the responsibility of the prime Contractor to have each of its subcontractors sign the appropriate Subscription Agreement, with the appropriate Union prior to the subcontractor beginning work on Project Work.

Section 2.8 Other City Work. Nothing contained herein shall be interpreted to prohibit, restrict, or interfere with the performance of any other operation, work or function not covered by this Agreement, which may be performed by City employees or contracted for by the City for its own account, on its property or in and around a Project site.

Section 2.9 Separate Liability. It is understood that the liability of the Contractor(s) and the liability of the separate Unions under this Agreement shall be several and not joint. The Unions agree that this Agreement does not have the effect of creating any joint employment status between or among the City or CWA Administrator and/or any Contractor.

Section 2.10 Completed Project Work. As areas of Project Work are accepted by the City, this Agreement shall have no further force or effect on such items or areas except where the Contractor is directed by the City or its representatives to engage in repairs, modification, check-out and/or warranties functions required by its contract(s) with the City under the Construction Agreement.

ARTICLE 3 UNION RECOGNITION AND EMPLOYMENT

Section 3.1 Recognition. The Contractor recognizes the Trades Council and the Unions as the sole and exclusive bargaining representative for the employees engaged in Project Work. Contractors further recognize that the Unions shall be the primary source of all craft persons employed on the Projects. In the event that a Contractor has its own core workforce, said Contractor shall follow the procedures outlined below.

Section 3.2 Contractor Selection of Employees. Each Contractor shall have the right to determine the competency of all employees, the number of employees required, the duties of such employees within their craft jurisdiction, and shall have the sole responsibility for selecting employees to be laid off, consistent with Section 3.3 and Section 4.3, below. Each Contractor shall also have the right to reject any applicant referred by a Union for any reason, subject to any reporting pay required by Section 6.6; provided, however, that such right is exercised in good faith and not for

the purpose of avoiding the Contractor's commitment to employ qualified workers through the procedures provided for in this Agreement.

Section 3.3 Referral Procedures.

3.3.1 For signatory Unions having a job referral system contained in a Master Labor Agreement as of the effective date of this Agreement, each Contractor agrees to comply with such system and it shall be used exclusively by such Contractor, except as modified by this Agreement. Such job referral system will be operated in a nondiscriminatory manner and in full compliance with federal, state, and local laws and regulations which require equal employment opportunities and non-discrimination. All of the foregoing hiring procedures, including related practices affecting apprenticeship, shall be operated so as to consider the goals of the City to encourage employment of City Residents on the Project, and to facilitate the ability of all Contractors to meet their employment needs.

3.3.2 The Unions will exert their best efforts to recruit and refer sufficient numbers of skilled craft persons to fulfill the labor requirements of each Contractor, including specific employment obligations to which such Contractor may be legally and/or contractually obligated; and to refer Apprentices as requested to develop a larger, skilled workforce. The Unions will work with their affiliated regional and national unions to identify and refer competent craft persons as needed for Project Work, and to identify and hire individuals, particularly City Residents, for entrance into joint labor/management apprenticeship programs, or to participate in other identified programs and procedures to assist individuals in qualifying and becoming eligible for such apprenticeship programs, all maintained to increase the available supply of skilled craft persons for Project Work to be undertaken by the City.

3.3.3 Each Union shall not knowingly refer an employee currently employed by a Contractor on a Project to any other Contractor.

Section 3.4 Non-Discrimination in Referral, Employment, and Contracting. Each Union and Contractor agree that they will not discriminate against any employee or applicant for employment in hiring and dispatching on the basis of race, color, religion, sex, gender, national origin, age, membership in a labor organization, sexual orientation, political affiliation, marital status or disability. Further, to the extent the City currently has or hereafter adopts policies, programs, and goals for the utilization of local small business enterprises, the Parties shall jointly endeavor to assure that these commitments are fully met, and that any provisions of this Agreement which may appear to interfere with local small business enterprises successfully bidding for work within the scope of this Agreement shall be carefully reviewed, and adjustments made as may be appropriate and agreed upon among the Parties, to ensure full compliance with the spirit and letter of the City's policies and commitment to its goals for the significant utilization of local small businesses as direct Contractors or suppliers for Project Work.

Section 3.5 Employment of Local Residents.

3.5.1 Each Union and Contractor agrees that, to the extent allowed by law, they shall each use their best efforts to refer and recruit sufficient numbers of Local Residents to fulfill the requirements of the Contractors, so long as such Local Residents possess the requisite skills and qualifications. Towards that end, the Unions shall exert their best efforts to encourage and provide

referrals and utilization of qualified workers, who reside in those first tier zip codes which cover the City of Irvine, as reflected on the attached list of zip codes on **Attachment B (“City Residents”)**. If the Unions cannot provide the Contractors with referrals of City Residents sufficient to meet the Contractor’s needs, then the Unions, as a second priority, shall refer qualified Veterans residing in Orange County. If the Unions cannot provide the Contractors with referrals from City Residents and Veterans residing in Orange County, then the Unions, as a third priority, shall refer graduates from the Building Trades Multi-Craft Core Curriculum (“MC3 Graduates”) residing in Orange County. If the Unions cannot provide the Contractors with referrals of City Residents, Veterans living in Orange County, and MC3 Graduates living in Orange County, then the Unions, as a fourth priority shall refer qualified persons residing within Orange County. For dispatch purposes, employees described in this Section 3.5.1 shall be referred to as “Local Residents.”

3.5.2 A goal of thirty percent (30%) of the total work hours on each Construction Contract for Project Work shall be performed by Local Residents (**“Local Employment Threshold”**).

3.5.3 To help reach the Local Employment Threshold, the Trades Council and Unions shall encourage and assist residents of the City of Irvine that desire to participate in the Santa Ana College apprenticeship training program to enroll in that program.

Section 3.6 **Requirements on Contractors**. To facilitate the dispatch of Local Residents and Veterans, all Contractors will be required to utilize the “Craft Employee Request Form” whenever they are requesting the referral of any employee from a Union referral list for any Project Work, a sample of which is attached as **Attachment C**. When Local Residents, MC3 Graduates and Veterans are requested by the Contractors, the Unions will refer such workers regardless of their place in the Unions’ hiring halls’ list and normal referral procedures.

Section 3.7 **Helmets to Hardhats**. The Contractors and the Unions recognize a desire to facilitate the entry of interested Veterans into the building and construction trades. The Contractors and Unions agree to utilize the services of non-profit Veterans support organizations, including but not limited to, the Center for Military Recruitment, Assessment and Veterans Employment (hereinafter **“Center”**) and the Center’s “Helmets to Hardhats” program to serve as a resource for preliminary orientation, assessment of construction aptitude, referral to apprenticeship programs or hiring halls, counseling and mentoring, support network, employment opportunities and other needs as identified by the Parties. It shall be the responsibility of each qualified applicant to provide the Unions with proof of his/her status as a Veteran for the Helmets to Hardhats program.

3.7.1 The Unions and Contractors agree to coordinate with non-profit Veteran organizations, including, the Center to create and maintain an integrated database of Veterans interested in working on Project Work and of apprenticeship and employment opportunities for working on Project Work. To the extent permitted by law, the Unions will give credit to such Veterans for bona fide, provable past experience.

Section 3.8 Core Employees.

3.8.1 Contractors not currently signatory to a Master Labor Agreement may employ, as needed, first, a member of his core workforce (as defined in Section 3.8.2), then an employee through a referral from the appropriate Union hiring hall, then a second core employee, then a second employee through the referral system, and so on until a maximum of five (5) core employees are employed, thereafter, all additional employees in the affected trade or craft shall be requisitioned from the craft hiring hall in accordance with Section 3.3. In the laying off of employees, the number of core employees shall not exceed one-half plus one of the workforce for an employer with 10 or fewer employees, assuming the remaining employees are qualified to undertake the work available. As part of this process, all Contractors shall require their core employees and any other persons employed other than through the referral process, to register with the appropriate Union hiring hall, if any, prior to their first day of employment at a Project site.

3.8.2 The core workforce is comprised of those employees whose names appeared on the Contractor's active payroll for sixty (60) of the one hundred (100) working days immediately before award of Project Work to the Contractor; who have worked at least two-thousand (2,000) hours in the construction craft in which they are employed, during the prior four (4) years; who possess any license required by state or federal law for the Project Work to be performed; who have the ability to safely perform the basic functions of the applicable trade.

3.8.3 Prior to each Contractor performing any work on the Project, each Contractor shall provide a list of the employees in its core workforce to the Trades Council. Failure to do so will prohibit the Contractor from using any of its core workforce for work on the Project. Upon request by any Party to this Agreement, the Contractor hiring any employee for its core workforce shall provide satisfactory proof (i.e., payroll records, quarterly tax records, driver's license, voter registration, postal address and such governmental documentation) evidencing the employee's qualification for the core workforce to the Trades Council.

Section 3.9 Time for Referral. If any Union's registration and referral system does not fulfill the requirements for specific classifications requested by any Contractor within forty-eight (48) hours (excluding Saturdays, Sundays and holidays), that Contractor may use employment sources other than the Union registration and referral services, and may employ applicants meeting such classification from any other available source. Contractors shall inform the Union of any applicants hired from other sources and such applicants shall register with the appropriate hiring hall, if any, before commencing work.

Section 3.10 Lack of Referral Procedure. If a signatory Union does not have a job referral system as set forth in Section 3.3 above, the Contractors shall give the Union equal opportunity to refer applicants. Contractors shall notify the Union of employees so hired, as set forth in Section 3.5.

Section 3.11 Individual Seniority. Except as provided in Section 4.3, individual seniority shall not be recognized or applied to employees working on Project Work; provided, however, that group and/or classification seniority in a Union's Master Labor Agreement as of the effective date of this Agreement shall be recognized for purposes of layoffs.

Section 3.12 Foremen. The selection and number of craft foreman and/or general foreman shall be the responsibility of the Contractor. All foremen shall take orders exclusively from the designated

Contractor representatives. Craft foreman shall be designated as working foreman at the request of the Contractors.

Section 3.13 Out of State Workers. In determining compliance with the targeted hiring goals of Section 3.5 above, hours of Project Work performed by residents of states other than California will be excluded from the calculation.

Section 3.14 Union Security. Employees are not required to become or remain union members or pay dues or fees as a condition of performing Project Work under this Agreement. Employers shall make and transmit all deductions for union dues, fees, and assessments that have been authorized by employees in writing in accordance with the applicable Master Labor Agreement. Nothing in this Section 3.14 is intended to supersede independent requirements of applicable Master Labor Agreements as to those Employers otherwise signatory to such Master Labor Agreements and as to the employees of those Employers who are performing Project Work.

ARTICLE 4 UNION ACCESS AND STEWARDS

Section 4.1 Access to Project Sites. Authorized representatives of the Union shall have access to Project Work, provided that they do not interfere with the work of employees and further provided that such representatives shall notify the person charged with on-site Project supervision and fully comply with posted visitor, security and safety rules.

Section 4.2 Stewards.

4.2.1 Each signatory Union shall have the right to dispatch a working journey person as a Steward for each shift, and shall notify the Contractor in writing of the identity of the designated Steward prior to the assumption of such person's duties as Steward. Such designated Steward shall not exercise any supervisory functions. There will be no non-working Stewards. Stewards will receive the regular rate of pay for their respective crafts.

4.2.2 In addition to his/her work as an employee, each Steward shall have the right to receive, but shall not to solicit, complaints or grievances and to discuss and assist in the adjustment of the same with the employee's appropriate supervisor. Each Steward shall be concerned only with the employees of the Steward's Contractor and, if applicable, subcontractor(s), and not with the employees of any other Contractor. A Contractor will not discriminate against the Steward in the proper performance of his/her Union duties.

4.2.3 When a Contractor has multiple, non-contiguous work locations at one site, the Contractor may request, and the Union shall appoint, such additional Stewards as the Contractor requests to provide independent coverage of one or more such locations. In such cases, each Steward may not service more than one work location without the approval of the Contractor.

4.2.4 No Steward shall have the right to determine when overtime shall be worked or who shall work overtime.

Section 4.3 Steward Layoff/Discharge. Contractor agrees to notify the appropriate Union twenty-four (24) hours before the layoff of a Steward, except in the case of disciplinary discharge for just

cause. If the Steward is protected against such layoff by the provisions of the applicable Master Labor Agreement, such provisions shall be followed when the Steward possesses the necessary qualifications to perform the remaining work. In any case in which the Steward is discharged or disciplined for just cause, the appropriate Union will be notified immediately by the Contractor, and such discharge or discipline shall not become final (subject to any later filed grievance) until twenty-four (24) hours after such notice has been given.

ARTICLE 5 WAGES AND BENEFITS

Section 5.1 Wages. All employees covered by this Agreement shall be classified in accordance with work performed and paid by the Contractors the hourly wage rates for those classifications in compliance with the applicable prevailing wage rate determination established pursuant to applicable law. If a prevailing rate increases under law, the Contractor shall pay that rate as of its effective date under the law. This Agreement does not relieve Contractors directly signatory to a Master Labor Agreement with one of the Unions signing this Agreement from paying all of the wages set forth in such Agreements.

Section 5.2 Benefits.

5.2.1 Contractors shall pay contributions to the established employee benefit funds in the amounts designated in the appropriate Master Labor Agreement on behalf of all employees and make all employee-authorized deductions in the amounts designated in the appropriate Master Labor Agreement; provided, however, that such contributions shall not exceed the contribution amounts set forth in the applicable prevailing wage determination. This Agreement does not relieve Contractors directly signatory to one or more of the Master Labor Agreements from making all contributions set forth in those Master Labor Agreements without reference to the foregoing.

5.2.2 Contractors shall adopt and agree to be bound by the written terms of the applicable, legally established, trust agreement(s) specifying the detailed basis on which payments are to be made into, and benefits paid out of, such trust funds for its employees. Contractors shall authorize the Parties to such trust funds to appoint trustees and successor trustees to administer the trust funds and hereby ratifies and accepts the trustees so appointed as if made by the Contractor.

5.2.3 Each Contractor is required to maintain records evidencing that it has paid all benefit contributions due and owing to the appropriate trust(s) prior to the receipt of its final payment and/or retention. Further, a Union shall work with any prime Contractor or subcontractor who is delinquent in payments to assure that proper benefit contributions are made. In the event of failure of a Contractor to timely make the delinquent payments, a Union may request that the City or the prime Contractor withhold payments otherwise due such Contractor, until such contributions have been made or otherwise guaranteed.

Section 5.3 Wage Premiums. Wage premiums, including but not limited to pay based on height of work, hazard pay, scaffold pay, and special skills shall not be applicable to work under this Agreement, except to the extent provided for in any applicable prevailing wage determination.

ARTICLE 6
HOURS OF WORK, OVERTIME, SHIFTS AND HOLIDAYS

Section 6.1 Hours of Work. Eight (8) hours per day between the hours of 6:00 a.m. and 5:30 p.m., plus one-half (½) hour unpaid lunch approximately mid-way through the shift, shall constitute the standard workday. Forty (40) hours per week shall constitute a regular week's work. The work week will start on Sunday and conclude on Saturday. The foregoing provisions of this Article are applicable unless otherwise provided in the applicable prevailing wage determination, or unless changes are permitted by law and such are agreed upon by the Parties. Nothing herein shall be construed as guaranteeing any employee eight (8) hours per day or forty (40) hours per week, or a Monday through Friday standard work schedule.

Section 6.2 Place of Work. Craft Employees shall be at their place of work (as designated by the Contractor), at the starting time and shall remain at their place of work, performing their assigned functions, until quitting time. The place of work is defined as the gang or tool box or equipment at the employee's assigned work location or the place where the appropriate foreman gives instructions. The Parties reaffirm their policy of a fair day's work for a fair day's wage. Except as provided in Section 6.6, there shall be no pay for time not worked unless the employee is otherwise engaged at the direction of the Contractor.

Section 6.3 Overtime. Overtime shall be paid in accordance with the requirements of the applicable prevailing wage determination. There shall be no restriction on the Contractor's scheduling of overtime or the nondiscriminatory designation of employees who will work overtime. There shall be no pyramiding of overtime (payment of more than one form of overtime compensation for the same hour) under any circumstances.

Section 6.4 Shifts and Alternate Work Schedules.

6.4.1 Alternate starting and quitting time and/or shift work may be performed at the option of the Contractor upon three (3) days' prior notice to the affected Union(s), unless a shorter notice period is provided for in the applicable Master Labor Agreement. If two shifts are worked, each shall consist of eight (8) hours of continuous work exclusive of a one-half (½) hour non-paid lunch period, for eight (8) hours pay. The last shift shall start on or before 6:00 p.m. The first shift starting at or after 6:00 a.m. is designated as the first shift, with the second shift following.

6.4.2 Contractors, the Trades Council and the Union recognize the economic impact upon the City and City residents of the Project being undertaken by the City and agree that all Parties to this Agreement desire and intend Project Work to be undertaken in a cost efficient and effective manner to the highest standard of quality and craftsmanship. Recognizing the economic conditions, the Parties agree that, except to the extent permitted by law, employees performing Project Work shall not be entitled to any differentials or additional pay based upon the shift or work schedule of the employees. Instead, all employees working on Project Work shall be paid at the same base rate regardless of shift or work schedule worked, unless required under the applicable prevailing wage determination.

6.4.3 Because of operational necessities, the second shift may, at the City's direction, be scheduled without the preceding shift having been worked. It is recognized that the City's operations and/or mitigation obligations may require restructuring of normal work schedules.

Except in an emergency or when specified in the City's bid specification, the Contractor shall give affected Union(s) at least three (3) days' notice of such schedule changes.

Section 6.5 Holidays. Recognized holidays for Project Work shall be those set forth and governed by the prevailing wage determination(s) applicable to such Project Work.

Section 6.6 Show-up Pay.

6.6.1 Except as otherwise required by State law, employees reporting for work and for whom no work is provided, except when given prior notification not to report to work, shall receive pay in accordance with the applicable Master Labor Agreement.

6.6.2 An employee called out to work outside of his/her shift shall receive a minimum of two (2) hours pay at the appropriate rate. This does not apply to time worked as an extension of (before or after) the employee's normal shift.

6.6.3 When an employee leaves the job or work location of his/her own volition, or is discharged for cause or is not working as a result of the Contractor's invocation of Section 12.2, the employee shall only be paid for actual time worked.

Section 6.7 Meal Periods. The Contractor will schedule a meal period in accordance with the applicable Master Labor Agreement.

Section 6.8 Make-up Days. To the extent permitted by the applicable general wage determination, when an employee has been prevented from working for reasons beyond the control of the employer, including, but not limited to inclement weather or other natural causes, during the regularly scheduled work week, a make-up day may be worked on a non-regularly scheduled work day for which an employee shall receive eight (8) hours pay at the straight time rate of pay or any premium rate required for such hours under the state prevailing wage law.

ARTICLE 7 WORK STOPPAGES AND LOCK-OUTS

Section 7.1 No Work Stoppages or Disruptive Activity. The Trades Council and the Unions signatory hereto agree that neither they, and each of them, nor their respective officers or agents or representatives, shall incite or encourage, condone or participate in any strike, walk-out, slow-down, picketing, observing picket lines or other activity of any nature or kind whatsoever, for any cause or dispute whatsoever with respect to or in any way related to Project Work, or which interferes with or otherwise disrupts, Project Work, or with respect to or related to the City or Contractors, including, but not limited to, economic strikes, unfair labor practice strikes, safety strikes, sympathy strikes and jurisdictional strikes whether or not the underlying dispute is arbitrable. Any such actions by the Trades Council, or Unions, or their members, agents, representatives or the employees they represent shall constitute a violation of this Agreement. The Trades Council and the Union shall take all steps necessary to obtain compliance with this Article.

Section 7.2 Employee Violations. The Contractor may discharge any employee violating Section 7.1 above and any such employee will not be eligible for rehire under this Agreement.

Section 7.3 Standing to Enforce. The City, the CWA Administrator, or any Contractor affected by an alleged violation of Section 7.1 shall have standing and the right to enforce the obligations established therein.

Section 7.4 Expiration of Master Labor Agreement. If the Master Labor Agreement, or any local, regional, and other applicable collective bargaining agreements expire during the term of the Project, the Union(s) agree that there shall be no work disruption of any kind as described in Section 7.1 above as a result of the expiration of any such agreement(s) having application on this Project and/or failure of the involved Parties to that agreement to reach a new contract. Terms and conditions of employment established and set at the time of bid shall remain established and set. Otherwise to the extent that such agreement does expire and the Parties to that agreement have failed to reach concurrence on a new contract, work will continue on the Project on one of the following two (2) options, both of which will be offered by the Unions involved to the Contractors affected:

7.4.1 Each of the Unions with a Master Labor Agreement expiring must offer to continue working on the Project under interim agreements that retain all the terms of the expiring contract, except that the Unions involved in such expiring contract may each propose wage rates and employer contribution rates to employee benefit funds under the prior contract different from what those wage rates and employer contributions rates were under the expiring contracts. The terms of the Union's interim agreement offered to Contractors will be no less favorable than the terms offered by the Union to any other employer or group of employers covering the same type of construction work in Orange County.

7.4.2 Each of the Unions with a Master Labor Agreement expiring must offer to continue working on the Project under all the terms of the expiring contract, including the wage rates and employer contribution rates to the employee benefit funds, if the Contractor affected by that expiring contract agrees to the following retroactive provisions: if a new Master Labor Agreement, local, regional or other applicable labor agreement for the industry having application at the Project is ratified and signed during the term of this Agreement and if such new labor agreement provides for retroactive wage increases, then each affected Contractor shall pay to its employees who performed work covered by this Agreement at the Project during the hiatus between the effective dates of such expired and new labor agreements, an amount equal to any such retroactive wage increase established by such new labor agreement, retroactive to whatever date is provided by the new labor agreement for such increase to go into effect, for each employee's hours worked on the Project during the retroactive period. All Parties agree that such affected Contractors shall be solely responsible for any retroactive payment to its employees.

7.4.3 Some Contractors may elect to continue to work on the Project under the terms of the interim agreement option offered under paragraph 7.4.1 and other Contractors may elect to continue to work on the Project under the retroactivity option offered under paragraph 7.4.2. To decide between the two options, Contractors will be given one week after the particular labor agreement has expired or one week after the Union has personally delivered to the Contractors in writing its specific offer of terms of the interim agreement pursuant to paragraph 7.4.1, whichever is the later date. If the Contractor fails to timely select one of the two options, the Contractor shall be deemed to have selected the provisions of 7.4.2.

Section 7.5 No Lockouts. Contractors shall not cause, incite, encourage, condone or participate in any lock-out of employees with respect to Project Work during the term of this Agreement. The term “**lock-out**” refers only to a Contractor’s exclusion of employees in order to secure collective bargaining advantage, and does not refer to the discharge, termination or layoff of employees by the Contractor for any reason in the exercise of rights pursuant to any provision of this Agreement, or any other agreement, nor does “**lock-out**” include the City’s decision to stop, suspend or discontinue any Project Work or any portion thereof for any reason.

Section 7.6 Best Efforts to End Violations.

7.6.1 If a Contractor contends that there is any violation of this Article or Section 8.3, it shall notify, in writing, the Executive Secretary of the Trades Council (“**Executive Secretary**”), the Senior Executive of the involved Union(s) (“**Senior Executive**”), and the City. The Executive Secretary and the leadership of the involved Union(s) will immediately instruct, order, and use their best efforts to cause the cessation of any violation of the relevant Article or Section.

7.6.2 If the Union contends that any Contractor has violated this Article, it will notify that Contractor and the City, setting forth the facts which the Union contends violate the Agreement, at least twenty-four (24) hours prior to invoking the procedures of Section 7.8. If the City determines, after reasonable investigation, that the information presented by the Union demonstrates a violation of this Article, the City shall promptly order the involved Contractor(s) to cease such violation.

Section 7.7 Withholding of Services for Failure to Pay Wages and Fringe Benefits.

7.7.1 Notwithstanding any provision of this Agreement to the contrary, it shall not be a violation of this Agreement for any Union to withhold the services of its members (but not the right to picket) from a particular Contractor who:

(a) fails to timely pay its weekly payroll; or

(b) fails to make timely payments to the Union’s Joint Labor/Management Trust Funds in accordance with the provisions of the applicable Master Labor Agreements. Prior to withholding its members’ services for the Contractor’s failure to make timely payments to the Union’s Joint Labor/Management Trust Funds, the Union shall give at least ten (10) days (unless a lesser period of time is provided in the Union’s Master Labor Agreement, but in no event less than forty-eight (48) hours) written notice of such failure to pay by registered or certified mail, return receipt requested, and by facsimile transmission to the involved Contractor and to the City. Union will meet within the ten (10) day period to attempt to resolve the dispute.

7.7.2 Upon the payment of the delinquent Contractor of all monies due and then owing for wages and/or fringe benefit contributions, the Union shall direct its members to return to work and the Contractor shall return all such members back to work. Notwithstanding anything to the contrary, the provisions for liquidated damages or any other delay related damages under the Construction Contract remain in full force and effect.

Section 7.8 Expedited Enforcement Procedure. Any party, including the City, which the Parties agree is a Party to the Agreement for purposes of this Article and an intended beneficiary of this

Article, or the CWA Administrator, may institute the following procedures, in lieu of or in addition to any other action at law or equity, when a breach of Section 7.1 or 7.5, above, or Section 8.3 is alleged.

7.8.1 The Party invoking this procedure shall notify Fred Horowitz, or Louis Zigman, who have been selected by the negotiating Parties, and whom the Parties agree shall be the permanent arbitrators under this procedure (“**Permanent Arbitrators**”). If the Permanent Arbitrators are unavailable at any time, any one of the Permanent Arbitrators who is notified shall appoint his alternate to hear the matter. Expenses incurred in arbitration shall be borne equally by the Parties involved in the arbitration and the decision of the arbitrator shall be final and binding on the Contractor(s) and Union(s), provided, however, that the arbitrator shall not have the authority to alter or amend or add to or delete from the provisions of this Agreement in any way. Notice to the arbitrator shall be by the most expeditious means available, with notices to the Parties alleged to be in violation, and to the Trades Council if it is a Union alleged to be in violation. For purposes of this Article, written notice may be given by hand delivery or overnight mail and will be deemed effective upon receipt.

7.8.2 Upon receipt of said notice, the arbitrator named above or his/her alternate shall sit and hold a hearing within twenty-four (24) hours if it is contended that the violation still exists, but not sooner than twenty-four (24) hours after notice has been dispatched to the Executive Secretary and the Senior Executive(s) as required by Section 7.6, as above.

7.8.3 The arbitrator shall notify the Parties of the place and time chosen for this hearing. Said hearing shall be completed in one session, which, with appropriate recesses at the arbitrator’s discretion, shall not exceed 24 hours unless otherwise agreed upon by the Contractor(s) or Union(s). A failure of any Contractor or Union to attend said hearings shall not delay the hearing of evidence or the issuance of any award by the arbitrator.

7.8.4 The sole issue at the hearing shall be whether or not a violation of Sections 7.1 or 7.5, above, or Section 8.3 has in fact occurred. The arbitrator shall have no authority to consider any matter in justification, explanation, or mitigation of such violation. The award shall be issued in writing within three (3) hours after the close of the hearing and may be issued without an opinion. If any Contractor or Union desires a written opinion, one shall be issued within fifteen (15) days, but its issuance shall not delay compliance with, or enforcement of, the award. The arbitrator may order cessation of the violation of the Article and other appropriate relief, and such award shall be served on all Parties by hand or registered mail upon issuance.

7.8.5 Such award shall be final and binding on the affected Contractors and Unions and may be enforced by any court of competent jurisdiction upon the filing of this Agreement and all other relevant documents referred to herein above in the following manner. Written notice of the filing of such enforcement proceedings shall be given to the affected Contractor or Union. In any judicial proceeding to obtain a temporary order enforcing the arbitrator’s award as issued under this Article, all affected Contractors and Unions waive the right to a hearing and agree that such proceedings may be ex parte. Such agreement does not waive any Contractor’s or Union’s right to participate in a hearing for a final order of enforcement. The court’s order or orders enforcing the arbitrator’s award shall be served on the affected Contractors and Unions by hand or by delivery to their address as shown on this Agreement (for a Union), as shown on their business contract for work under this Agreement (for a Contractor) and to the representing Union (for an employee), by

certified mail by the Contractor(s) or Union(s) first alleging the violation.

7.8.6 Any rights created by statute or law governing arbitration proceedings inconsistent with the above procedure or which interfere with compliance hereto are hereby waived by the Contractor(s) or Union(s) to whom they accrue.

7.8.7 The fees and expenses of the arbitrator shall be equally divided between the Party(ies) initiating this procedure and the respondent Contractor(s) or Union(s).

ARTICLE 8 WORK ASSIGNMENTS AND JURISDICTIONAL DISPUTES

Section 8.1 Assignment of Work. The assignment of Project Work will be solely the responsibility of the Contractor performing the work involved; and such work assignments will be in accordance with the Plan for the Settlement of Jurisdictional Disputes in the Construction Industry (the “**Plan**”) or any successor Plan.

Section 8.2 The Plan. All jurisdictional disputes on Project Work between or among the building and construction trades Unions and the Contractor Parties to this Agreement, shall be settled and adjusted according to the present Plan or any other successor plan or method of procedure that may be adopted in the future by the North America’s Building Trades Unions. Decisions rendered shall be final, binding and conclusive on the Contractor and Union Parties to this Agreement.

8.2.1 If a dispute arising under this Article involves the Southwest Mountain States Regional Council of Carpenters or any of its subordinate bodies, an arbitrator shall be chosen by the procedures specified in Article V, Section 5, of the Plan from a list composed of John Kagel, Robert Hirsch, and Thomas Pagan, and the arbitrator’s hearing on the dispute shall be held at the offices of the Trades Council within 14 days of the selection of the arbitrator. All other procedures shall be as specified in the Plan.

Section 8.3 No Work Disruption Over Jurisdiction. All jurisdictional disputes shall be resolved without the occurrence of any strike, work stoppage, or slow-down of any nature, and the Employer’s assignment shall be adhered to until the dispute is resolved. Individuals violating this Section shall be subject to immediate discharge.

Section 8.4 Pre-Job Conferences. As provided in Article 16, each Contractor will conduct a pre-job conference with the appropriate affected Union(s) prior to commencing work. The Trades Council and the CWA Administrator shall be advised in advance of all such conferences and may participate if they wish.

Section 8.5 Resolution of Jurisdictional Disputes. If any actual or threatened strike, sympathy strike, work stoppage, slow down, picketing, hand-billing or otherwise advising the public that a labor dispute exists, or interference with the progress of Project Work by reason of a jurisdictional dispute or disputes occurs, the Parties shall exhaust the expedited procedures set forth in the Plan, if such procedures are in the Plan or successor Plan then currently in effect, or otherwise as in Article 7 above.

ARTICLE 9 MANAGEMENT RIGHTS

Section 9.1 Contractor and City Rights. The Contractors and the City have the sole and exclusive right and authority to oversee and manage construction operations on Project Work, as set forth in this Article, without any limitations unless expressly limited or required by a specific provision of this Agreement or a Master Labor Agreement. In addition to the following and other rights of the Contractors enumerated in this Agreement, the Contractors expressly reserve their management rights and all the rights conferred upon them by law. The Contractor's rights include, but are not limited to, the right to:

- (a) Plan, direct and control operations of all work;
- (b) Hire, promote, transfer and layoff their own employees, respectively, as deemed appropriate to satisfy work and/or skill requirements;
- (c) Promulgate and require all employees to observe reasonable job rules and security and safety regulations;
- (d) Discharge, suspend or discipline their own employees for just cause;
- (e) Utilize, in accordance with City approval, any work methods, procedures or techniques, and select, use and install any types or kinds of materials, apparatus or equipment, regardless of source of manufacture or construction; assign and schedule work at their discretion; and
- (f) Assign overtime, determine when it will be worked and the number and identity of employees engaged in such work, subject to such provisions in the applicable Master Labor Agreement (s) requiring such assignments be equalized or otherwise made in a nondiscriminatory manner.

Section 9.2 Specific City Rights. In addition to the following and other rights of the City enumerated in this Agreement, the City expressly reserves its management rights and all the rights conferred on it by law. The City's rights (and those of any City employee authorized to administer this Agreement on its behalf) include but are not limited to the right to:

- (a) Inspect any construction site or facility to ensure that the Contractor follows the applicable safety and other work requirements;
- (b) Require Contractors to establish a different work week or shift schedule for particular employees as required to meet the operational needs of the Project Work at a particular location;
- (c) At its sole option, terminate, delay and/or suspend any and all portions of the Project Work at any time; prohibit some or all work on certain days or during certain hours of the day to accommodate the ongoing operations of the City's facilities and/or to mitigate the effect of ongoing Project Work on businesses and residents near the Project site; and/or require such other operational or schedule changes that City deems necessary, in its sole judgment, to effectively maintain its primary mission and remain a good neighbor to those in the area of its facilities. To

permit Contractors and Unions to make appropriate scheduling plans, the City will provide the affected Contractor(s) and Union(s) with reasonable notice of any changes it requires pursuant to this Section; provided, however, that if notice is not provided in time to advise employees not to report for work, show-up pay shall be due pursuant to the provision of Section 6.6;

(d) Approve any work methods, procedures and techniques used by Contractors whether or not these methods, procedures or techniques are part of industry practices or customs; and

(e) Investigate and process complaints, through the CWA Administrator, in the matter set forth in Articles 7 and 10.

Section 9.3 Use of Materials. There should be no limitations or restriction by Unions upon a Contractor's choice of materials or design, nor, regardless of source or location, upon the full use and utilization, of equipment, machinery, packaging, precast, prefabricated, prefinished, or preassembled materials, tools or other labor saving devices, subject to the application of the State Public Contracts and Labor Codes as required by law. The onsite installation or application of such items shall be performed by the craft having jurisdiction over such work.

Section 9.4 Special Equipment, Warranties and Guaranties

9.4.1 It is recognized that certain equipment of a highly technical and specialized nature may be installed at Project Work sites. The nature of the equipment, together with the requirements for manufacturer's warranties and/or guaranties, may dictate that it be prefabricated pre-piped and/or pre-wired and that it be installed under the supervision and direction of the City's and/or manufacturer's personnel. Unless otherwise required to prevent the loss of or negation of manufacturer warranties, the Unions agree to cause the installation of such equipment without incident and as required by the manufacturer.

9.4.2 The Parties recognize that the Contractor will initiate from time to time the use of new technology, equipment, machinery, tools, and other labor-savings devices and methods of performing Project Work. The Unions agree that they will not restrict the implementation of, or cause others to restrict the implementation of, such devices or work methods. The Unions will accept and will not refuse to handle, install or work with any standardized and/or catalogue: parts, assemblies, accessories, prefabricated items, preassembled items, partially assembled items, or materials whatever their source of manufacture or construction.

9.4.3 If any disagreement between the Contractor and the Unions concerning the methods of implementation or installation of any equipment, or device or item, or method of work, arises, or whether a particular part or pre-assembled item is a standardized or catalog part or item, the work will proceed as directed by the Contractor and the Parties shall immediately consult over the matter. If the disagreement is not resolved, the affected Union(s) shall have the right to proceed through the procedures set forth in Article 10.

ARTICLE 10
SETTLEMENT OF GRIEVANCES AND DISPUTES

Section 10.1 Cooperation and Harmony on Site.

10.1.1 This Agreement is intended to establish and foster continued close cooperation between management and labor. The Trades Council shall assign a representative to this Project for the purpose of assisting the local Unions, and working with the City, together with the Contractors, to complete the construction of the Project economically, efficiently, continuously and without any interruption, delays or work stoppages.

10.1.2 The Contractors, Unions, and employees collectively and individually, realize the importance to all Parties of maintaining continuous and uninterrupted performance of Project Work, and agree to resolve disputes in accordance with the grievance provisions set forth in this Article or, as appropriate, those of Article 7 or 8.

10.1.3 The Unions and/or Council shall oversee the processing of grievances under this Article and Articles 7 and 8, including the scheduling and arrangements of facilities for meetings, selection of the arbitrator from the agreed-upon panel to hear the case, and any other administrative matters necessary to facilitate the timely resolution of any dispute; provided, however, it is the responsibility of the principal parties to any pending grievance to ensure the time limits and deadlines are met.

Section 10.2 Processing Grievances. Any questions arising out of and during the term of this Agreement involving its interpretation and application, which includes applicable provisions of the Master Labor Agreement, but not jurisdictional disputes or alleged violations of Section 7.1 and 7.4 and similar provisions, shall be considered a grievance and subject to resolution under the following procedures.

Step 1. Employee Grievances. When any employee subject to the provisions of this Agreement feels aggrieved by an alleged violation of this Agreement, the employee shall, through his local Union business representative or, job steward, within ten (10) working days after the occurrence of the violation, give notice to the work site representative of the involved Contractor stating the provision(s) alleged to have been violated. A business representative of the local Union or the Steward and the work site representative of the involved Contractor shall meet and endeavor to resolve the matter within ten (10) working days after timely notice has been given. If they fail to resolve the matter within the prescribed period, the grieving party may, within ten (10) working days thereafter, pursue Step 2 of this grievance procedure provided the grievance is reduced to writing, setting forth the relevant information, including a short description thereof, the date on which the alleged violation occurred, and the provision(s) of the Agreement alleged to have been violated. Grievances and disputes settled at Step 1 shall be non-precedential except as to the parties directly involved.

Union or Contractor Grievances. Should the Union(s) or any Contractor have a dispute with the other Party(ies) and, if after conferring within ten (10) working days after the disputing Party knew or should have known of the facts or occurrence giving rise to the dispute, a settlement is not reached within five (5) working days, the dispute shall be reduced to writing and processed to Step 2 in the same manner as outlined in Step 1 above for the adjustment of an

employee complaint.

Step 2. The business manager of the involved Union or his designee, together with the site representative of the involved Contractor, shall meet within five (5) working days of the referral of the dispute to this second step to arrive at a satisfactory settlement thereof. If the Union(s) and Contractor(s) fail to reach an agreement, the dispute may be appealed in writing in accordance with the provisions of Step 3 within five (5) working days after the initial meeting at Step 2.

Step 3.

(a) If the grievance shall have been submitted but not resolved under Step 2, either the Union(s) or Contractor(s) may request in writing to the other Party(ies) to the grievance within five (5) working days after the initial Step 2 meeting, that the grievance be submitted to an arbitrator selected from the agreed upon list in **Attachment D** attached hereto, on a rotational basis in the order listed. The Contractor shall notify the parties to the grievance of the date, time and location of the hearing. The failure of any Contractor or Union to attend said hearing shall not delay the hearing of evidence or the issuance of any decision by the arbitrator. The decision of the arbitrator shall be final and binding on all parties. Should any Party seek confirmation of the award made by the arbitrator, the prevailing party shall be entitled to receive its reasonable attorney fees and costs.

(b) Failure of the grieving Contractor(s) or Union(s) to adhere to the time limits established herein shall render the grievance null and void. The time limits established herein may be extended only by consent of the Contractor(s) and Union(s) involved at the particular step where the extension is agreed upon. The arbitrator shall have the authority to make decisions only on issues presented and shall not have the authority to change, amend, add to or detract from any of the provisions of this Agreement.

(c) The fees and expenses incurred by the arbitrator, as well as those jointly utilized by the Parties (i.e. conference room, court reporter, etc.) in arbitration, shall be divided equally by the Contractor(s) and Union(s) to the arbitration, including Union(s) and Contractor(s) involved; for the avoidance of doubt, no fees or expenses shall be shared by or imposed upon the City.

Section 10.3 Limit on Use of Procedures. The procedures contained in this Article shall not be applicable to any alleged violation of Articles 7 or 8, with a single exception that any employee discharged for violation of Section 7.2, or Section 8.3, may resort to the procedures of this Article to determine only if he/she was, in fact, engaged in that violation.

Section 10.4 Notice. The City shall be notified by the involved Contractor of all actions at Steps 2 and 3, and further, the City may, in its sole discretion, designate a City staff member to participate fully as a party in all proceedings at such steps.

ARTICLE 11 REGULATORY COMPLIANCE

Section 11.1 Compliance with All Laws. The Trades Council and all Unions, Contractors, and their employees shall comply with all applicable federal and state laws, ordinances and regulations

including, but not limited to, those relating to safety and health, employment and applications for employment. All employees shall comply with the safety regulations established by the City, the CWA Administrator or the Contractor. Employees must promptly report any injuries or accidents to a supervisor.

Section 11.2 Prevailing Wage Compliance. All Contractors shall comply with the state and local laws and regulations on prevailing wages. Compliance with this obligation may be enforced by the appropriate parties through Article 10 above, or by pursuing the remedies available under state law through the Labor Commissioner or the Department of Industrial Relations, and/or as otherwise authorized by state or local law.

Section 11.3 Violations of Law. Should there be a finding by a Court or administrative tribunal of competent jurisdiction that a Contractor has violated federal and/or state law or regulation, the City, upon notice to the Contractor that it or its subcontractors is in such violation (including any finding of non-compliance with the California prevailing wage obligations as enforced pursuant to DIR regulations), the City, and in the absence of the Contractor or subcontractor remedying such violation, may take such action as it is permitted by law or contract to encourage that Contractor to come into compliance, including, but not limited to, assessing fines and penalties and/or removing the offending Contractor from Project Work, subject to the applicable Construction Contract.

ARTICLE 12 SAFETY AND PROTECTION OF PERSON AND PROPERTY

Section 12.1 Safety.

12.1.1 It shall be the responsibility of each Contractor to ensure safe working conditions and employee compliance with any safety rules contained herein or established by the City or the Contractor, whichever is most restrictive shall apply. It is understood that employees have an individual obligation to use diligent care to perform their work in a safe manner and to protect themselves and the property of the Contractor and the City.

12.1.2 Employees shall be bound by the safety, security and visitor rules established by the Contractor and/or the City. These rules will be published and posted. An employee's failure to satisfy his/her obligations under this section will subject him/her to discipline, up to and including discharge.

12.1.3 Unions and the Contractors shall adopt both the Substance Abuse Policy attached hereto as **Attachment E**, and the City's Drug and Alcohol Free Workplace Policy (Policy No. 1017) which shall be the policies and procedure utilized under this Agreement.

Section 12.2 Suspension of Work for Safety. A Contractor may suspend all or a portion of the job to protect the life and safety of employees. In such cases, employees will be compensated only for the actual time worked; provided, however, that where the Contractor requests employees to remain at the site and be available for work, the employees will be compensated for stand-by time at their basic hourly rate of pay.

Section 12.3 Water and Sanitary Facilities. The Contractor shall provide adequate supplies of drinking water and sanitary facilities for all employees as required by state law or regulation.

ARTICLE 13 TRAVEL AND SUBSISTENCE

Travel expenses, travel time, subsistence allowances, zone rates and parking reimbursements shall be paid in accordance with the applicable Master Labor Agreement unless superseded by the applicable prevailing wage determination.

ARTICLE 14 APPRENTICES

Section 14.1 Importance of Training. The Parties recognize the need to maintain continuing support of the programs designed to develop adequate numbers of competent workers in the construction industry, the obligation to capitalize on the availability of the local work force in the area served by the City, and the opportunities to provide continuing work under the construction program. To these ends, the Parties will facilitate, encourage, and assist Local Residents to commence and progress in Joint Labor/Management Apprenticeship Programs and/or training programs in the construction industry leading to participation in such apprenticeship programs. The City and the Trades Council, will work cooperatively to identify, or establish and maintain, effective programs and procedures for persons interested in entering the construction industry and which will help prepare them for the formal joint labor/management apprenticeship programs maintained by the signatory Unions; such efforts include but are not limited to the obligations set forth in Section 3.5.3, above.

Section 14.2 Use of Apprentices.

14.2.1 Apprentices used on Projects under this Agreement shall be registered in Joint Labor Management Apprenticeship Programs approved by the State of California. Apprentices may comprise up to thirty percent (30%) of each Craft's work force (calculated by hours worked) at any time, unless the standards of the applicable joint apprenticeship committee confirmed by the Division of Apprenticeship Standards ("DAS"), establish a lower or higher maximum percentage. Where the standards permit a higher percentage, such percentage shall apply on Project Work. Where the applicable standards establish a lower percentage, the applicable Union will use its best efforts with the Joint Labor Management Apprenticeship Program committee and, if necessary, the DAS to permit up to thirty percent (30%) Apprentices on the Project.

14.2.2 The Unions agree to cooperate with the Contractor in furnishing Apprentices as requested up to the maximum percentage. The Apprentice ratio for each Craft shall be in compliance, at a minimum, with the applicable provisions of the Labor Code relating to utilization of apprentices. The City shall encourage such utilization, both as to Apprentices and as to the overall supply of journey person. The Unions and Trades Council will work to provide appropriate and maximum utilization of Apprentices and the continuing availability of both apprentices and journey-level craft workers.

14.2.3 The Parties agree that Apprentices will not be dispatched to Contractors working under this Agreement unless there is a journey person working on the project where the Apprentice

is to be employed who is qualified to assist and oversee the apprentice's progress through the program in which he/she is participating.

14.2.4 All apprentices shall work under the direct supervision of a journeyperson from the trade in which the apprentice is indentured. A journeyperson shall be defined as set forth in the California Code of Regulations, Title 8 [apprenticeship] section 205, which defines a journeyperson as a person who has either completed an accredited apprenticeship in his or her craft, or has completed the equivalent of an apprenticeship in length and content of work experience and all other requirements in the craft which has workers classified as journeyperson in the apprenticeable occupation. Should a question arise as to a journeyperson's qualification under this subsection, the Contractor shall provide adequate proof evidencing the worker's qualification as a journeyperson to the Trades Council.

ARTICLE 15 [RESERVED]

ARTICLE 16 PRE-JOB CONFERENCES

Section 16.1 Each prime Contractor which is awarded a Construction Contract by the City for Project Work shall conduct a pre-job conference with the appropriate affected Union(s) prior to commencing work. All Contractors who have been awarded contracts by the prime Contractor shall attend the pre-job conference. The Trades Council and the CWA Administrator shall be advised in advance of all such conferences and may participate if they wish. All work assignments shall be disclosed by the prime Contractor and all Contractors at the pre-job conference in accordance with industry practice. Should there be any formal jurisdictional dispute raised under Article 8, the CWA Administrator shall be promptly notified. prime Contractor shall have available at the pre-job conference the plans and drawing for the work to be performed on the Project. Should additional Project Work not previously included within the scope of the Project Work be added, the Contractors performing such work will conduct a separate pre-job conference for such newly included Project Work. At no time shall the City be responsible for additional costs related to, associated with, or resulting from jurisdictional disputes or newly included work not previously identified in the Construction Contract.

ARTICLE 17 WORK OPPORTUNITIES PROGRAM

Section 17.1 The Parties to this Agreement support the development of increased numbers of skilled construction workers from among the residents residing within the City of Irvine to meet the labor needs of the Contractors. Towards that end the Parties agree to cooperate respecting the establishment of a work opportunities programs for these City Residents. In furtherance of the foregoing, the Unions specifically agree to all of the following:

a) Encourage the referral and utilization of qualified City Residents as journeypersons and apprentices on Project Work, to the extent permitted by law.

b) Encourage the referral and entrance, to the extent permitted by the apprentice training programs, of City Residents into pre-apprentice and apprentice training programs, and encourage the

referral and utilization, to the extent permitted by law and hiring hall practices, of qualified City Residents as journeypersons and apprentices on the Project.

c) To increase construction industry work opportunities for City Residents, assist City Residents in contacting pre-apprenticeship programs that utilize the Building Trades multi-craft core curriculum (MC3) and the Apprenticeship Training Committees for the crafts and trades they are interested in. The Unions shall assist City Residents who are seeking Union jobs on the Project and Union membership in assessing their work experience and giving them credit for provable past experience in their relevant craft or trade, including experience gained working for non-union Contractors. The Unions shall put on their rolls qualified bona fide City Residents for work on this Project; and

d) Conduct joint outreach to recent graduates of high schools in Irvine through participation in job fairs or other career events.

e) Support outreach to and collaborate with nonprofits and high schools in Irvine to inform individuals (including without limitation current and former students of high schools in Irvine who continue to reside in Irvine) about career opportunities through apprenticeships and employment opportunities through the Unions.

f) Assist City Residents in contacting pre-apprenticeship programs in Orange County, including without limitation the program at Santa Ana College, the Building Trades Multi-Craft Core Curriculum (MC3) and the Apprenticeship Training Committees for the crafts and trades they are interested in.

g) Assist City Residents who are seeking Union jobs in assessing their work experience and giving them credit for provable past experience in their relevant craft or trade, including experience gained working for non-union Contractors.

h) Support local events and programs designed to recruit and develop adequate numbers of qualified workers in the construction industry.

Section 17.2 The requirements in Section 17.1 shall apply throughout the term, without regard to whether the Local Employment Threshold is satisfied.

ARTICLE 18 LABOR/MANAGEMENT COOPERATION

Section 18.1 Joint Committee. The Parties to this Agreement may establish a six (6) person Joint Administrative Committee (“JAC”). This JAC shall be comprised of three (3) representatives selected by the City and three (3) representatives selected by the Trades Council to monitor compliance with the terms and conditions of this Agreement and to recommend amendments to this Agreement, with the exception of the dollar threshold specified in Section 2.2(a) and the term of this Agreement under Section 21.1, when doing so would be to the mutual benefit of the Parties. Each representative shall designate an alternate who shall serve in his or her absence for any purpose contemplated by this Agreement. A quorum will consist of at least two (2) representatives selected by the City and at least two (2) representatives selected by the Trades Council. For voting

purposes, only an equal number of City and Union representatives present may constitute a voting quorum.

Section 18.2 Functions of Joint Administrative Committee. The JAC shall meet on a schedule to be determined by the JAC or at the call of the joint chairs, to discuss the administration of the Agreement, the progress of the Project, general labor management problems that may arise, and any other matters consistent with this Agreement. Substantive grievances or disputes arising under Articles 7, 8 or 10 shall not be reviewed or discussed by this JAC, but shall be processed pursuant to the provisions of the appropriate Article. The CWA Administrator shall be responsible for the scheduling of the meetings, the preparation of the agenda topics for the meetings, with input from the Unions the Contractors and the City. Notice of the date, time and place of meetings, shall be given to the JAC members at least three (3) days prior to the meeting.

ARTICLE 19 SAVINGS AND SEPARABILITY

Section 19.1 Savings Clause. It is not the intention of the City, the CWA Administrator, Contractor, or the Union parties to violate any laws governing the subject matter of this Agreement. The Parties hereto agree that in the event any provision of this Agreement is finally held or determined to be illegal or void as being in contravention of any applicable law or regulation, the remainder of the Agreement shall remain in full force and effect unless the part or parts so found to be void are wholly inseparable from the remaining portions of this Agreement. Further, the Parties agree that if and when any provision(s) of this Agreement is finally held or determined to be illegal or void by a court of competent jurisdiction, the Parties will promptly enter into negotiations concerning the substantive effect of such decision for the purposes of achieving conformity with the requirements of any applicable laws and the intent of the Parties hereto. If the legality of this Agreement is challenged and any form of injunctive relief is granted by any court, suspending temporarily or permanently the implementation of this Agreement, then the Parties agree that all Project Work that would otherwise be covered by this Agreement should be continued to be bid and constructed without application of this Agreement so that there is no delay or interference with the ongoing planning, bidding and construction of any Project Work.

Section 19.2 Effect of Injunctions or Other Court Orders. The Parties recognize the right of the City to withdraw, at its absolute discretion, the utilization of the Agreement as part of any bid specification should a Court of competent jurisdiction issue any order, or any applicable statute which could result, temporarily or permanently in delay of the bidding, awarding and/or construction on the Project. Notwithstanding such an action by the City, or such court order or statutory provision, the Parties agree that the Agreement shall remain in full force and effect on covered Project Work to the maximum extent legally possible; provided however, that the continuance of the Project is not determined to be financially or legally detrimental to the City.

ARTICLE 20 WAIVER

A waiver of or a failure to assert any provisions of this Agreement by any or all of the Parties hereto shall not constitute a waiver of such provision for the future. Any such waiver shall not constitute a modification of the Agreement or change in the terms and conditions of the Agreement

and shall not relieve, excuse or release any of the Parties from any of their rights, duties or obligations hereunder.

ARTICLE 21 AMENDMENTS

The provisions of this Agreement can be renegotiated, supplemented, rescinded or otherwise altered only by mutual agreement in writing, hereafter signed by the negotiating Parties hereto. In the event of any conflict or ambiguity between this Agreement and any Attachment or exhibit, the provisions of this Agreement shall govern.

ARTICLE 22 DURATION OF THE AGREEMENT

Section 22.1 Duration.

22.1.1 This Agreement shall be effective from the date signed by all Parties and shall remain in effect for an initial period of five (5) years. Any Project Work within the scope of this Agreement awarded during the term of this Agreement shall continue to be covered hereunder, until completion of the Project Work, notwithstanding the expiration date of this Agreement.

22.1.2 This Agreement may be extended by written mutual consent of the City, as directed by the City Council and the signatory Unions for such further periods as the Parties shall agree to.

Section 22.2 Turnover and Final Acceptance of Completed Work.

22.2.1 Construction of any phase, portion, section, or segment of Project Work shall be deemed complete when such phase, portion, section or segment has been turned over to the City by the Contractor and the City has accepted such phase, portion, section, or segment. As areas and systems of the Project are inspected and construction-tested and/or approved and accepted by the City or third parties with the approval of the City, the Agreement shall have no further force or effect on such items or areas, except when the Contractor is directed by the City to engage and repairs or modifications required by its contract(s) with the City.

22.2.2 Notice of each final acceptance received by the Contractor will be provided to the Trades Council with the description of what portion, segment, etc. has been accepted. Final acceptance may be subject to a “punch” list, and in such case, the Agreement will continue to apply to each such item on the list until it is completed to the satisfaction of the City and Notice of Completion is issued by the City or its representative to the Contractor. At the request of the Union, complete information describing any “punch” list work, as well as any additional work required of a Contractor at the direction of the City pursuant to Section 22.2.1 above, involving otherwise turned-over and completed facilities which have been accepted by the City, will be available from the CWA Administrator.

ARTICLE 23 MISCELLANEOUS PROVISIONS

Section 23.1 Gender. The use of masculine or feminine gender or titles in this Agreement should be construed as including both genders and not as gender limitations unless the Agreement clearly requires a different construction.

Section 23.2 Headings and Subheadings. The use of Article titles and/or Section headings are for information only, and carry no legal significance.

Section 23.3 Binding Signatories Only. This Agreement shall only be binding on the signatory Parties hereto, and shall not apply to the parents, affiliates, subsidiaries, or other ventures of any such Party not performing Project Work.

Section 23.4 Separate Liability. It is understood that the liability of the Contractor(s) and the liability of the separate Unions under this Agreement shall be several and not joint. The Unions agree that this Agreement does not have the effect of creating any joint employment status between or among the City or CWA Administrator and/or any Contractor.

Section 23.5 Applicable Law; Venue. The internal laws of the State of California shall govern the interpretation and enforcement of this Agreement. In the event that either Party brings any action against the other under this Agreement, the Parties agree that trial of such action shall be vested exclusively in Orange County.

Section 23.6 Integration. This Agreement, including the attachments hereto and incorporated herein, represents the entire and integrated agreement between the Parties and supersedes all prior negotiations, representations, or agreements, either written or oral. The terms of this Agreement shall be construed in accordance with the meaning of the language used and shall not be construed for or against either Party by reason of the authorship of this Agreement or any other rule of construction which might otherwise apply.

Section 23.7 Counterparts. This Agreement may be executed in multiple counterparts, each of which shall be an original and all of which together shall constitute one agreement.

Section 23.8 Execution of Contract. The persons executing this Agreement on behalf of each of the Parties hereto represent and warrant that (i) such Party is duly organized and existing, (ii) they are duly authorized to execute and deliver this Agreement on behalf of said Party, (iii) by so executing this Agreement, such Party is formally bound to the provisions of this Agreement, and (iv) that entering into this Agreement does not violate any provision of any other Agreement to which said Party is bound.

Section 23.9 No Third-Party Beneficiaries. Except where, if anywhere, this Agreement explicitly declares the existence of an express third party beneficiary, there are no intended third-party beneficiaries under this Agreement and no such other third parties shall have any rights or obligations hereunder, except employees working on the Project and Union benefit and trust funds are recognized third-party beneficiaries with rights under this Agreement.


Section 23.10 Nonliability of City Officers and Employees. No officer, official, employee, agent,

representative, or volunteer of City shall be personally liable to any Party, or any successor in interest, in the event of any default or breach by City, or for breach of any obligation of the terms of this Agreement.

IN WITNESS whereof the Parties have caused this Community Workforce Agreement to be executed as of the date and year above stated.

CITY OF IRVINE

LOS ANGELES/ORANGE COUNTIES
BUILDING & CONSTRUCTION
TRADES COUNCIL

By: 
Farrah Khan (Nov 1, 2023 19:00 PDT)

Mayor

By: 
Ernesto Medrano
Executive Secretary

ATTEST:

By: 

Clerk of Council

APPROVED AS TO FORM:

Jeffrey Melching
By: Jeffrey Melching (Oct 18, 2023 09:12 PDT)

City Attorney

LOS ANGELES/ORANGE COUNTIES BUILDING AND CONSTRUCTION
TRADES COUNCIL CRAFT UNIONS AND DISTRICT COUNCILS

Asbestos Heat & Frost Insulators (Local 5)
 Boilermakers (Local 92)
 Bricklayers & Allied Craftworkers (Local 4)
 Cement Masons (Local 500)
 District Council of Laborers
 Electricians (Local 441)
 Elevator Constructors (Local 18)
 Gunitite Workers (Local 345)
 Iron Workers (Reinforced – Local 416)
 Iron Workers (Structural – Local 433)
 Laborers (Local 300) (remediation)
 Laborers (Local 652)
 Laborers (Local 1184)
 Operating Engineers (Local 12)
 Operating Engineers (Local 12)
 Operating Engineers (Local 12)
 Painters & Allied Trades DC 36
 Pipe Trades (Steamfitters Local 250)
 Pipe Trades (Local 345)
 Pipe Trades (Plumbers/Fitters Local 582)
 Pipe Trades (Sprinkler Fitters Local 709)
 Plasterers (Local 200)
 Plaster Tenders Local (1414)
 Roofers & Waterproofers (Local 220)
 Sheet Metal Workers (Local 105)
 Teamsters (Local 986)
 Southwest Mountain States Regional Council of Carpenters

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Luis Miramontez No
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 Jon Preciado
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 DocuSigned by:
 Ed Lamm (Grade #345)
 237F9D67A3B5408...
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 DocuSigned by:
 SERGIO RASCON
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 DocuSigned by:
 Adrian A Espanza
 77FDocuSigned by:
 10065011C15449...
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 DocuSigned by:
 Ernesto Toscano
 23380C656A87401...
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 Ben Clayton
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 DocuSigned by:
 Ricardo Perez
 8D644Signed by:
 Robert James
 2749F1EBD2D44D5...
Alfonso, Roy
 DocuSigned by:
 Vince Uribe
 4F23CB05C8D4E8...
[Signature]
 DocuSigned by:
 Steve Hinson
 8255891704541F...
 DocuSigned by:
 Caesar Bonas
 80551Signed by:
 10065011C15449...
[Signature]
 A254F165F8264B2...

ATTACHMENT A

LETTER OF ASSENT

To be signed by all contractors awarded work covered by the City of Irvine
Community Workforce Agreement prior to commencing work.

[Contractor's Letterhead]
City of Irvine Public
Works Department
1234 address
City, state, zip code
Attn: _____

Re: Community Workforce Agreement - Letter of Assent

Dear Sir:

This is to confirm that [name of company] agrees to be party to and bound by the City of Irvine Community Workforce Agreement effective_, 2023, as such Agreement may, from time to time, be amended by the negotiating parties or interpreted pursuant to its terms. Such obligation to be a party and bound by this Agreement shall extend to all work covered by the agreement undertaken by this Company on the project and this Company shall require all of its contractors and subcontractors of whatever tier to be similarly bound for all work within the scope of the Agreement by signing and furnishing to you an identical letter of assent prior to their commencement of work.

Sincerely.

[Name of Construction Company]

By: [_____] Name and Title of Authorized Executive

Contractor State License No.: _____

Project Name: _____

[Copies of this letter must be submitted to the CWA Administrator and to the Trades Council
Consistent with Section 2.6 (b).]

ATTACHMENT B

FIRST TIER ZIP CODES		
92602	92614	92620
92603	92616	92623
92604	92617	92650
92606	92618	92697
92612	92619	

ATTACHMENT C

CITY OF IRVINE CRAFT REQUEST FORM

TO THE CONTRACTOR: Please complete and fax this form to the applicable union to request craft workers that fulfill the hiring requirements for this project. After faxing your request, please call the Local to verify receipt and substantiate their capacity to furnish workers as specified below. Please print your Fax Transmission Verification Reports and keep copies for your records.

The City of Irvine Community Workforce Agreement establishes a priority for the fulfillment of total work hours as follows: first, in those first tier zip codes which overlap all of the City of Irvine, as attached hereto, second (if there are not sufficient persons available from the first group), from Veterans residing in Orange County, third (if there are not sufficient persons available from the first and second groups) from graduates from the Building Trades Multi-Craft Core Curriculum ("MC3 Graduates") residing in Orange County, and fourth, from persons residing within Orange County. For Dispatch purposes, persons falling within these four categories, shall be referred to as Local Residents.

TO THE UNION: Please complete the "Union Use Only" section on the next page and fax this form back to the requesting Contractor. Be sure to retain a copy of this form for your records.

CONTRACTOR USE ONLY

To: Union Local # _____ **Fax#** () _____ **Date:** _____
Cc: CWA Administrator
From: Company: _____ Issued By: _____
Contact Phone : () _____ Contact Fax: () _____

PLEASE PROVIDE ME WITH THE FOLLOWING UNION CRAFT WORKERS.

Craft Classification (i.e., plumber, painter, etc.)	Journeyman or Apprentice	Local Resident or General Dispatch	Number of workers needed	Report Date	Report Time
TOTAL WORKERS REQUESTED = _____					

Please have worker(s) report to the following work address indicated below:

Project Name: _____ Site: _____ Address: _____
Report to: _____ On-site Tel: _____ On-site Fax: _____

Comment or Special Instructions: _____

UNION USE ONLY

Date dispatch request received:
Dispatch received by:
Classification of worker requested:
Classification of worker dispatched:

WORKER REFERRED

Name:
Date worker was dispatched:
Is the worker referred a: (check all that apply)

JOURNEYMAN	Yes ____	No ____
APPRENTICE	Yes ____	No ____
CITY RESIDENT	Yes ____	No ____
VETERAN RESIDING IN ORANGE COUNTY	Yes ____	No ____
MC3 RESIDENT RESIDING IN ORANGE COUNTY	Yes ____	No ____
OTHER ORANGE COUNTY RESIDENT	Yes ____	No ____
GENERAL DISPATCH FROM OUT OF WORK LIST	Yes ____	No ____

--

ATTACHMENT D

List of Neutral Arbitrators

Mark Burstein
Andrea Dooley
Fred Horowitz
Najeeb Khoury
Michael Prihar

ATTACHMENT E

LOS ANGELES/ORANGE COUNTIES BUILDING AND CONSTRUCTION TRADES COUNCIL APPROVED

DRUG AND ALCOHOL TESTING POLICY

(rev. December 2019)

The Parties recognize the problems which drug and alcohol abuse have created in the construction industry and the need to develop drug and alcohol abuse prevention programs. Accordingly, the Parties agree that in order to enhance the safety of the workplace and to maintain a drug and alcohol-free work environment, individual Employers may require applicants or employees to undergo drug and alcohol testing.

1. It is understood that the use, possession, transfer or sale of illegal drugs, narcotics, or other unlawful substances, as well as being under the influence of alcohol and the possession or consuming alcohol is absolutely prohibited while employees are on the Employer's job premises or while working on any jobsite in connection with work performed under the Community Workforce Agreement ("CWA").

2. No Employer may implement a drug testing program which does not conform in all respects to the provisions of this Policy.

3. No Employer may implement drug testing at any jobsite unless written notice is given to the Union setting forth the location of the jobsite, a description of the project under construction, and the name and telephone number of the Project Supervisor. Said notice shall be addressed to the office of each Union signing the CWA. Said notice shall be sent by email or by registered mail before the implementation of drug testing. Failure to give such notice shall make any drug testing engaged in by the Employer a violation of the CWA, and the Employer may not implement any form of drug testing at such jobsite for the following six months.

4. An Employer who elects to implement drug testing pursuant to this Agreement shall require all employees on the Project to be tested. With respect to individuals who become employed on the Project subsequent to the proper implementation of a valid drug testing program, such test shall be administered upon the commencement of employment on the project, whether by referral from a Union Dispatch Office, transfer from another project, or another method. Individuals who were employed on the project prior to the proper implementation of a valid drug testing program may only be subjected to testing for the reasons set forth in paragraphs 5(g)(1) through 5(g)(3) and paragraphs 6(a) through 6(e) of this Policy. Refusal to undergo such testing shall be considered sufficient grounds to deny employment on the project.

5. The following procedure shall apply to all drug testing:

a. The Employer may request urine samples only. The applicant or employee shall not be observed when the urine specimen is given. An applicant or employee, at his or her sole option, shall, upon request, receive a blood test in lieu of a urine test. No employee of the Employer shall draw blood from a bargaining unit employee, touch or handle urine specimens, Community Workforce Agreement

or in any way become involved in the chain of custody of urine or blood specimens. A Union Business Representative, subject to the approval of the individual applicant or employee, shall be permitted to accompany the applicant or employee to the collection facility to observe the collection, bottling, and sealing of the specimen.

b. An employer may request an applicant to perform an alcohol breathalyzer test, at a certified laboratory only and cutoff levels shall be those mandated by applicable state or federal law.

c. The testing shall be done by a laboratory approved by the Substance Abuse & Mental Health Services Administration (SAMHSA), which is chosen by the Employer and the Union.

d. An initial test shall be performed using the Enzyme Multiplied Immunoassay Technique (EMIT). In the event a question or positive result arises from the initial test, a confirmation test must be utilized before action can be taken against the applicant or employee. The confirmation test will be by Gas Chromatography/Mass Spectrometry (GC/MS). Cutoff levels for both the initial test and confirmation test will be those established by SAMHSA. Should these SAMHSA levels be changed during the course of this Agreement or new testing procedures are approved, then these new regulations will be deemed as part of this existing Agreement. Confirmed positive samples will be retained by the testing laboratory in secured long-term frozen storage for a minimum of one year. Handling and transportation of each sample must be documented through strict chain of custody procedures.

e. In the event of a confirmed positive test result the applicant or employee may request, within forty-eight (48) hours, a sample of his/her specimen from the testing laboratory for purposes of a second test to be performed at a second laboratory, designated by the Union and approved by SAMHSA. The retest must be performed within ten (10) days of the request. Chain of custody for this sample shall be maintained by the Employer between the original testing laboratory and the Union's designated laboratory. Retesting shall be performed at the applicant's or employee's expense. In the event of conflicting test results the Employer may require a third test.

f. If, as a result of the above testing procedure, it is determined that an applicant or employee has tested positive, this shall be considered sufficient grounds to deny the applicant or employee his/her employment on the project.

g. No individual who tests negative for drugs pursuant to the above procedure and becomes employed on the project shall again be subjected to drug testing with the following exceptions:

1. Employees who are involved in industrial accidents resulting in damage to plant, property or equipment or injury to him/her or others may be tested for drug or alcohol pursuant to the procedures stated hereinabove.

2. The Employer may test employees following thirty (30) days advance written notice to the employee(s) to be tested and to the applicable Union. Notice to the applicable Union shall be as set forth in paragraph 3 above and such testing shall be pursuant to the procedures stated hereinabove.

3. The Employer may test an employee where the Employer has reasonable cause to believe that the employee is impaired from performing his/her job. Reasonable cause shall be defined as being aberrant or unusual behavior, the type of which is a recognized and accepted symptom of impairment (i.e., slurred speech, unusual lack of muscular coordination, etc.). Such behavior must be actually observed by at least two persons, one of whom shall be a supervisor who has been trained to recognize the symptoms of drug abuse or impairment and the other of whom shall be the Job Steward. If the Job Steward is unavailable or there is no Job Steward on the project the other person shall be a member of the applicable Union's bargaining unit. Testing shall be pursuant to the procedures stated hereinabove. Employees who are tested pursuant to the exceptions set forth in this paragraph and who test positive will be removed from the Employer's payroll.

h. Applicants or employees who do not test positive shall be paid for all time lost while undergoing drug testing. Payment shall be at the applicable wage and benefit rates set forth in the applicable Union's Master Labor Agreement. Applicants who have been dispatched from the Union and who are not put to work pending the results of a test will be paid waiting time until such time as they are put to work. It is understood that an applicant must pass the test as a condition of employment. Applicants who are put to work pending the results of a test will be considered probationary employees.

6. The Employers will be allowed to conduct periodic jobsite drug testing on the Project under the following conditions:

a. The entire jobsite must be tested, including any employee or subcontractor's employee who worked on that project three (3) working days before or after the date of the test;

b. Jobsite testing cannot commence sooner than fifteen (15) days after start of the work on the project;

c. Prior to start of periodic testing, a Business Representative will be allowed to conduct an educational period on company time to explain periodic jobsite testing program to affected employees;

d. Testing shall be conducted by a SAMHSA certified laboratory, pursuant to the provisions set forth in paragraph 5 hereinabove.

e. Only two (2) periodic tests may be performed in a twelve (12) month period.

7. It is understood that the unsafe use of prescribed medication, or where the use of prescribed medication impairs the employee's ability to perform work, is a basis for the Employer to remove the employee from the jobsite.

8. Any grievance or dispute which may arise out of the application of this Agreement shall be subject to the grievance and arbitration procedures set forth in the CWA.
9. The establishment or operation of this Policy shall not curtail any right of any employee found in any law, rule or regulation. Should any part of this Agreement be found unlawful by a court of competent jurisdiction or a public agency having jurisdiction over the parties, the remaining portions of the Agreement shall be unaffected, and the parties shall enter negotiations to replace the affected provision.
10. Present employees, if tested positive, shall have the prerogative for rehabilitation program at the employee's expense. When such program has been successfully completed the Employer shall not discriminate in any way against the employee. If work for which the employee is qualified exists, he/she shall be reinstated.
11. The Employer agrees that results of urine and blood tests performed hereunder will be considered medical records held confidential to the extent permitted or required by law. Such records shall not be released to any persons or entities other than designated Employer representatives and the applicable Union. Such release to the applicable Union shall only be allowed upon the signing of a written release and the information contained therein shall not be used to discourage the employment of the individual applicant or employee on any subsequent occasion.
12. The Employer shall indemnify and hold the Union harmless against any and all claims, demands, suits, or liabilities that may arise out of the application of this Agreement and/or any program permitted hereunder.
13. Employees who seek voluntary assistance for substance abuse may not be disciplined for seeking such assistance. Requests from employees for such assistance shall remain confidential and shall not be revealed to other employees or management personnel without the employee's consent. Employees enrolled in substance abuse programs will be subject to all Employer rules, regulations and job performance standards with the understanding that an employee enrolled in such a program is receiving treatment for an illness.
14. The parties agree to develop and implement a drug abuse prevention and testing program for all apprentices entering the industry.
15. This Memorandum of Understanding shall constitute the only Agreement in effect between the parties concerning drug and alcohol abuse, prevention and testing. Any modifications thereto must be accomplished pursuant to collective bargaining negotiations between the parties.

APPENDIX A: SPECIMEN REPORTING CRITERIA

Initial Test Analyte	Initial Test Cutoff ¹	Confirmatory Test Analyte	Confirmatory Test Cutoff Concentration
Marijuana metabolites (THCA) ²	50 ng/ml ³	THCA	15 ng/ml
Cocaine metabolite (Benzoylecgonine)	150ng/ml ³	Benzoylecgonine	100 ng/ml
Codeine/ Morphine	2000 ng/ml	Codeine Morphine	2000 ng/ml 2000 ng/ml
Hydrocodone/ Hydromorphone	300 ng/ml	Hydrocodone Hydromorphone	100ng/ml 100ng/ml
Alcohol	0.02%	Ethanol	0.02%
Oxycodone/ Oxymorphone	100 ng/ml	Oxycodone Oxymorphone	100ng/ml 100ng/ml
6-Acetylmorphine	10 ng/ml	6-Acetylmorphine	10 ng/ml
Phencyclidine	25 ng/ml	Phencyclidine	25 ng/ml
Amphetamine/ Methamphetamine	500 ng/ml	Amphetamine Methamphetamine	250ng/ml 250 ng/ml
MDMA ⁴ /MDA ⁵	500 ng/ml	MDMA MDA	250ng/ml 250 ng/ml

¹ For grouped analytes (i.e., two or more analytes that are in the same drug class and have the same initial test cutoff):

Immunoassay: The test must be calibrated with one analyte from the group identified as the target analyte. The cross-reactivity of the immunoassay to the other analyte(s) within the group must be 80 percent or greater; if not, separate immunoassays must be used for the analytes within the group.

Alternate technology: Either one analyte or all analytes from the group must be used for calibration, depending on the technology. At least one analyte within the group must have a concentration equal to or greater than the initial test cutoff or, alternatively, the sum of the analytes present (i.e., equal to or greater than the laboratory's validated limit of quantification) must be equal to or greater than the initial test cutoff.

² An immunoassay must be calibrated with the target analyte, 9-tetrahydrocannabinol-9- carboxylic acid (THCA).

³ **Alternate technology (THCA and benzoylecgonine):** The confirmatory test cutoff must be used for an alternate technology initial test that is specific for the target analyte (i.e., 15 ng/ml for THCA, 100 ng/ ml for benzoylecgonine).

⁴ Methylenedioxymethamphetamine (MDMA)

⁵ Methylenedioxyamphetamine (MDA)

Initial Test Analyte	Initial Test Cutoff	Confirmatory Test Analyte	Confirmatory Test Cutoff Concentration
Barbiturates	300 ng/ml	Barbiturates	200 ng/ml
Benzodiazepines	300 ng/ml	Benzodiazepines	300 ng/ml
Methadone	300 ng/ml	Methadone	100 ng/ml
Methaqualone	300 ng/ml	Methaqualone	300 ng/ml
Propoxyphene	300 ng/ml	Propoxyphene	100 ng/ml

**SIDE LETTER OF AGREEMENT
TESTING POLICY FOR DRUG ABUSE**

It is hereby agreed between the parties hereto that an Employer who has otherwise properly implemented drug testing, as set forth in the Testing Policy for Drug Abuse, shall have the right to offer an applicant or employee a “quick” drug screening test. This “quick” screen test shall consist either of the “ICUP” urine screen or similar test or an oral screen test. The applicant or employee shall have the absolute right to select either of the two “quick” screen tests, or to reject both and request a full drug test.

An applicant or employee who selects one of the “quick” screen tests, and who passes the test, shall be put to work immediately. An applicant or employee who fails the “quick” screen test, or who rejects the “quick” screen tests, shall be tested pursuant to the procedures set forth in the Testing Policy for Drug Abuse. The sample used for the “quick” screen test shall be discarded immediately upon conclusion of the test. An applicant or employee shall not be deprived of any rights granted to them by the Testing Policy for Drug Abuse as a result of any occurrence related to the “quick” screen test.

CORE EMPLOYEES LIST

TO BE COMPLETED BY ALL PRIME CONTRACTORS/CONSULTANTS, SUBCONTRACTORS/SUBCONSULTANTS

FIRM NAME: _____

PROJECT: _____

CONTRACT NO.: _____

CONTRACTOR: _____

TELEPHONE NO.: _____

The following is a list of "Core Employees" which in accordance with the Community Workforce Agreement (§3.8.2), have been on the active payroll for at least **sixty (60) out of the last one-hundred (100) days** prior to the award, **have worked at least two-thousand (2,000) hours in the craft in which they are employed**, are able to safely perform and have any licenses required for the work they are performing. Pursuant to the requirements of SB 1362 and California Labor Code §3099.2, all employees performing **electrical work** for a subcontractor holding a C-10 license **must be certified**. If employees working on project are found to be not certified, they shall be immediately removed. Failure to provide proof of this documentation on all employees will be considered a violation and subject the subcontractor to corrective action up to and including being removed from the project.

The prime contractor/consultant and any subcontractor/subconsultant, at any tier, must submit this form no later than ten (10) days prior to commencing work on the project.

☐

Check if company is directly signatory to all unions it will be assigning work to. List unions here:

Name	SSN	Trade	ZIP Code of residence	Certificate # (Electricians only)	MC3 Graduate? Y/N	Veteran? Y/N

Certification:

I certify that the information contained hereon is true and correct. If it is determined that the information reported hereon is not true and correct, I will not be allowed to do work (begin, finish, complete) for the City of Irvine.

Signature: _____

Date: _____

Name/Title: _____

PRE-JOB CONFERENCE FORM

CWA Pre-Job Conference Form

Project Information	
Project Name:	
Specification Number:	Contract Number:
Contract Award Amount:	Pre-Job Conference:
Estimated Start Date:	Conference Location:
Estimated End Date:	

General Contractor Information	
Prime Contractor:	
Address:	
Phone:	
Email:	Fax:
Prime Contractor's License Number:	

Project Description

Heavy Equipment to Be Utilized on Job

Jobsite Information	
Project Address:	
Site Phone:	Email:
Fax:	Jobsite Labor Rep:
Project Manager:	Jobsite Safety Rep:
Job Superintendent:	Manpower Ordered By:

Jobsite Scheduling Information	
Number of Shifts:	Start / Stop Times:
Pay Day:	Ending Day of Pay Period:

Jobsite Facilities
Location(s) of First Aid Facilities:
Location(s) of Sanitary Facilities:
Location(s) of Drinking Water Facilities:
Description of Jobsite Parking:
Name of Selected Hospital:
Hospital Address:
Hospital Phone Number

Contractor Jurisdictional Work Assignments

As required by CWA Article 8, the assignment of work will be solely the responsibility of the contractor performing the work involved; and such work assignments will be in accordance with the Plan for the Settlement of Jurisdictional Disputes in the Construction Industry (the "Plan") or any successor plan.

All jurisdictional disputes on this project shall be settled in accordance with CWA Article 8.

Jurisdictional Work Assignments

[illegible]

Subcontractor Information – Complete or Attach Subcontractor Listing	
Subcontractor Name:	
Type/Scope of Work:	
Address:	
Start Date:	End Date:
Contact Person:	Phone:
Email:	Contractor License Number:
Subcontractor Name:	
Type/Scope of Work:	
Address:	
Start Date:	End Date:
Contact Person:	Phone:
Email:	Contractor License Number:
Subcontractor Name:	
Type/Scope of Work:	
Address:	
Start Date:	Start Date:
Contact Person:	Contact Person:
Email:	Email:
Subcontractor Name:	
Type/Scope of Work:	
Address:	
Start Date:	End Date:
Contact Person:	Phone:
Email:	Contractor License Number:
Subcontractor Name:	
Type/Scope of Work:	
Address:	

Start Date:	End Date:
Contact Person:	Phone:
Email:	Contractor License Number:
Subcontractor Name:	
Type/Scope of Work:	
Address:	
Start Date:	End Date:
Contact Person:	Phone:
Email:	Contractor License Number:
Subcontractor Name:	
Type/Scope of Work:	
Address:	
Start Date:	End Date:
Contact Person:	Phone:
Email:	Contractor License Number:
Subcontractor Name:	
Type/Scope of Work:	
Address:	
Start Date:	End Date:
Contact Person:	Phone:
Email:	Contractor License Number:
Subcontractor Name:	
Type/Scope of Work:	
Address:	
Start Date:	End Date:
Contact Person:	Phone:
Email:	Contractor License Number:

Subcontractor Name:	
Type/Scope of Work:	
Address:	
Start Date:	End Date:
Contact Person:	Phone:
Email:	Contractor License Number:

APPENDIX E

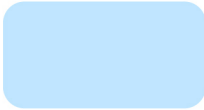




PHASING PLAN





PHASING PLAN

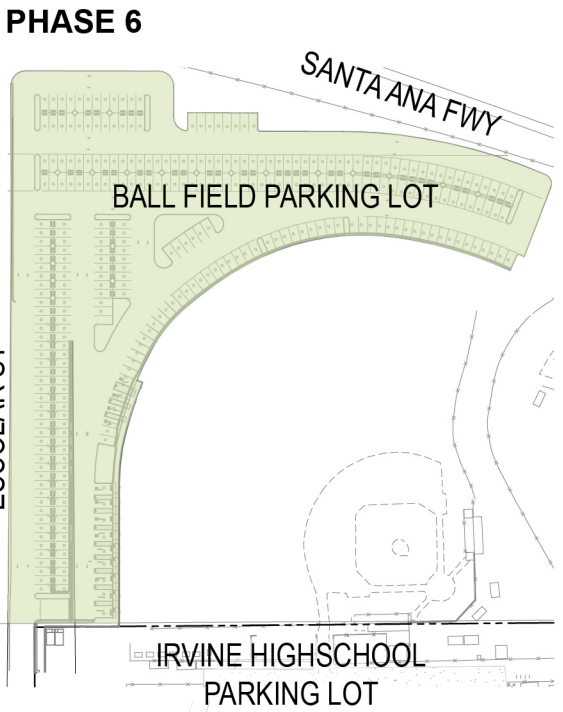
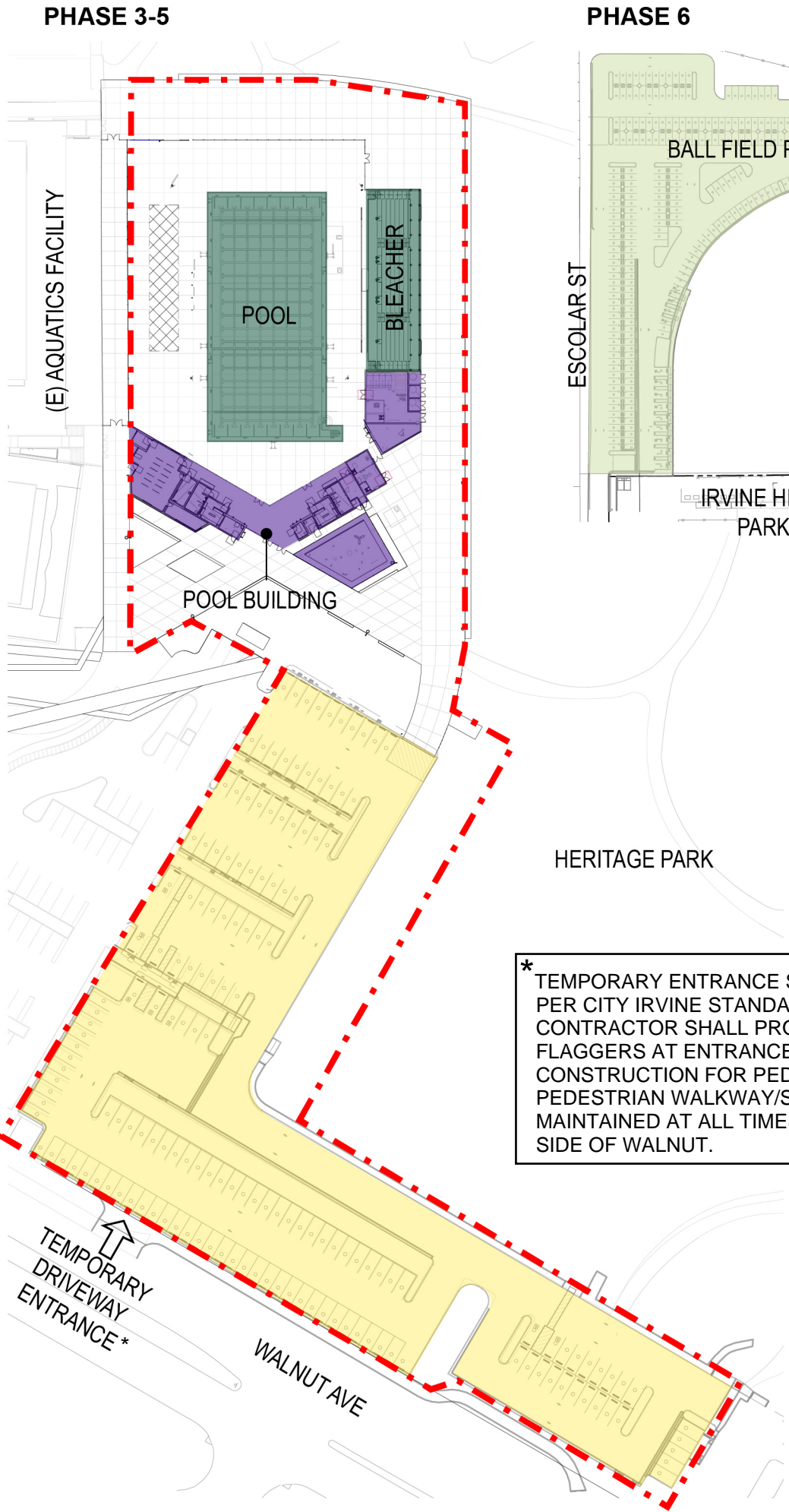
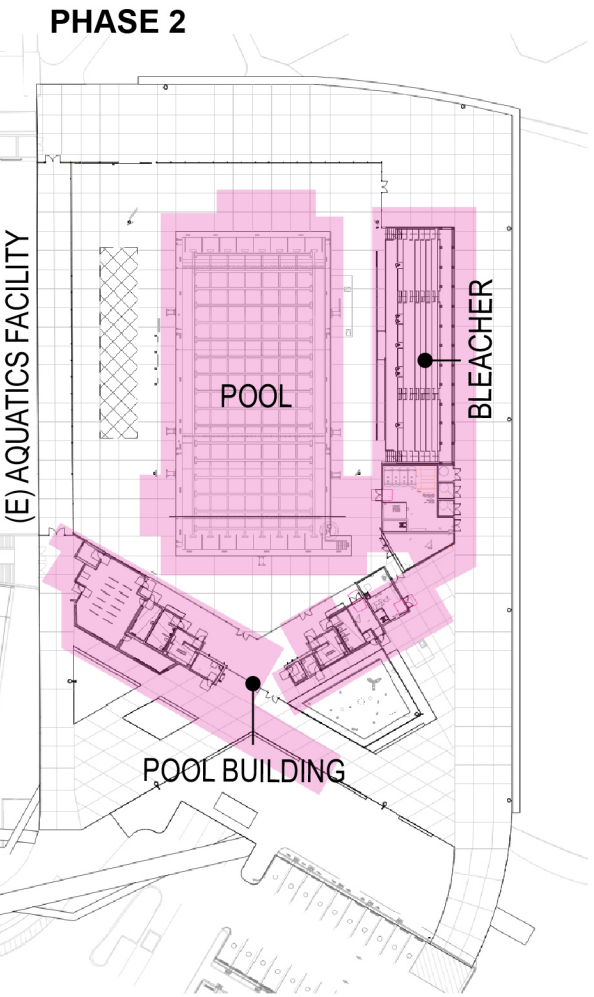
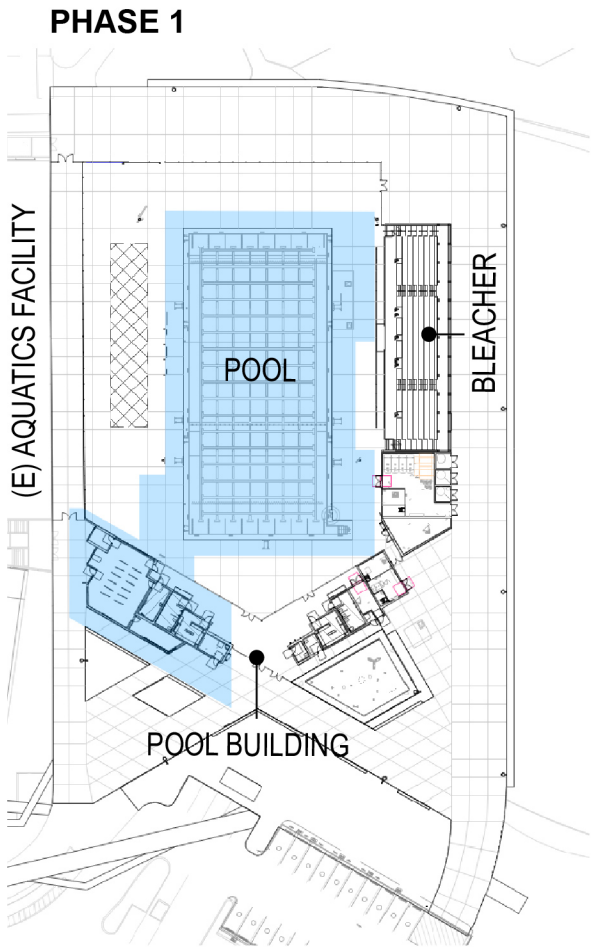
WOOLLETT AQUATICS & PARKING LOT

WOOLLETT AQUATICS

	PHASE 1 - GROUND IMPROVEMENTS (GEOPIERS) 40 Working Days from NTP MILESTONE 1
	PHASE 2 - OVER EX & GRADE PADS 50 Working Days from Completion of Milestone 1
	PHASE 3 - UNDERGRDOUND UTILITY 50 Working Days from Completion of Milestone 1 MILESTONE 2
	PHASE 4A - POOL AND BLEACHERS 180 Working Days from Completion of Milestone 2 MILESTONE 3
	PHASE 4B - BLDGS AND SPLASH PADS 105 Working Days from Completion of Milestone 3 MILESTONE 4

WALNUT PARKING LOT

	PHASE 5 - PARKING LOT 2, FLATWORK, LANDSCAPING 45 Working Days from Completion of Milestone 4
	BALL FIELD PARKING LOT PHASE 6 - PARKING LOT 1, FLATWORK, LANDSCAPING 45 Working Days from Completion of Milestone 4 MILESTONE 5



* TEMPORARY ENTRANCE SHALL BE INSTALLED PER CITY IRVINE STANDARD 205 TYPE II-A. CONTRACTOR SHALL PROVIDE A MINIMUM OF 2 FLAGGERS AT ENTRANCE DURING CONSTRUCTION FOR PEDESTRIAN CROSSINGS. PEDESTRIAN WALKWAY/SIDEWALK SHALL BE MAINTAINED AT ALL TIMES ALONG THE EAST SIDE OF WALNUT.

APPENDIX F

GEOTECHNICAL REPORT



John R. Byerly

I N C O R P O R A T E D

December 19, 2025

PBK Architects
2400 East Katella Avenue, Suite 950
Anaheim, California 92806

File No.: S-14708
Rpt. No.: 8967

Attention: Arielle Mascarinas, Project Manager

Project: Proposed William Woollett Jr. Aquatics Center Improvements, 4601 Walnut Avenue, Irvine, California

Subject: Response to Third Engineering Geology and Seismology Review

References: a) Geotechnical Investigation, William Woollett Jr. Aquatics Center Improvements, 4601 Walnut Avenue, Irvine, California.; John R. Byerly, Inc., File No. S-14708, Rpt. No. 8566, September 17, 2024

b) Geotechnical Recommendations, Proposed William Woollett Jr. Aquatics Center Improvements, 4601 Walnut Avenue, Irvine, California; John R. Byerly, Inc., File No. S-14708, Rpt. No. 8575, October 1, 2024

c) Additional Foundation Recommendations for Swimming Pool and Surge Pit Tanks, Proposed William Woollett Jr. Aquatics Center Improvements, 4601 Walnut Avenue, Irvine, California; John R. Byerly, Inc., File No. S-14708, Rpt. No. 8620, November 14, 2024

d) Engineering Geology and Seismology Review for Irvine High School – William Woollett Jr. Aquatics Ctr – Proposed Additions, 4601 Walnut Avenue, Irvine, CA, 92604, CGS Application No. 04-CGS6810, DSA Application No. 04-124187, February 27, 2025

e) Response to Engineering Geology and Seismology Review, Proposed William Woollett Jr. Aquatics Center Improvements, 4601 Walnut Avenue, Irvine, California; John R. Byerly, Inc., File No. S-14708, Rpt. No. 8731, March 3, 2025

f) Supplemental Geotechnical Investigation, William Woollett Jr. Aquatics Center Improvements, 4601 Walnut Avenue, Irvine, California.; John R. Byerly, Inc., Rpt. No. 8853, July 28, 2025

g) Third Engineering Geology and Seismology Review for Irvine High School – William Woollett Jr. Aquatics Ctr – Proposed Additions, 4601 Walnut Avenue, Irvine, CA, 92604; California Geological Survey, CGS Application No. 04-CGS6810, DSA Application No. 04-124187, December 8, 2025

GEOTECHNICAL ENGINEERS • TESTING AND INSPECTION

2257 South Lilac Avenue, Bloomington, CA 92316-2903
Bloomington (909) 877-1324 Riverside (909) 783-1910 Fax (909) 877-5210

Ladies and Gentlemen:

We are in receipt of the engineering geology and seismology review (Reference g) prepared by the California Geological Survey on behalf of the Division of the State Architect. A copy of the review is attached as Enclosure 3.

The items presented in the review letter for which additional information is requested from John R. Byerly, Inc. are itemized below. Some items in the review letter request responses from the ground improvement contractor. These items are located in the section "Discussion of Ground Improvement Design and Plans." John R. Byerly, Inc. will not be responding to the comments directed at the ground improvement contractor. Each comment John R. Byerly, Inc. is responding to is presented below.

Liquefaction, Seismic Settlement, and Lateral Spreading Analysis:

COMMENT

- *CGS observes the consultants set the in-situ groundwater at a depth of 20 feet in their liquefaction and seismic settlement analyses, not at the depths of 24 feet or 25 feet as they report were encountered. Their approach appears to underestimate the liquefaction-induced settlement of the existing soils. Therefore, the consultants are requested to revise their analyses considering more accurate in-situ groundwater level and to report the updated values of total and differential seismic settlement.*

RESPONSE: Additional liquefaction analyses were conducted based on the CPT data using the Cliq program and an historic ground water high of 20 feet, an in-situ ground water depth of 25 feet and no depth-weighting factor. Our CPT locations are shown on Enclosure 1, and the results of the liquefaction analyses are presented on Enclosure 2. A summary of the total vertical seismic settlement and differential settlement results are presented in the table below. The differential settlement is one-half of the total vertical settlement.

CPT NUMBER	TOTAL VERTICAL SETTLEMENT (inches)	DIFFERENTIAL SETTLEMENT (inches)
1	2.617	1.309
2	3.442	1.721
3	1.547	0.774
4	1.389	0.695
5	3.141	1.571

Lateral displacement calculations were performed using an historic ground water high of 20 feet, an in-situ ground water depth of 25 feet and no depth-weighting factor. The analyses reveal values ranging from 5.9 inches to 18.6 inches. The lateral displacement values and their locations are shown in the table below:

CPT NUMBER	LATERAL DISPLACEMENT (inches)
1	9.667
2	18.642
3	9.062
4	5.926
5	13.306

The lateral displacements measured in CPT-2 and CPT-5 are greater than 12 inches and are considered above tolerable limits.

COMMENT

- In the submitted ground improvement design package, the specialty contractor reports the consultants performed the seismic settlement analysis with depth weighting. Based on provided copies of the analysis results, it is unknown to CGS whether the depth-*

weighting factor has been applied in their analysis. Therefore, the consultants are requested to clearly indicate if they have applied depth-weighting in their CPT-based analyses of seismic settlement and, if so, to provide comparative results of the estimated liquefaction-induced settlement without applying the depth-weighting factor as these results are critical to informing the recommendations for performing ground improvement at the site.

RESPONSE: In the supplemental geotechnical investigation (Reference (f) of this current report, Report 5 referenced in the CGS review letter), the liquefaction analyses used a depth-weighting factor. In our liquefaction analyses for this response report, the depth-weighting factor was not used. Our latest analyses used an in-situ ground water depth of 25 feet and an historic ground water high of 20 feet. The tables below show a comparison of the liquefaction-induced settlement and lateral spread analyses presented in Reference (f) and our current calculations based on an in-situ ground water depth of 25 feet and no depth-weighting factor.

CPT Number	Vertical Settlement (inches) with weighting factor, in-situ ground water at 20 feet	Vertical Settlement (inches) with no weighting factor, in-situ ground water at 25 feet
1	0.993	2.617
2	1.417	3.442
3	0.602	1.547
4	0.892	1.389
5	1.271	3.141

CPT Number	Lateral Displacement (inches) with weighting factor, in-situ ground water at 20 feet	Lateral Displacement (inches) with no weighting factor, in-situ ground water at 25 feet
1	9.011	9.667
2	17.526	18.642
3	8.919	9.062
4	5.663	5.926
5	12.72	13.306

Comparing the two analyses with different input values, it is apparent there is more seismic-induced vertical settlement and lateral displacement using an in-situ ground water depth of 25 feet and no weighting factor.

Discussion of Ground Improvement Recommendations

COMMENT

...based on our review of Report 5 and as noted above, CGS requests the consultants to revise their analyses of liquefaction and seismic settlement for the unimproved soils using the available CPT data for all areas of the site. The consultants should then reconsider the area(s) of the site for which the recommended ground improvement should be performed and update their recommendations if warranted.

RESPONSE: Based on the results of our updated liquefaction analyses using an in-situ ground water depth of 25 feet and not using a weighting factor, the anticipated liquefaction-induced vertical settlement ranges from 1.389 inches to 3.442 inches. This settlement is generally within tolerable limits; however, the differential settlement based on the CPT data exceeds the allowable differential settlement threshold values required in Table 12.13-3 in ASCE Standard 7-16. The equation used in Table 12.13-3 is $\frac{1}{4}(0.005L)$, where L is the building width.

Differential settlement, if it occurs, will likely transpire across the width and length of the buildings and swimming pool. In general, for this project differential settlement should not exceed 0.3 inch over a minimum horizontal distance of 20 feet. The differential settlement should also adhere to the requirements in Table 12.13-3. However, due to strict differential settlement requirements below the swimming pool, the ground improvement contractor should coordinate with the swimming pool designer, so the ground improvement design accommodates the settlement limitations below the pool.

Since the differential settlement based on the CPT data exceeds the allowable differential settlement threshold values required in Table 12.13-3 in ASCE Standard 7-16, it is recommended that the potential settlement of the soils below the building areas, the bleachers and the swimming pool be minimized by the implementation of a ground improvement method. In addition, the potential for lateral spread as indicated in CPT-2 and CPT-5 should be mitigated by ground improvement. Based on discussions with a representative of Western Ground Improvement, the optimal ground improvement method is the utilization of rammed aggregate piers.

It is the opinion of John R. Byerly, Inc., that rammed aggregate piers are suitable for ground improvement on the project.

The ground improvement method should be designed so both the static and liquefaction-induced total settlements will each be less than or equal to one inch.

Discussion of Ground Improvement Design and Plans

COMMENT

- *The specialty contractor is requested to clearly report the minimum amount of post-installation CPTs that should be performed for each planned improvement area. CGS*

reminds that GEOR should review and approve the locations of post-installation of CPTs.

RESPONSE: John R. Byerly, Inc. has reviewed the locations of the five post-installation CPTs. It is our opinion that the locations are suitable for the proposed development.

COMMENT

CGS advises and requests the geotechnical consultants and the specialty contractor to collaborate in addressing our concerns noted above and to provide a revised submittal with clear and complete geotechnical recommendations and consistent design of the planned ground improvement system for the project. In addition, CGS requests the consultants to review the specialty contractor's revised ground improvement package and provide the formal documentation of their additional review to CGS and DSA. They should include clear and complete statements regarding their opinion and recommendations for provision of ground improvement beneath each of the proposed new structures and full supporting analysis and justification for any recommendations to not provide ground improvement for any of the proposed structures.

RESPONSE: To assist in the preparation of this response, the project architect, specialty contractor, structural engineer and geotechnical engineer have discussed the project requirements. Based on our recent analyses, it is the opinion of John R. Byerly, Inc. that ground improvement is required below the buildings, swimming pool, bleachers and splash pad.

The specialty contractor's revised ground improvement package was reviewed by representatives of John R. Byerly, Inc. on December 18, 2025. The ground improvement package shows proposed ground improvement locations below and adjacent to all proposed buildings, swimming pool, bleachers and splash pad. It is our opinion that the ground improvement package meets the conditions of the project requirements.

The ground improvement package will be provided to CGS and DSA for review.

Discussion of Swimming Pool Design

COMMENT

The consultants recommend the soils within 3 feet vertically below the bottom of the pool, 2 feet vertically below the bottom of the foundation elements supporting surge tank, and within 7 feet horizontally of the sides of the surge tank and swimming pool walls should be removed and replaced with engineered fill that has a very low expansion potential. These appear to be reasonable recommendations. The consultants provide reasonable active and at-rest lateral earth pressure for both drained and undrained (with hydrostatic pressure) conditions behind the walls. CGS notes that if the pool walls are to be designed per Item 1 of Section 1803A.5.12 and Section 1807A.2.2 of CBC due to the walls supporting more than 6 feet of backfill height, the consultants should provide calculations to support a reasonable value of seismic increment of lateral earth pressure to be applied in design.

RESPONSE: The swimming pool walls will have a minimum height of 6 feet. The dynamic component of lateral earth pressure on cantilever retaining walls and swimming pool walls should be computed according to the following equation:

$$P_{AE} = 7.4 H^2$$

The dynamic component of lateral earth pressure on retaining walls and swimming pool walls that are fixed at the top should be computed according to the following equation:

$$P_{OE} = 11.1 H^2$$

where:

H = wall height (ft.)


P_{AE} and P_{OE} = resultant force in pounds per linear foot of wall length

The resultant dynamic component acts at 0.33H above the bottom of the retaining wall and should be added to the resultant from the active earth pressure.

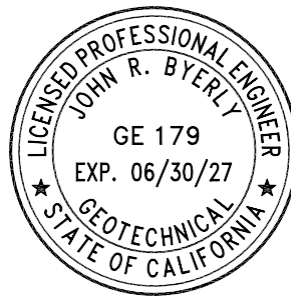
We appreciate this opportunity to be of service. Should there be questions, please feel free to contact this office.

Respectfully submitted,

JOHN R. BYERLY, INC.



John R. Byerly, Geotechnical Engineer
President



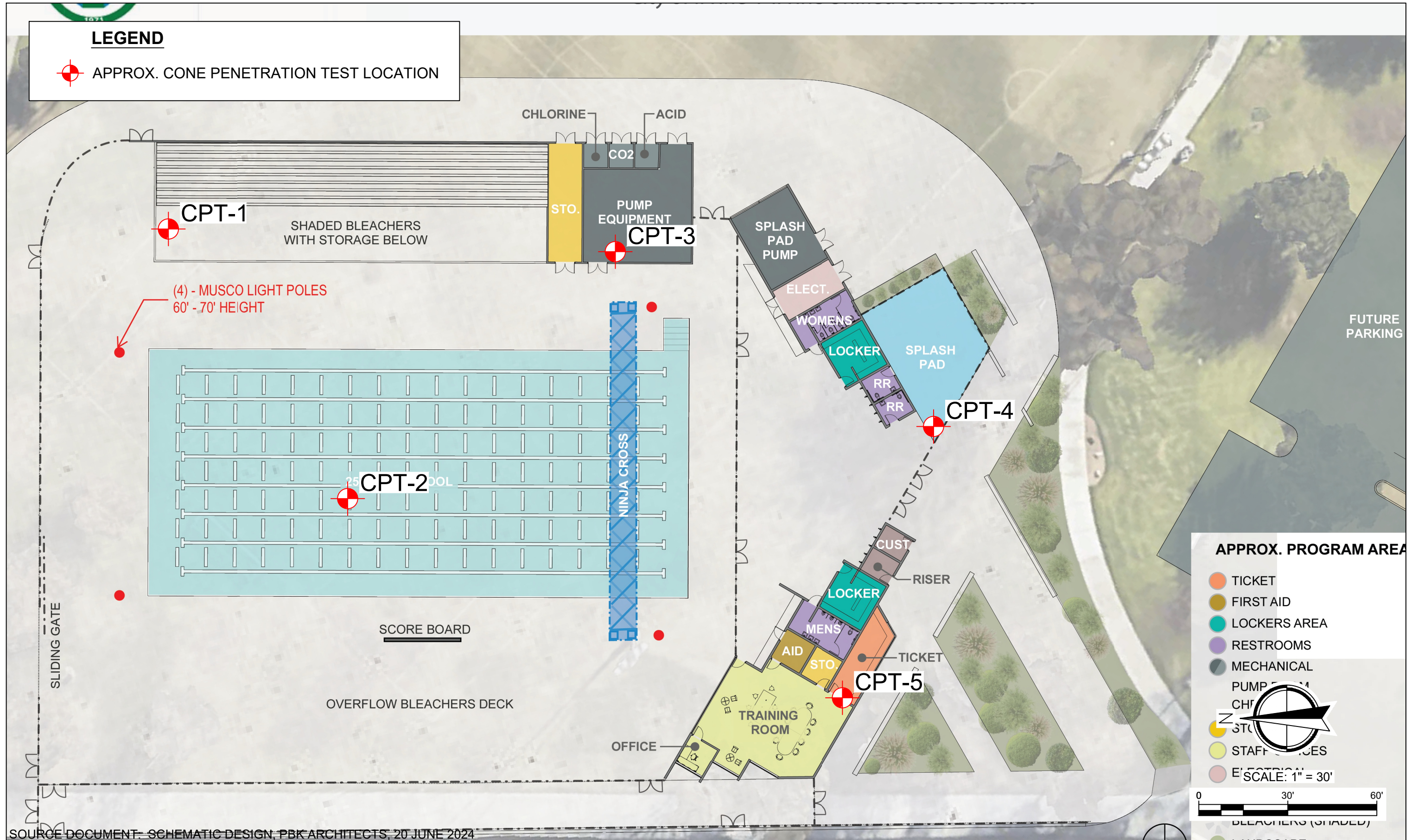
JRB:GSF:st

cc: (1) Client

Enclosures: 1) Plot Plan
 2) Liquefaction Analyses
 3) Third Engineering Geology and Seismology Review

LEGEND

 APPROX. CONE PENETRATION TEST LOCATION



SOURCE DOCUMENT: SCHEMATIC DESIGN, PBK ARCHITECTS, 20 JUNE 2024



LIQUEFACTION ANALYSIS REPORT

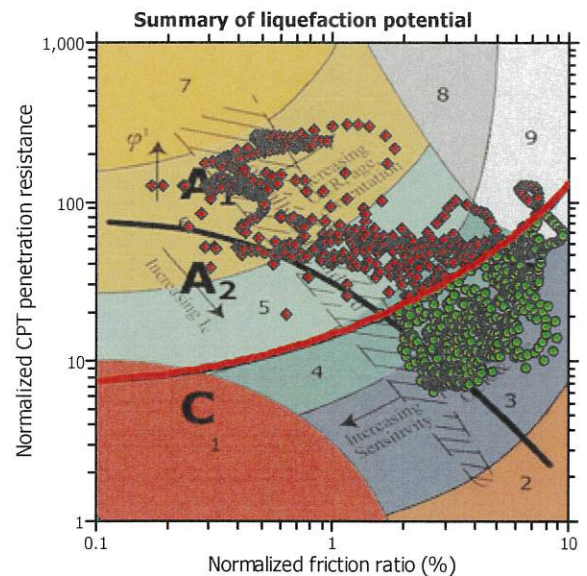
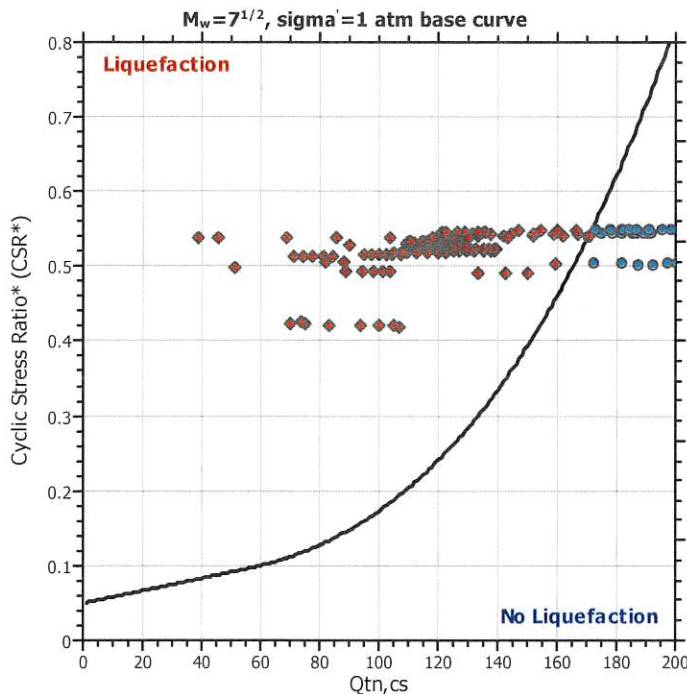
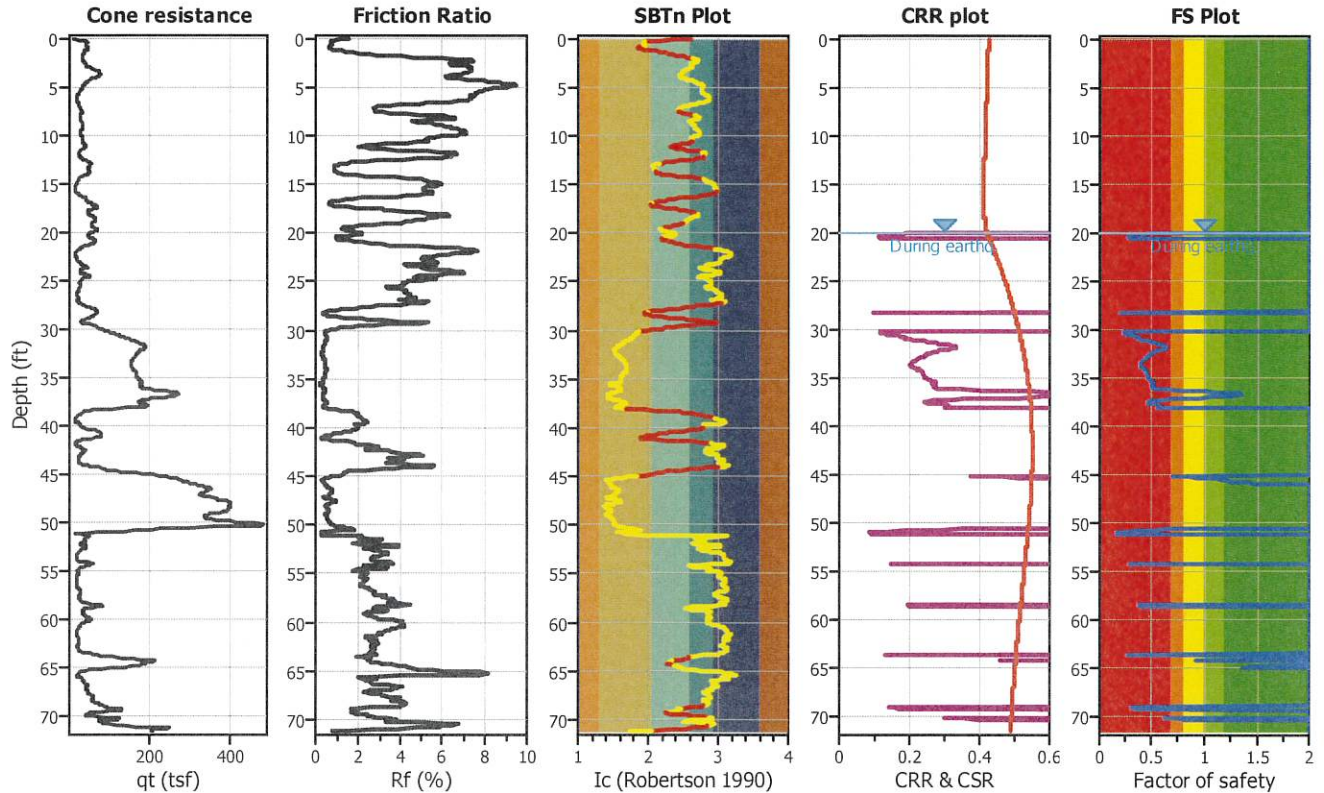
Project title :

Location :

CPT file : CPT-1

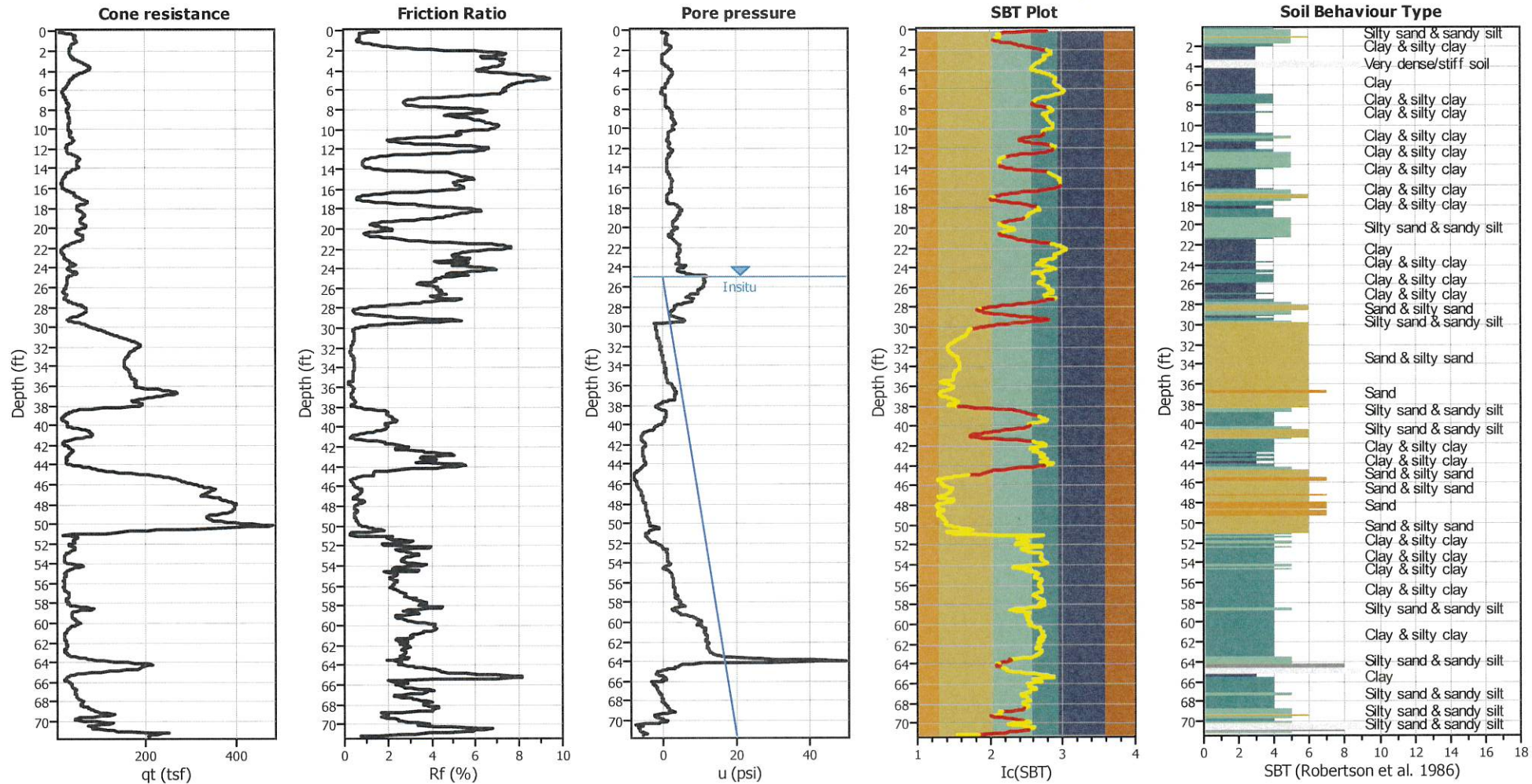
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Fines correction method:	NCEER (1998)	G.W.T. (earthq.):	20.00 ft	Fill height:	N/A	applied:	Sands only
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Earthquake magnitude M_w :	7.80	Ic cut-off value:	2.60	Trans. detect. applied:	Yes	Limit depth:	N/A
Peak ground acceleration:	0.59	Unit weight calculation:	Based on SBT	K_0 applied:	Yes	MSF method:	Method based



Zone A₁: Cyclic liquefaction likely depending on size and duration of cyclic loading
Zone A₂: Cyclic liquefaction and strength loss likely depending on loading and ground geometry
Zone B: Liquefaction and post-earthquake strength loss unlikely, check cyclic softening
Zone C: Cyclic liquefaction and strength loss possible depending on soil plasticity, brittleness/sensitivity, strain to peak undrained strength and ground geometry

CPT basic interpretation plots



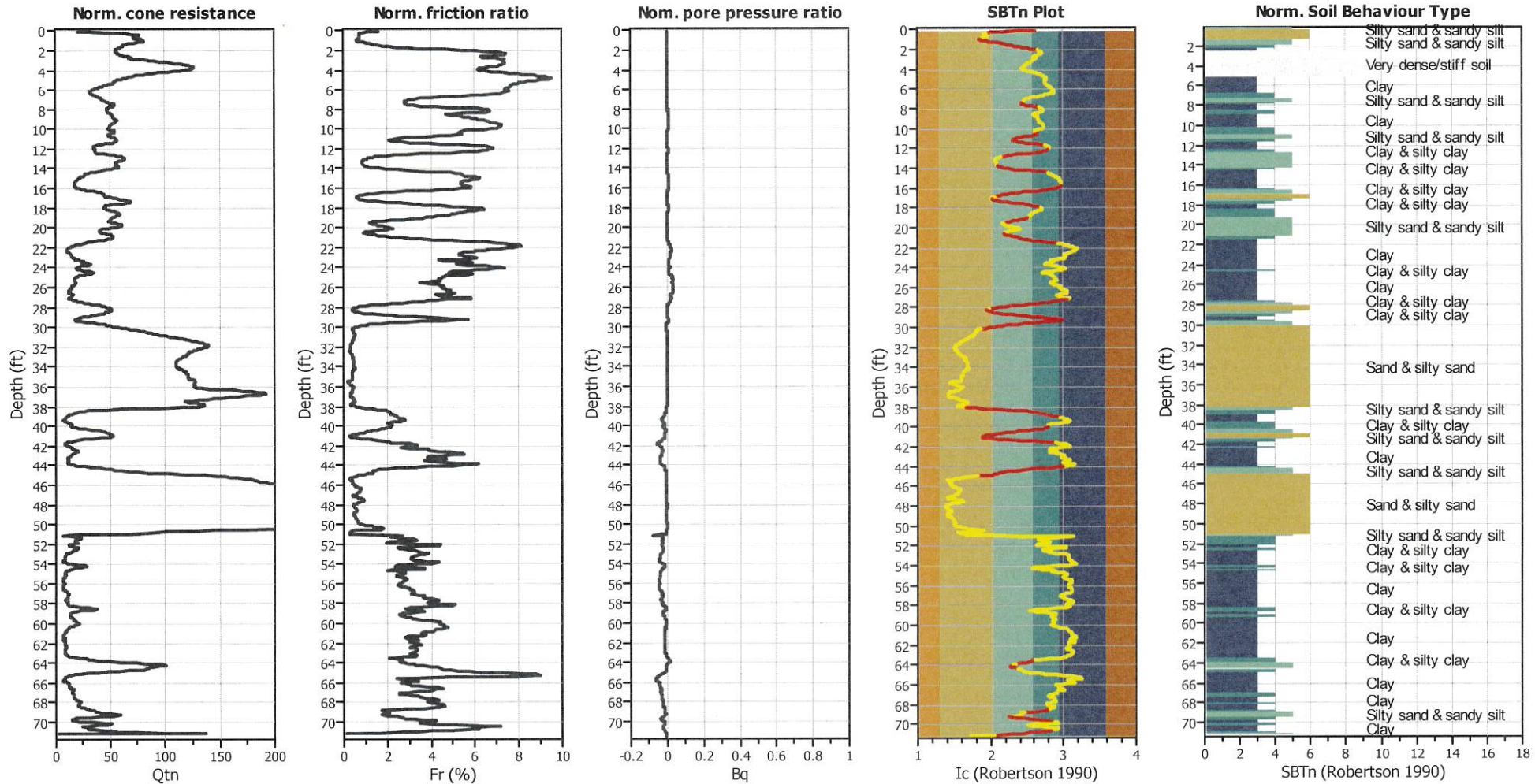
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Fines correction method:	NCEER (1998)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K ₀ applied:	Yes
Earthquake magnitude M _w :	7.80	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.59	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	25.00 ft	Fill height:	N/A	Limit depth:	N/A

SBT legend

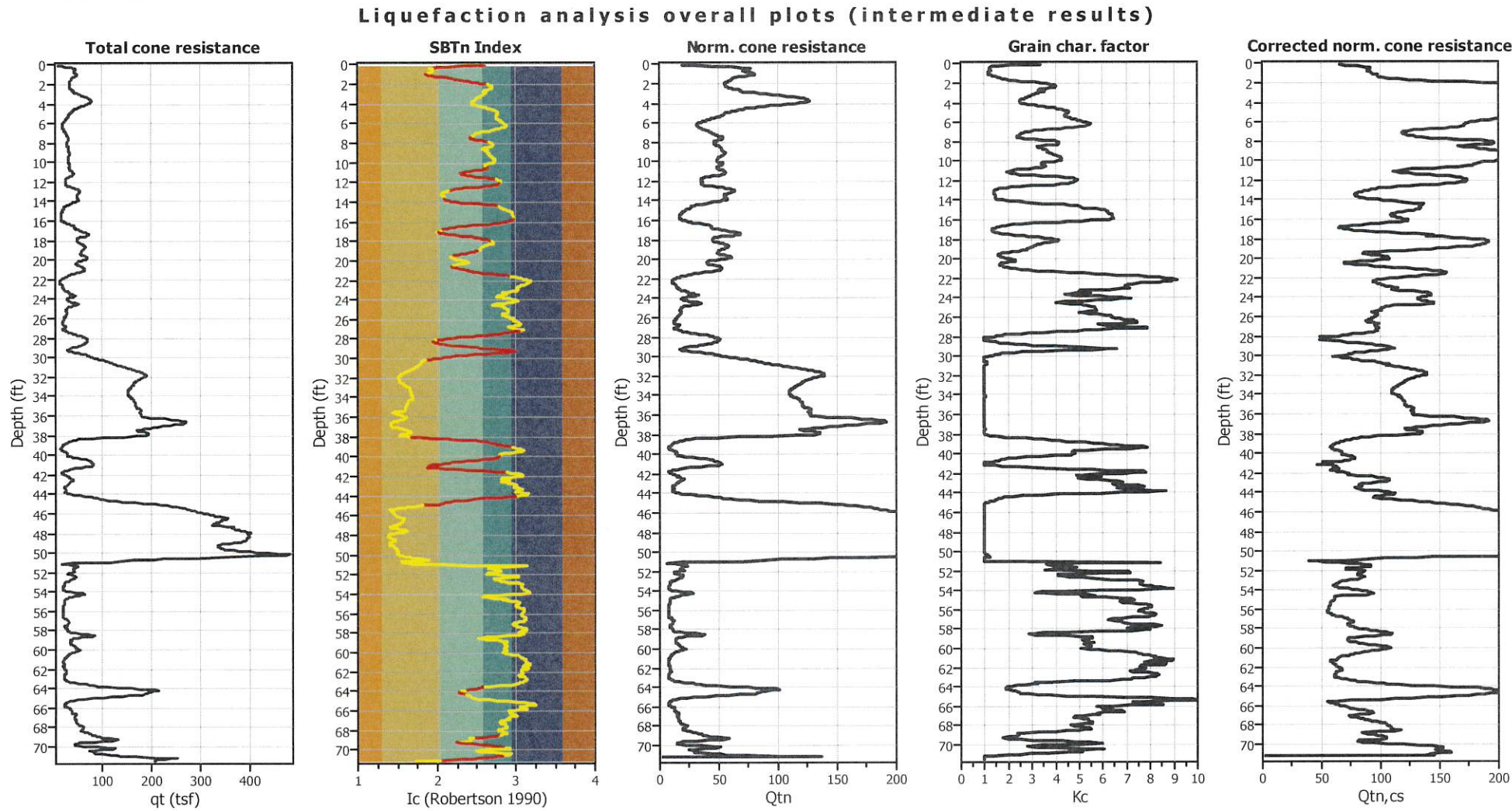
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2. Organic material	5. Silty sand to sandy silt	8. Very stiff sand to
3. Clay to silty clay	6. Clean sand to silty sand	9. Very stiff fine grained

CPT basic interpretation plots (normalized)



Input parameters and analysis data

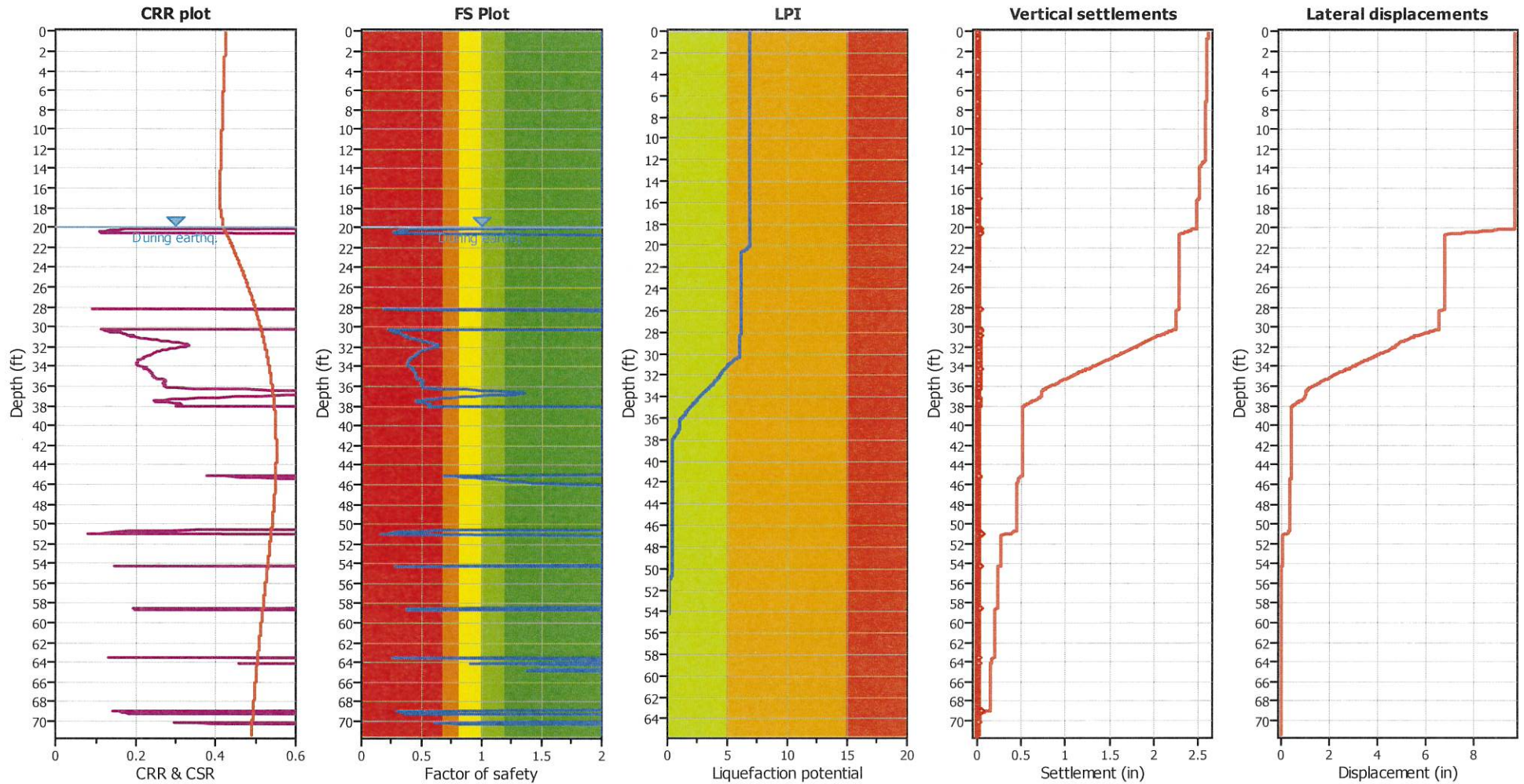
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Points to test:	Based on Ic value	Ic cut-off value:	2.60	K _a applied:	Yes
Earthquake magnitude M _w :	7.80	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.59	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	25.00 ft	Fill height:	N/A	Limit depth:	N/A



Input parameters and analysis data

Analysis method:	NCEER (1998)	Depth to water table (earthq.):	20.00 ft	Fill weight:	N/A
Fines correction method:	NCEER (1998)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on I_c value	I_c cut-off value:	2.60	K_{α} applied:	Yes
Earthquake magnitude M_w :	7.80	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.59	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	25.00 ft	Fill height:	N/A	Limit depth:	N/A

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	NCEER (1998)	Depth to water table (earthq.):	20.00 ft	Fill weight:	N/A
Fines correction method:	NCEER (1998)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K _o applied:	Yes
Earthquake magnitude M _w :	7.80	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.59	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	25.00 ft	Fill height:	N/A	Limit depth:	N/A

F.S. color scheme

Red	Almost certain it will liquefy
Orange	Very likely to liquefy
Yellow	Liquefaction and no liq. are equally likely
Green	Unlike to liquefy
Dark Green	Almost certain it will not liquefy

LPI color scheme

Red	Very high risk
Orange	High risk
Yellow	Low risk

LIQUEFACTION ANALYSIS REPORT

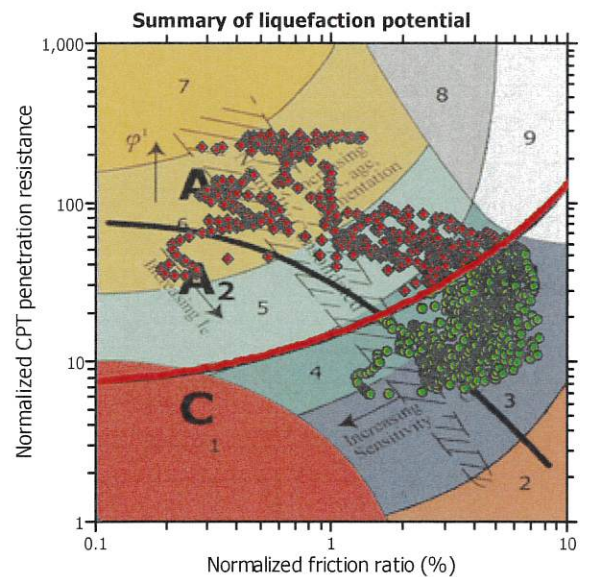
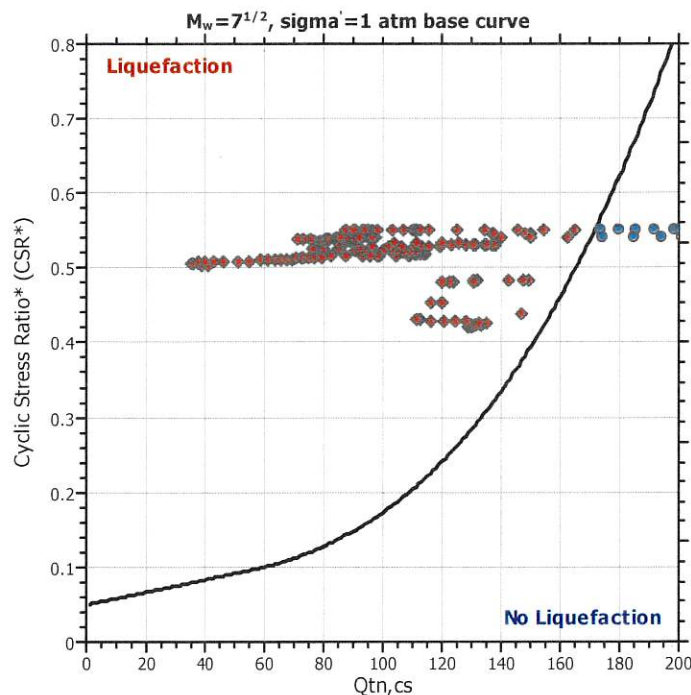
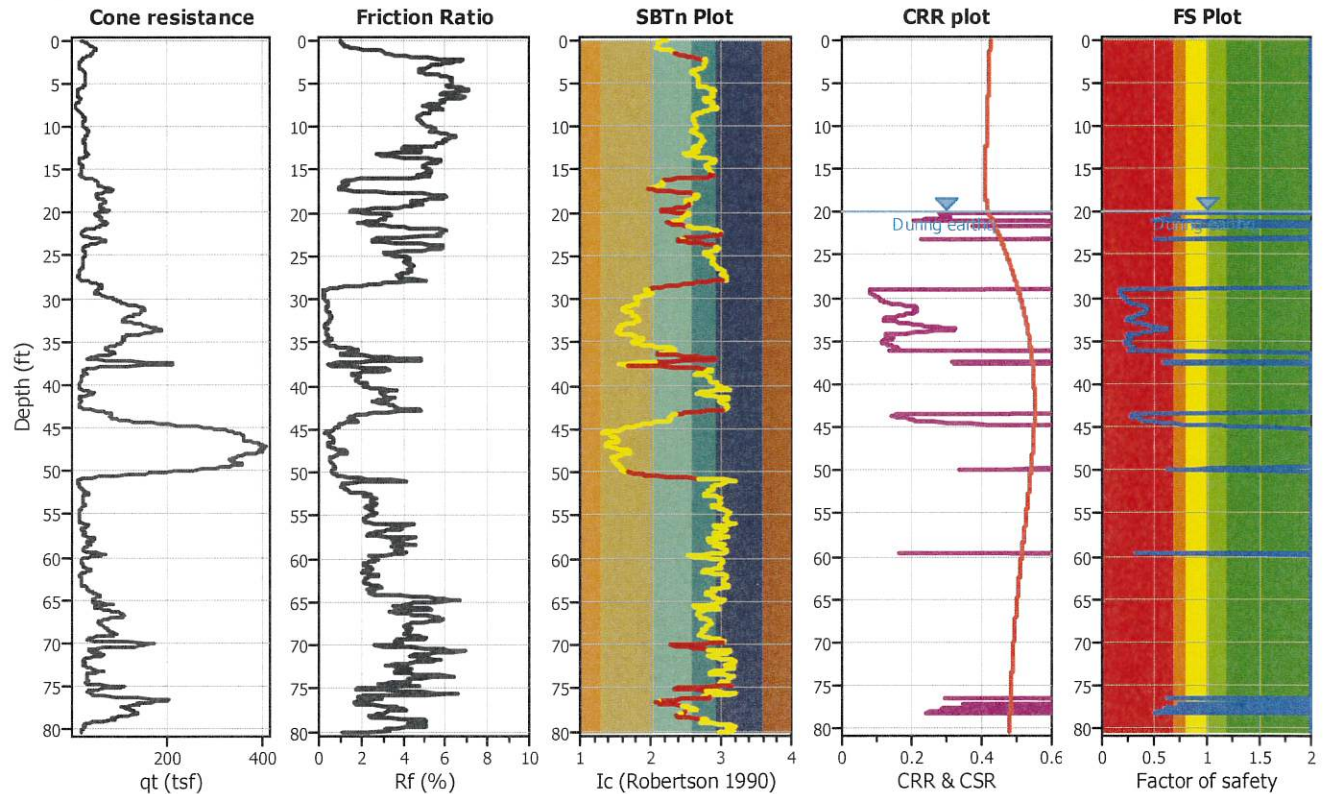
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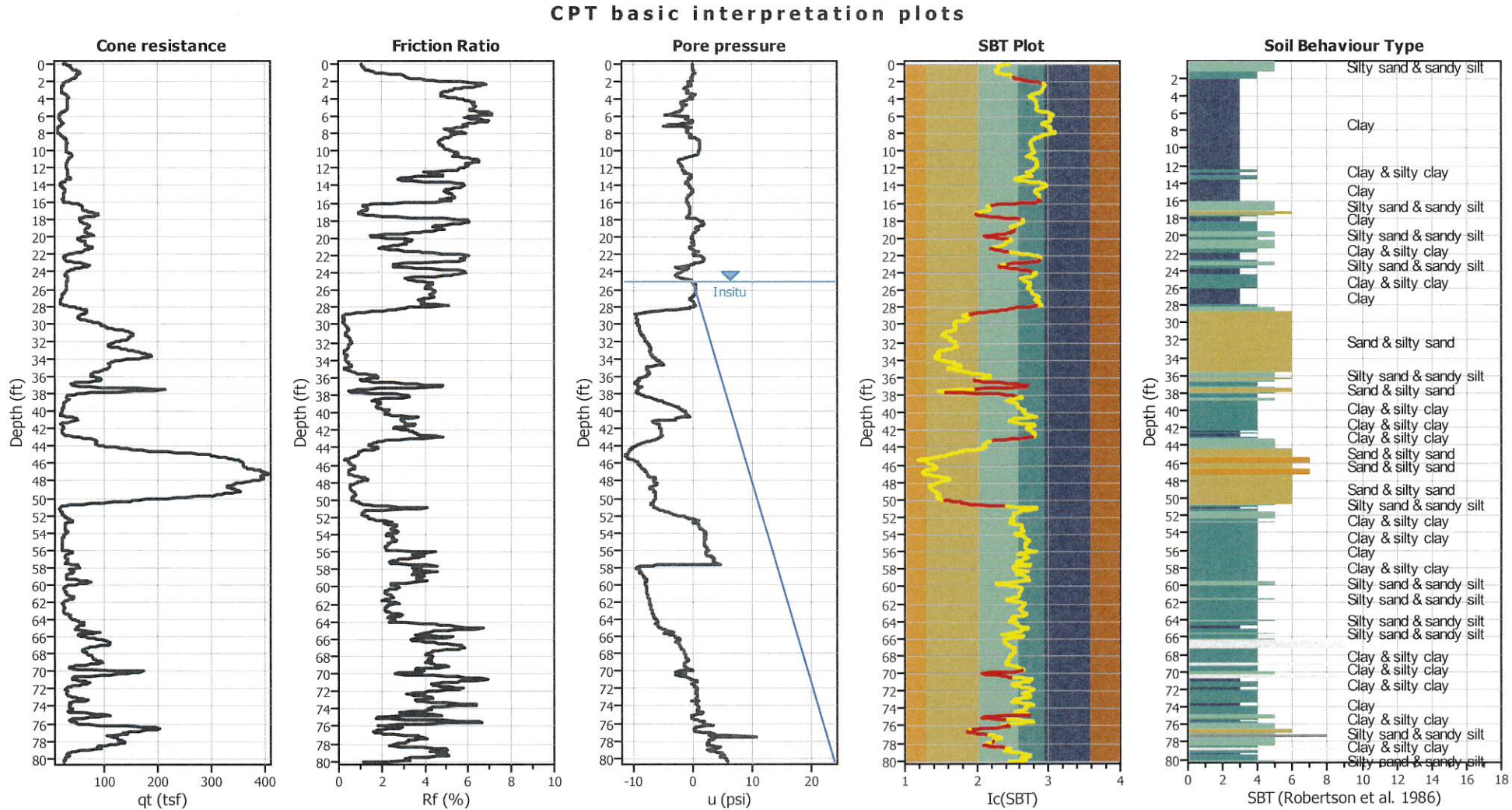
CPT file : CPT-2

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Earthquake magnitude M_w :	7.80	Ic cut-off value:	2.60	Trans. detect. applied:	Yes	Limit depth:	N/A
Peak ground acceleration:	0.59	Unit weight calculation:	Based on SBT	K_0 applied:	Yes	MSF method:	Method based



Zone A: Cyclic liquefaction likely depending on size and duration of cyclic loading
 Zone A₂: Cyclic liquefaction and strength loss likely depending on loading and ground geometry
 Zone B: Liquefaction and post-earthquake strength loss unlikely, check cyclic softening
 Zone C: Cyclic liquefaction and strength loss possible depending on soil plasticity, brittleness/sensitivity, strain to peak undrained strength and ground geometry

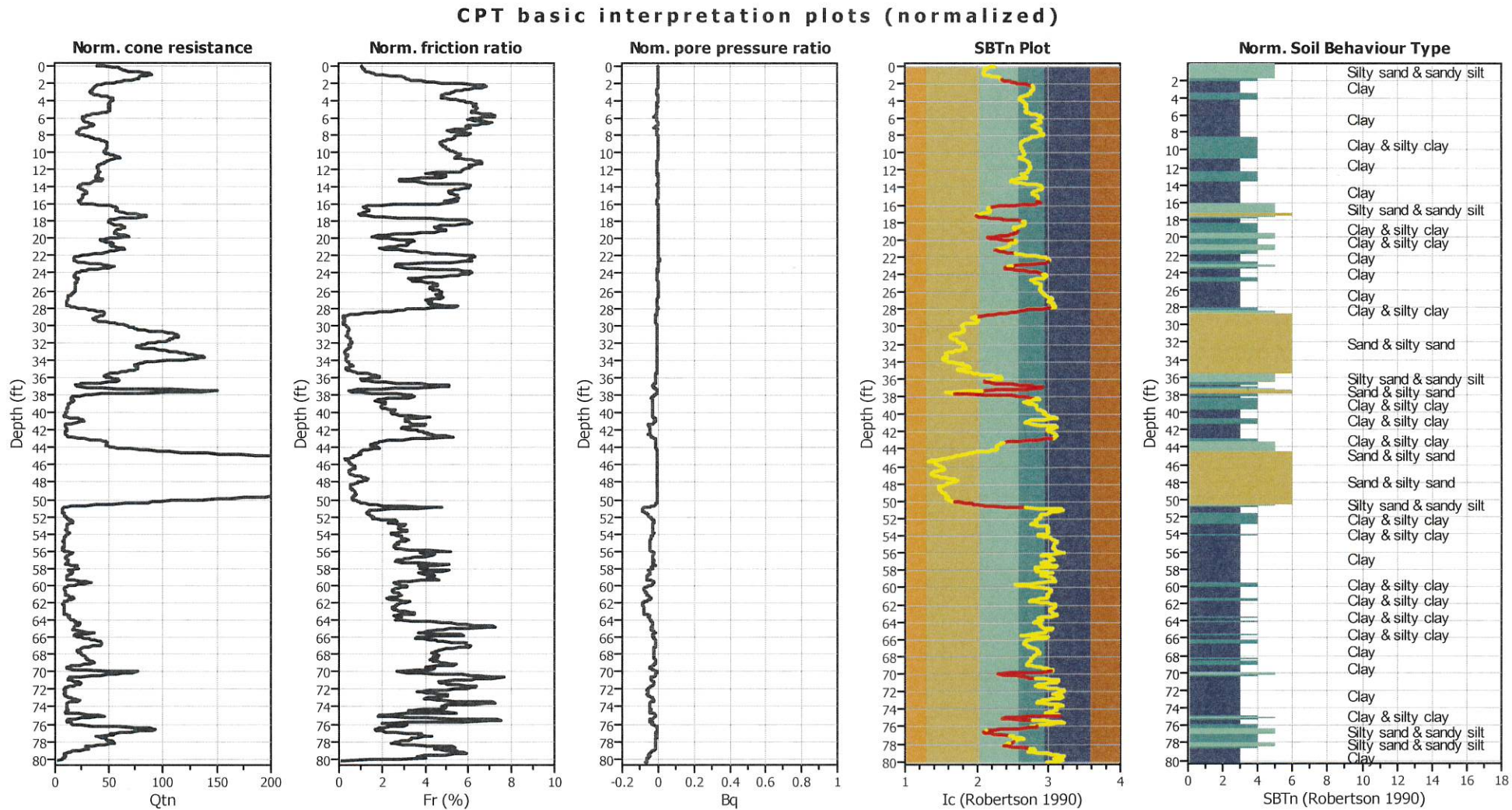


Input parameters and analysis data

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Earthquake magnitude M _w :	7.80	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.59	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	25.00 ft	Fill height:	N/A	Limit depth:	N/A

SBT legend

1. Sensitive fine grained	4. Clayey silt to silty	7. Gravely sand to sand
2. Organic material	5. Silty sand to sandy silt	8. Very stiff sand to
3. Clay to silty clay	6. Clean sand to silty sand	9. Very stiff fine grained



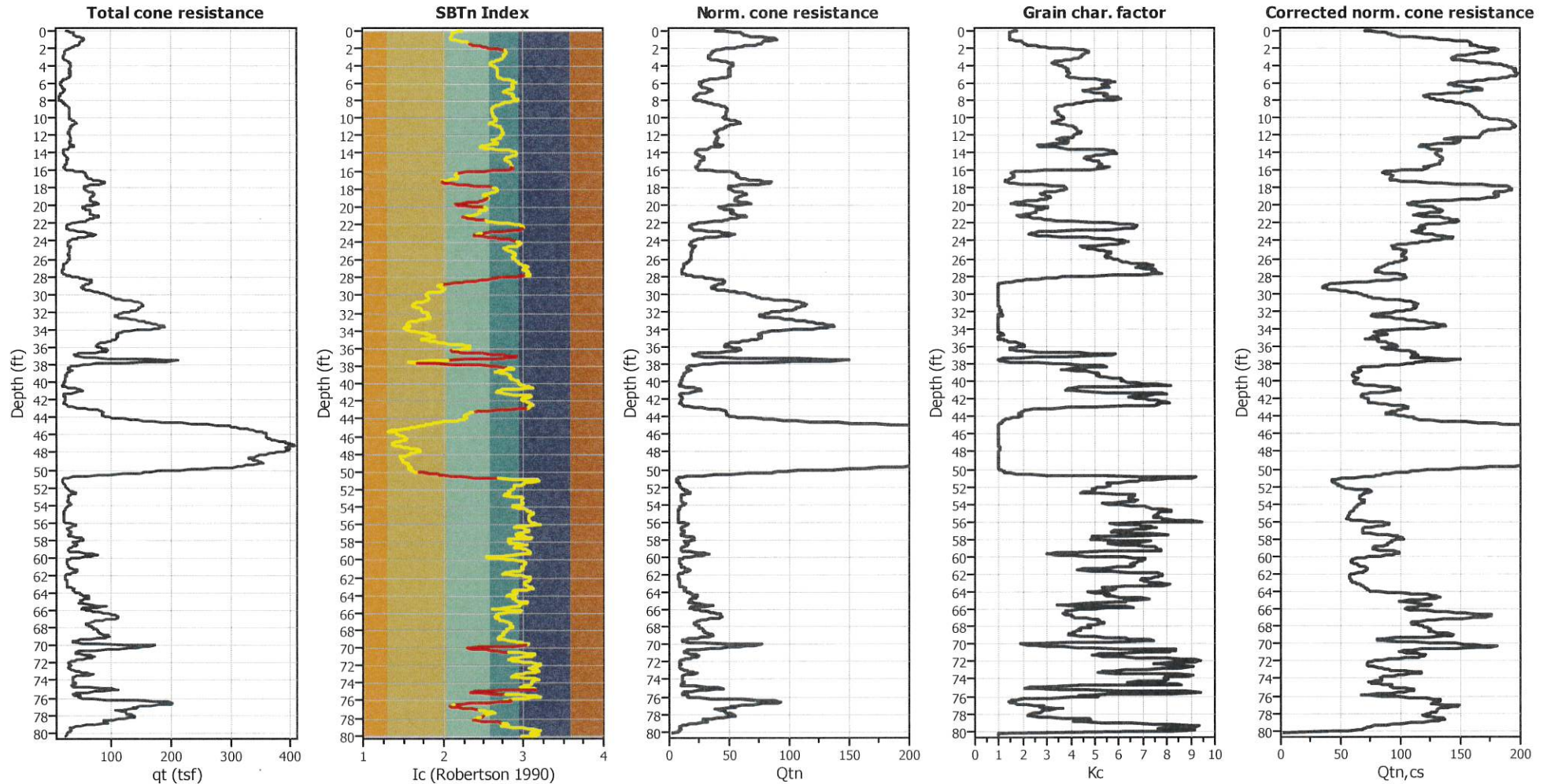
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Fines correction method:	NCEER (1998)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K ₀ applied:	Yes
Earthquake magnitude M _w :	7.80	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.59	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	25.00 ft	Fill height:	N/A	Limit depth:	N/A

SBTn legend

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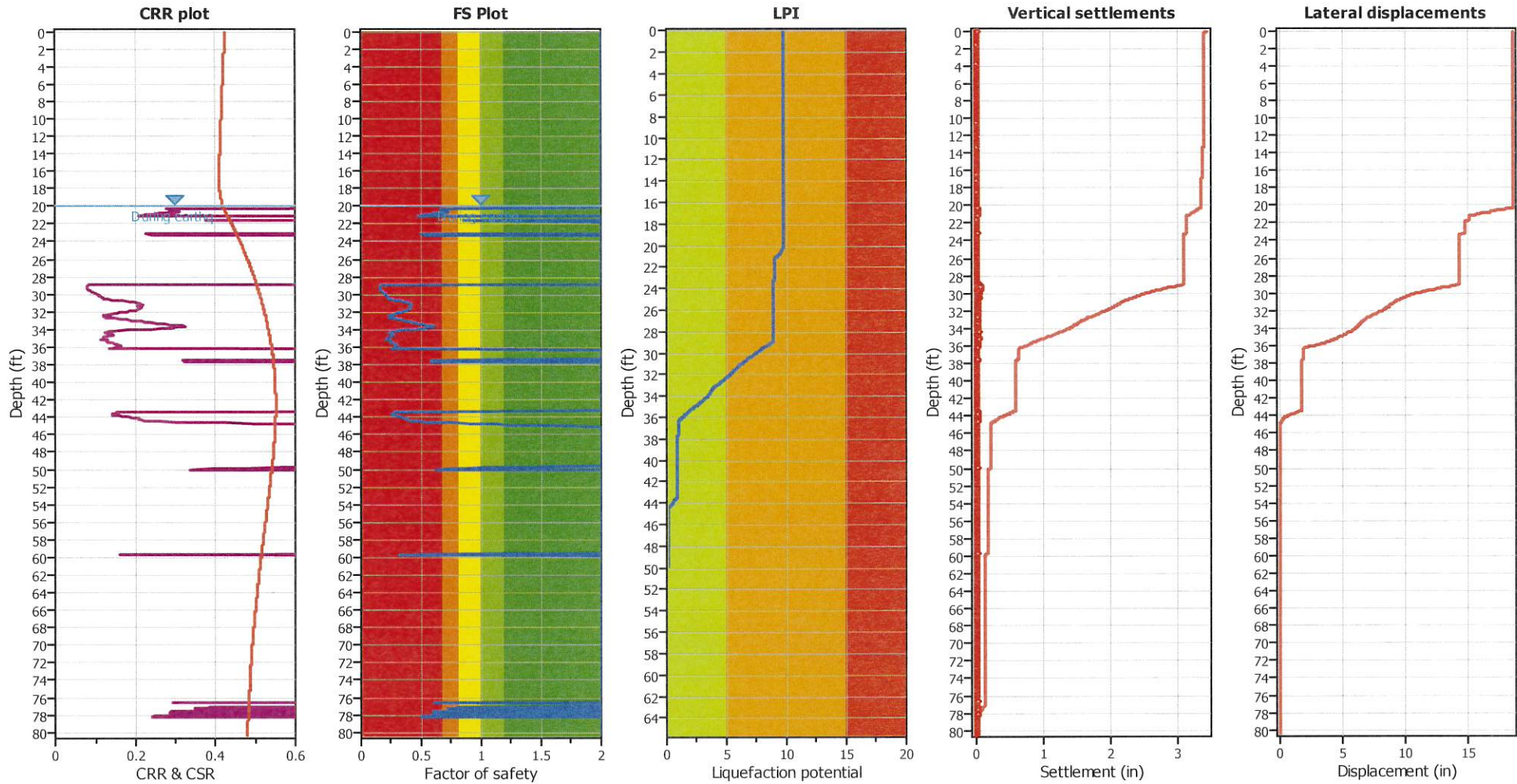
Liquefaction analysis overall plots (intermediate results)



Input parameters and analysis data

Analysis method:	NCEER (1998)	Depth to water table (erthq.):	20.00 ft	Fill weight:	N/A
Fines correction method:	NCEER (1998)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K _o applied:	Yes
Earthquake magnitude M _w :	7.80	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.59	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	25.00 ft	Fill height:	N/A	Limit depth:	N/A

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	NCEER (1998)	Depth to water table (erthq.):	20.00 ft	Fill weight:	N/A
Fines correction method:	NCEER (1998)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K _o applied:	Yes
Earthquake magnitude M _w :	7.80	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.59	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	25.00 ft	Fill height:	N/A	Limit depth:	N/A

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LIQUEFACTION ANALYSIS REPORT

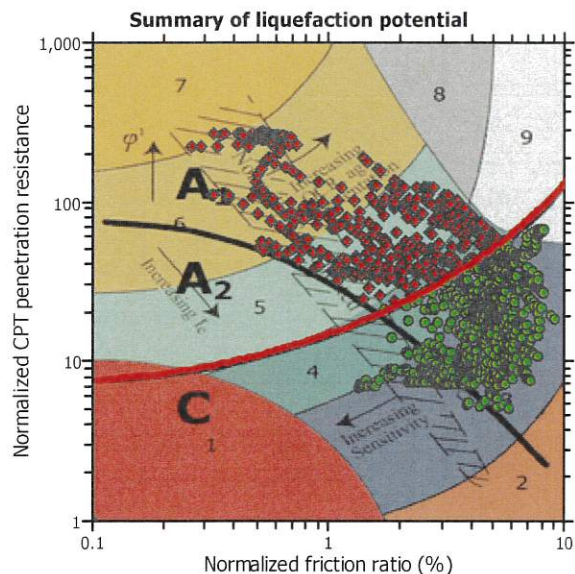
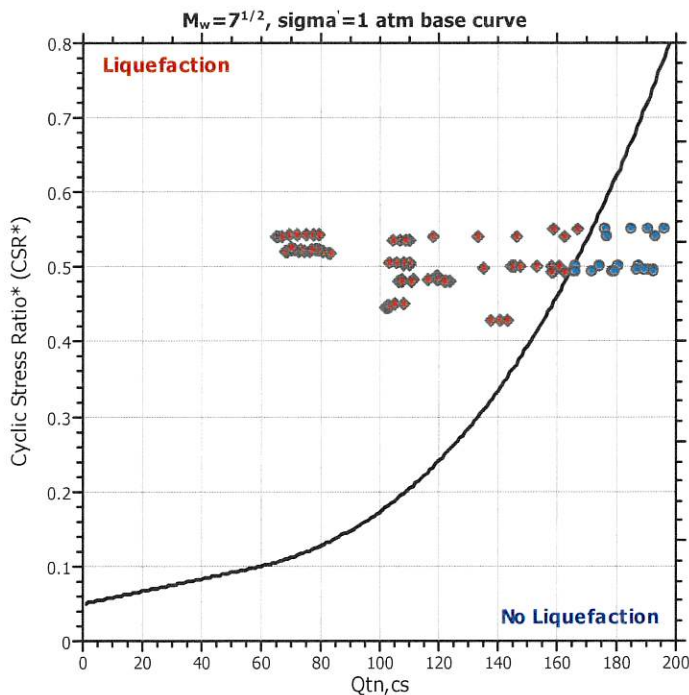
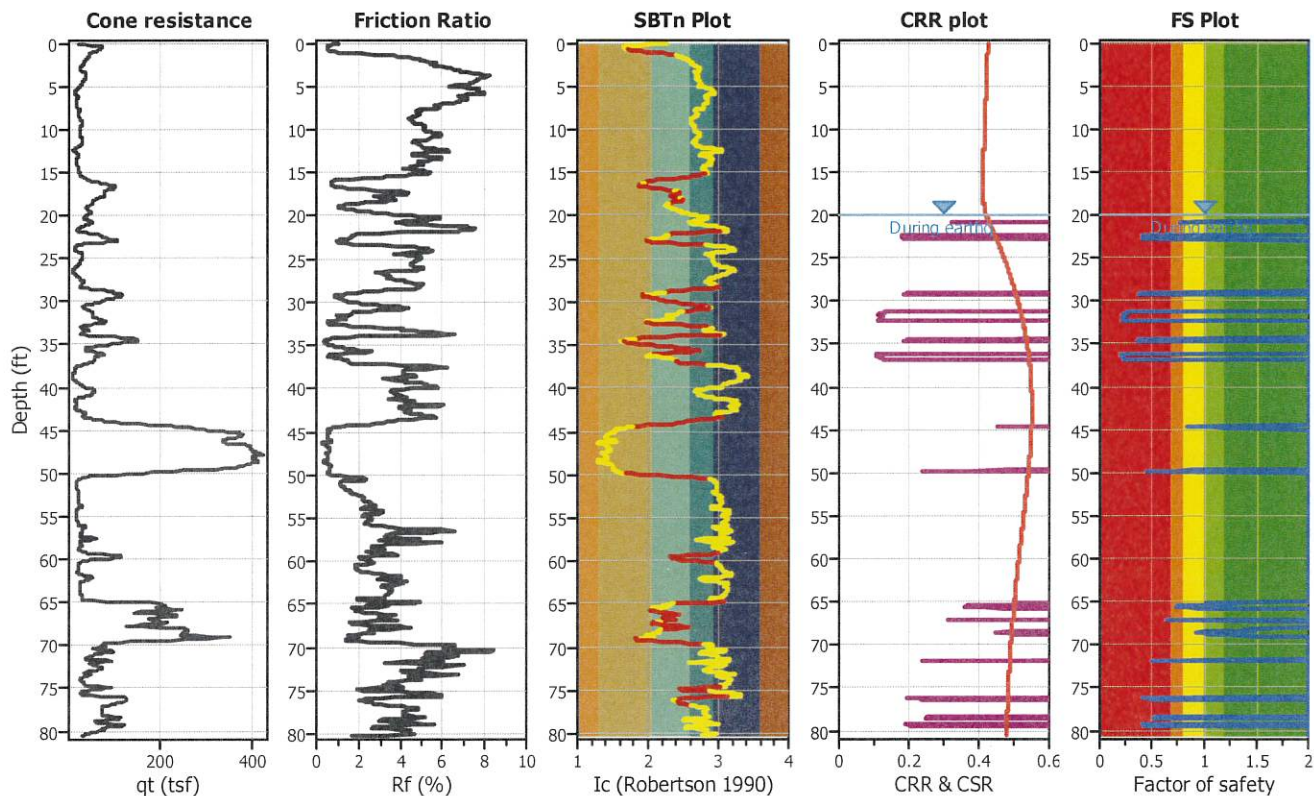
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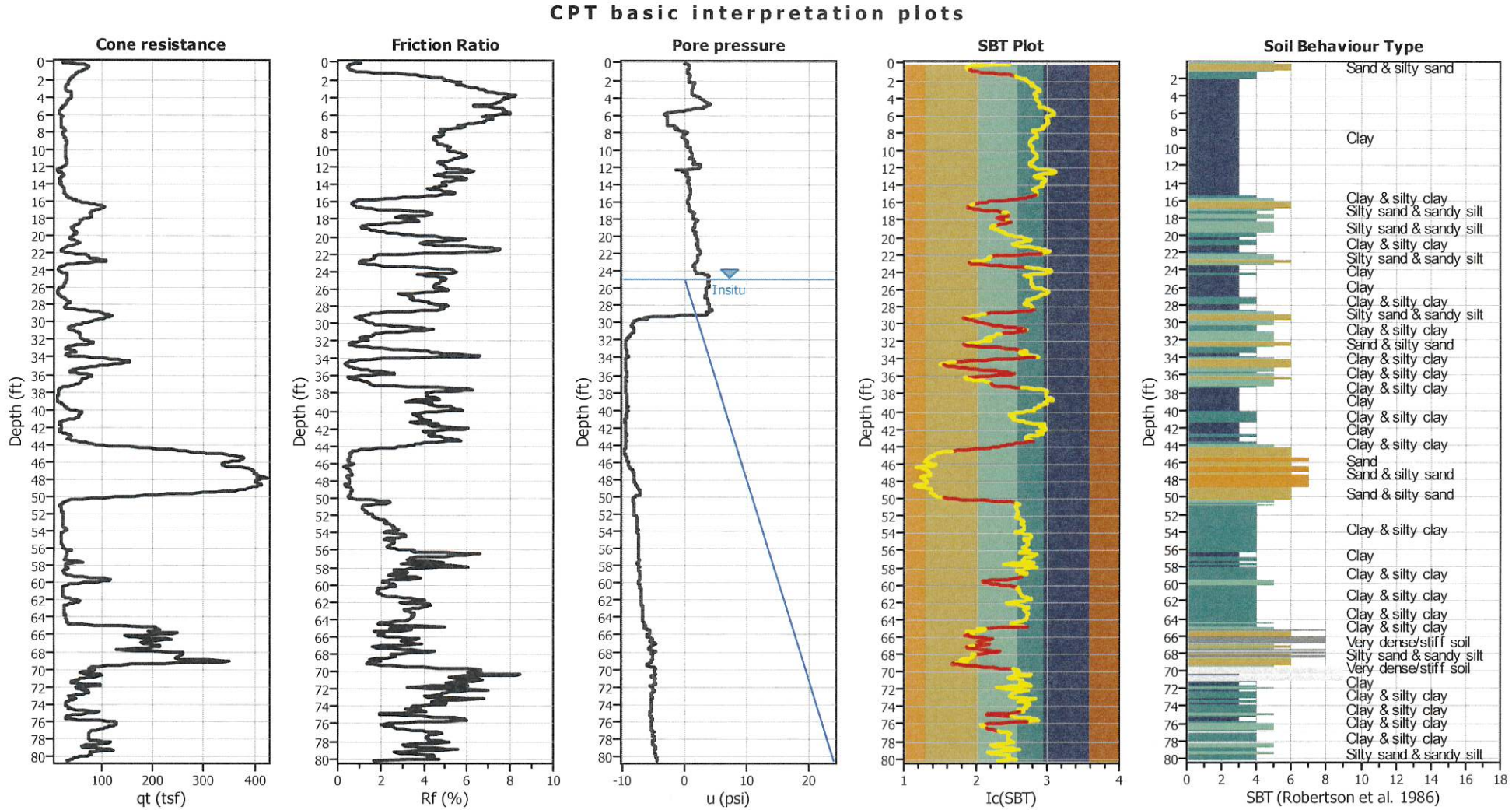
CPT file : CPT-3

Input parameters and analysis data

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Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth applied:	No
Earthquake magnitude M_w :	7.80	Ic cut-off value:	2.60	Trans. detect. applied:	Yes	Limit depth:	N/A
Peak ground acceleration:	0.59	Unit weight calculation:	Based on SBT	K_0 applied:	Yes	MSF method:	Method based



Zone A₁: Cyclic liquefaction likely depending on size and duration of cyclic loading
 Zone A₂: Cyclic liquefaction and strength loss likely depending on loading and ground geometry
 Zone B: Liquefaction and post-earthquake strength loss unlikely, check cyclic softening
 Zone C: Cyclic liquefaction and strength loss possible depending on soil plasticity, brittleness/sensitivity, strain to peak undrained strength and ground geometry

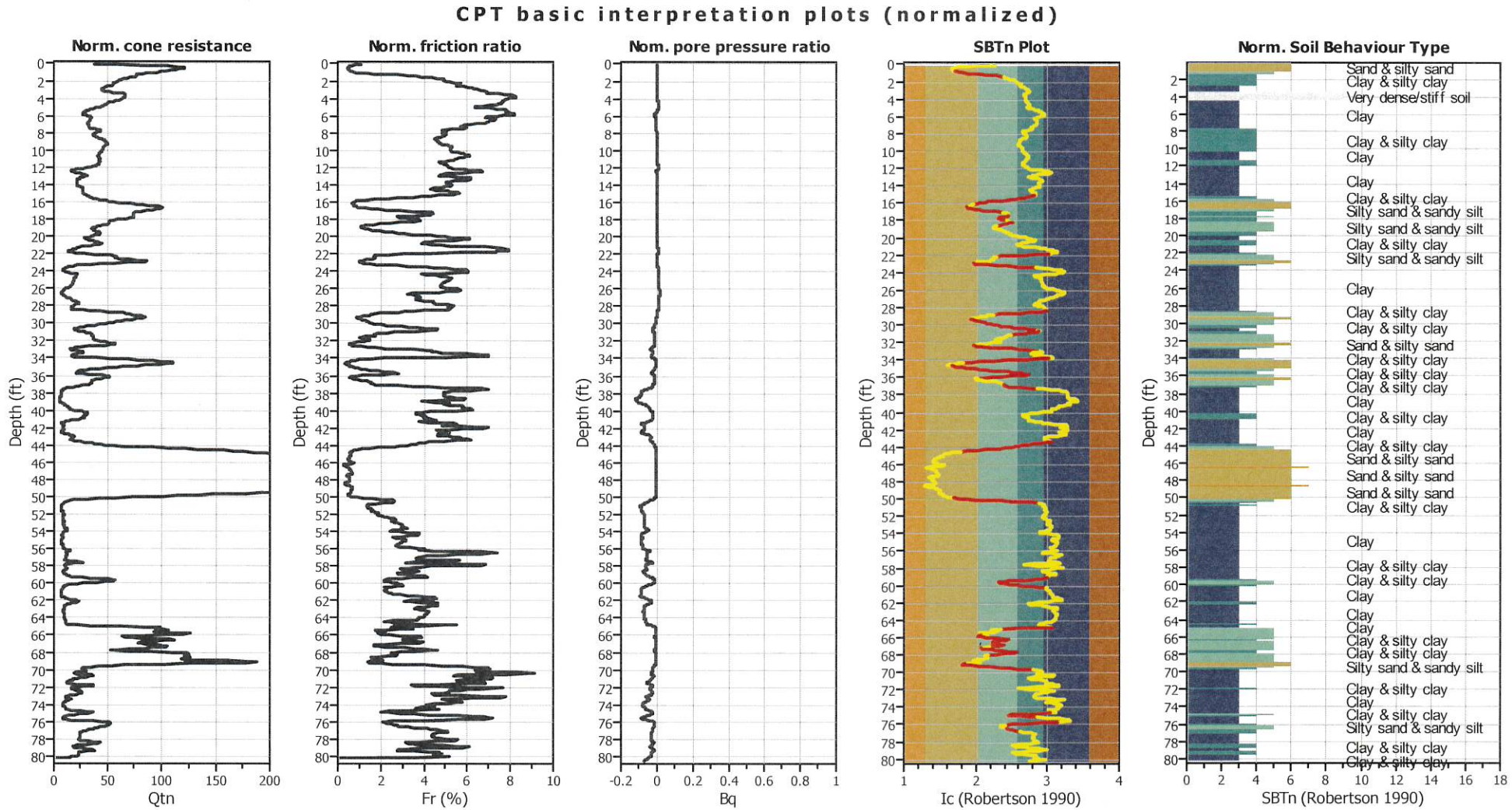


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Points to test:	Based on Ic value	Ic cut-off value:	2.60	K ₀ applied:	Yes
Earthquake magnitude M _w :	7.80	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.59	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	25.00 ft	Fill height:	N/A	Limit depth:	N/A

SBT legend

1. Sensitive fine grained	4. Clayey silt to silty	7. Gravely sand to sand
2. Organic material	5. Silty sand to sandy silt	8. Very stiff sand to
3. Clay to silty clay	6. Clean sand to silty sand	9. Very stiff fine grained



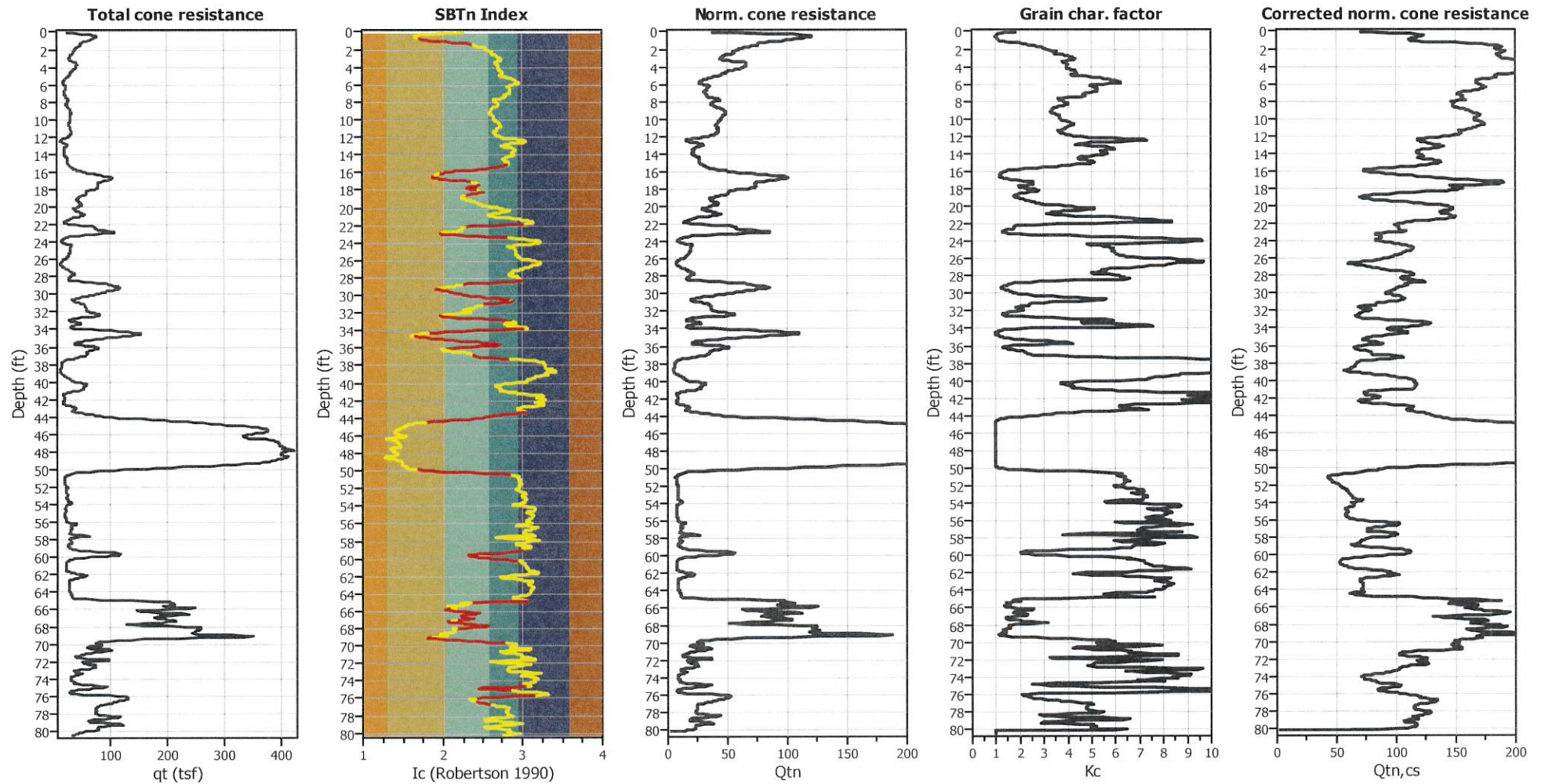
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Fines correction method:	NCEER (1998)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K ₀ applied:	Yes
Earthquake magnitude M _w :	7.80	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.59	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	25.00 ft	Fill height:	N/A	Limit depth:	N/A

SBTn legend

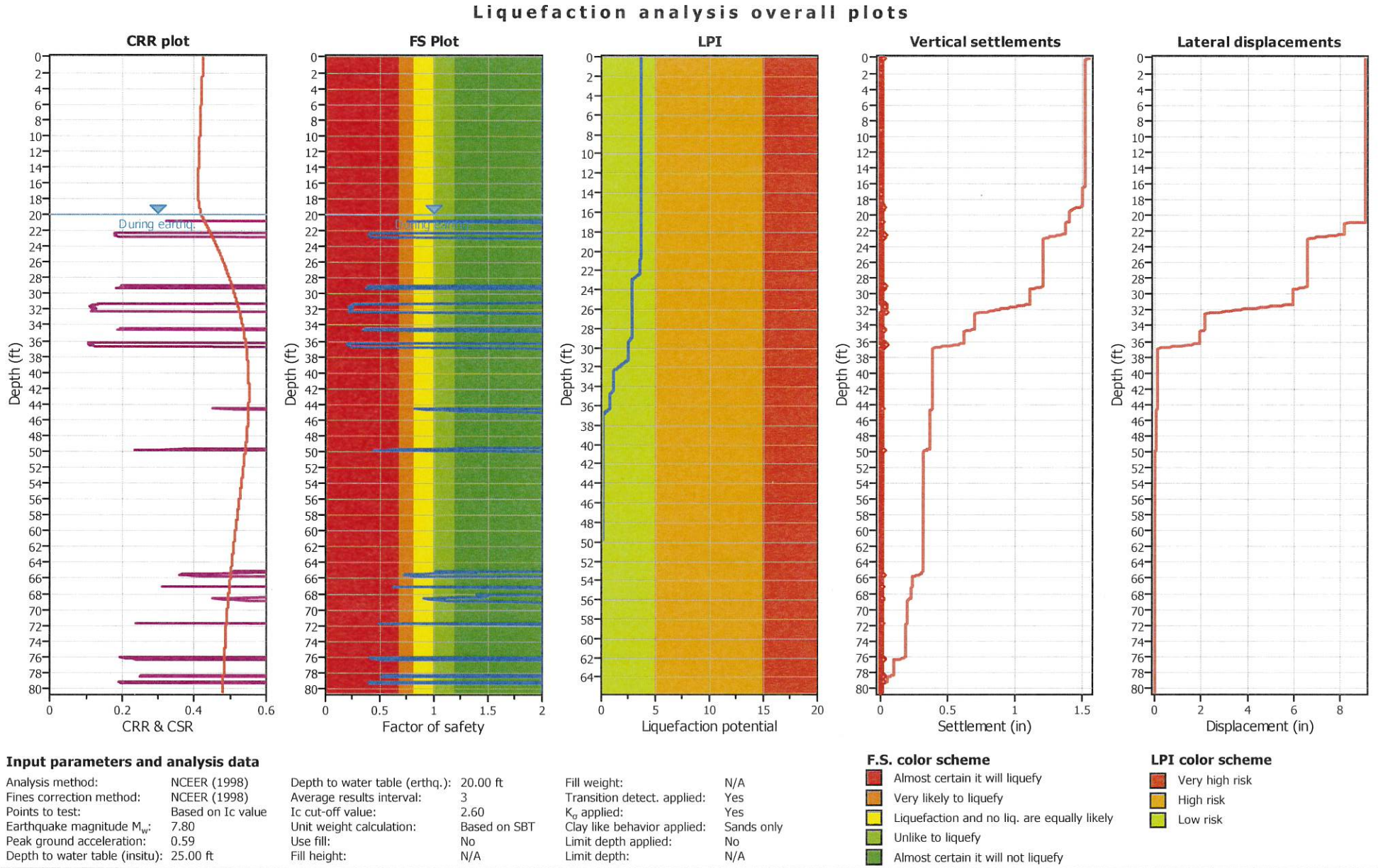
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2. Organic material	5. Silty sand to sandy silt	8. Very stiff sand to
3. Clay to silty clay	6. Clean sand to silty sand	9. Very stiff fine grained

Liquefaction analysis overall plots (intermediate results)



Input parameters and analysis data

Analysis method:	NCEER (1998)	Depth to water table (erthq.):	20.00 ft	Fill weight:	N/A
Fines correction method:	NCEER (1998)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on I_c value	I_c cut-off value:	2.60	K_{α} applied:	Yes
Earthquake magnitude M_w :	7.80	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.59	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	25.00 ft	Fill height:	N/A	Limit depth:	N/A



LIQUEFACTION ANALYSIS REPORT

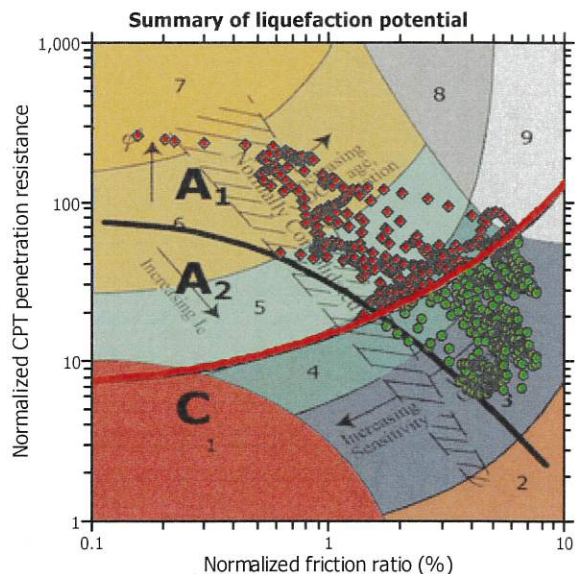
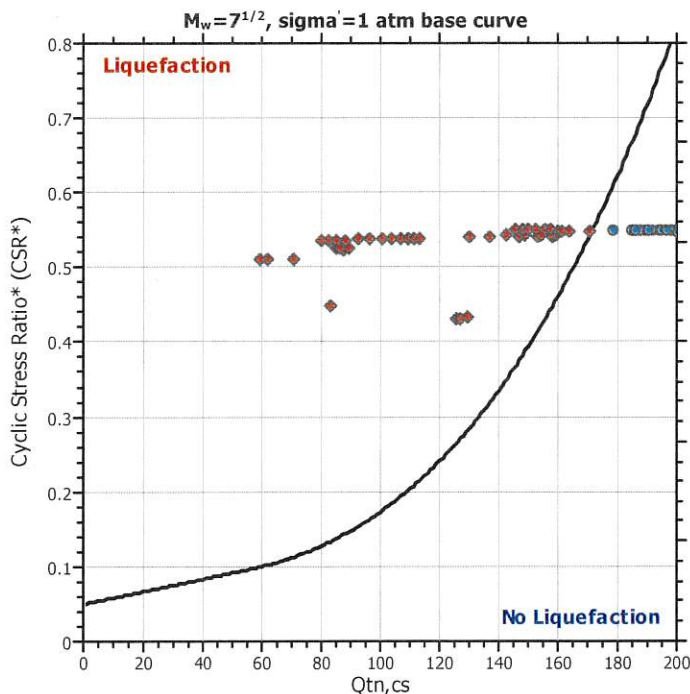
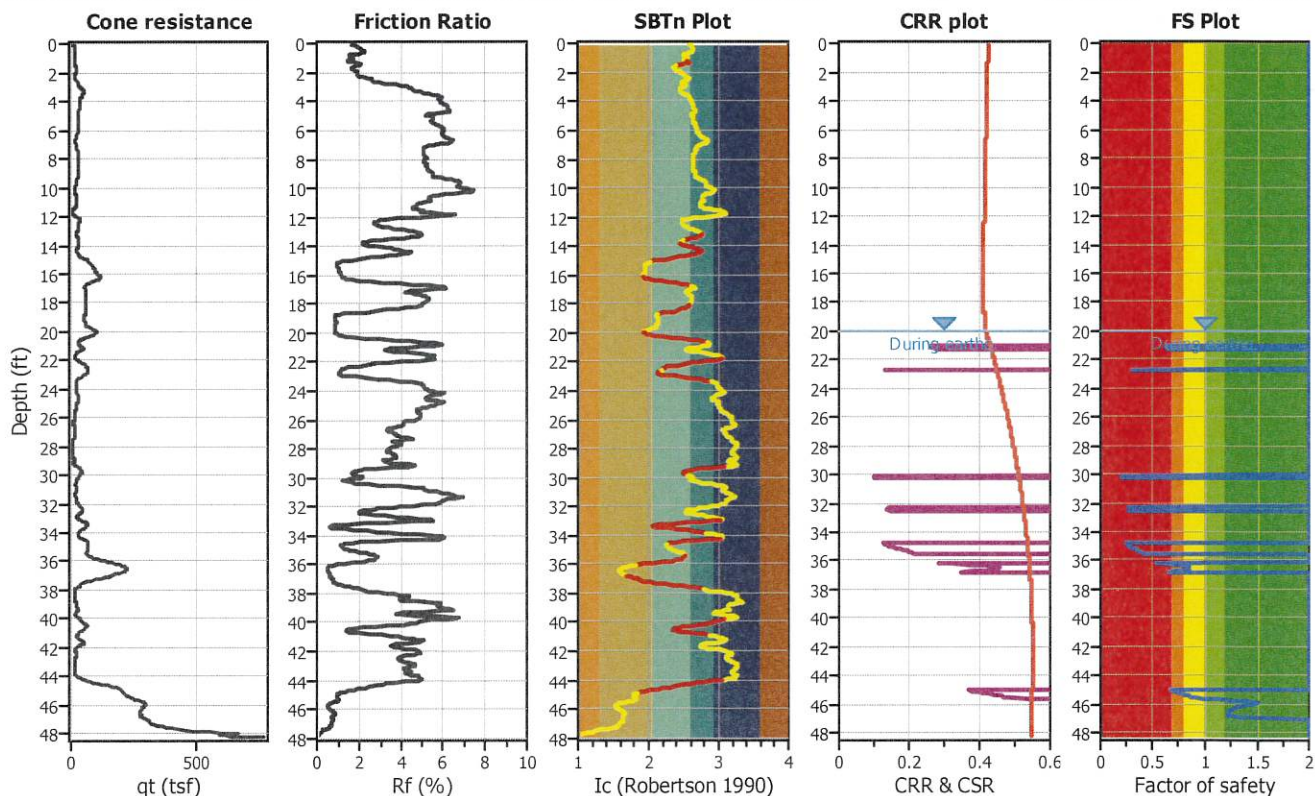
Project title :

Location :

CPT file : CPT-4

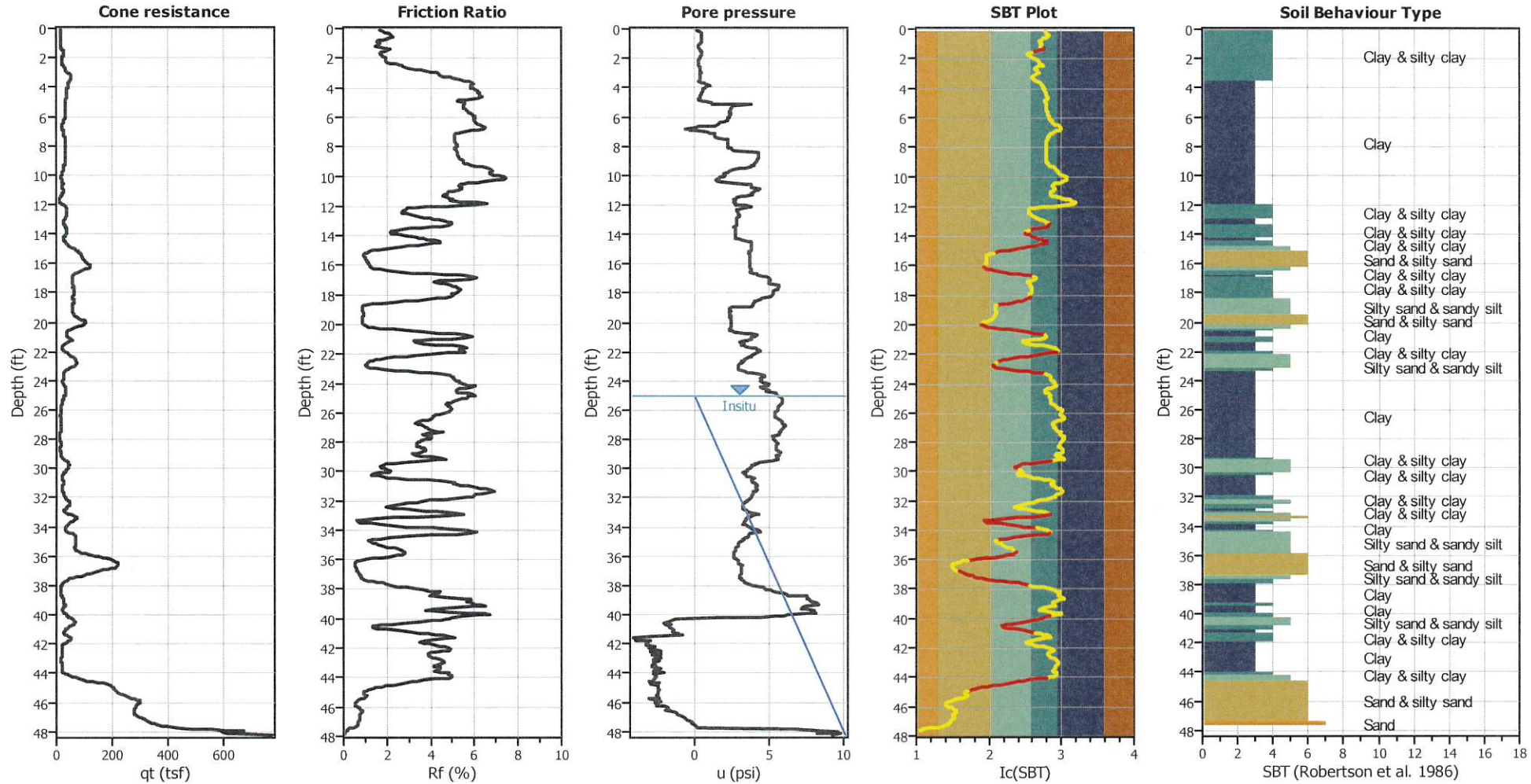
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Fines correction method:	NCEER (1998)	G.W.T. (earthq.):	20.00 ft	Fill height:	N/A	applied:	Sands only
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth applied:	No
Earthquake magnitude M_w :	7.80	Ic cut-off value:	2.60	Trans. detect. applied:	Yes	Limit depth:	N/A
Peak ground acceleration:	0.59	Unit weight calculation:	Based on SBT	K_0 applied:	Yes	MSF method:	Method based



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CPT basic interpretation plots



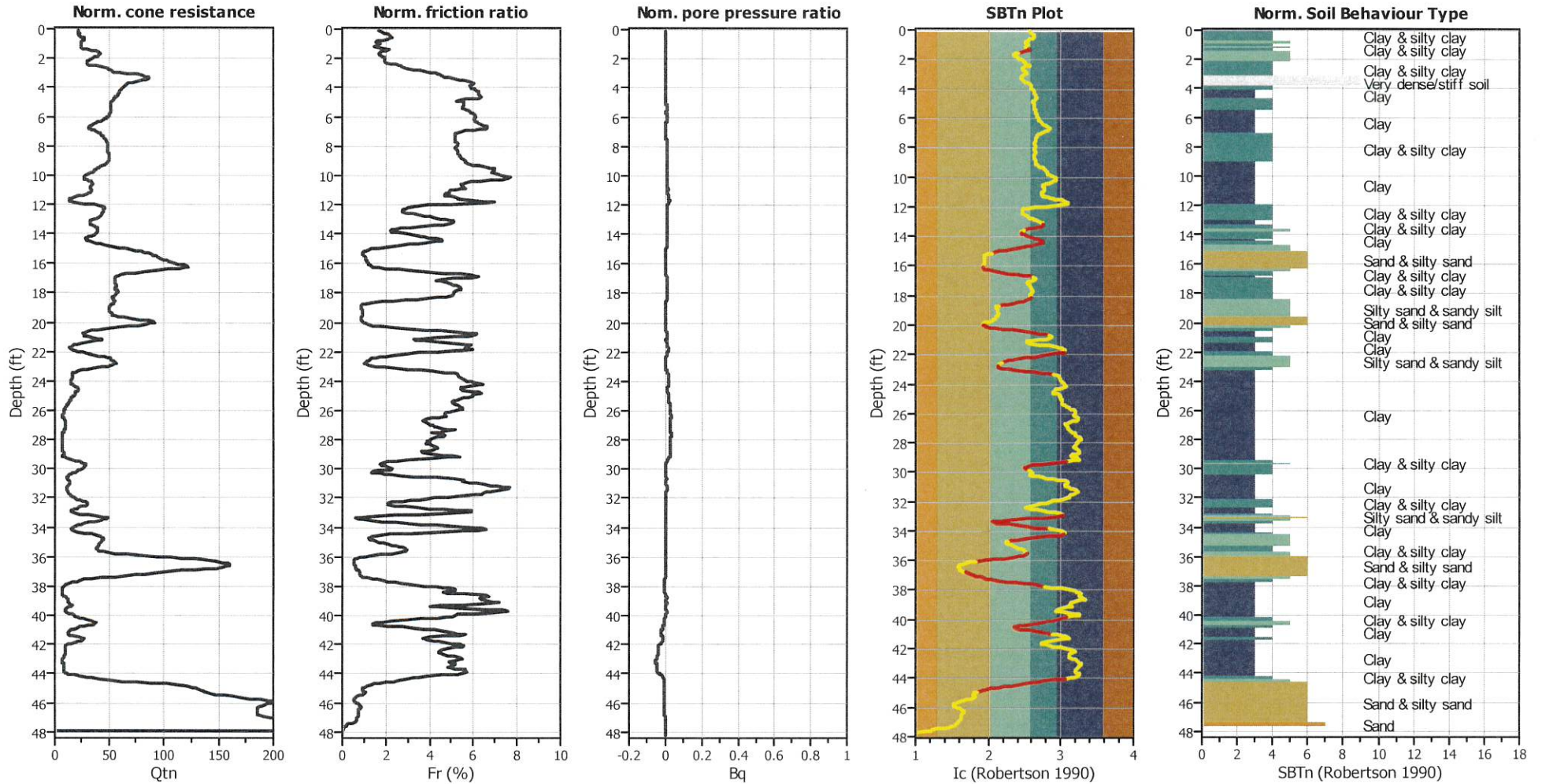
Input parameters and analysis data

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Fines correction method:	NCEER (1998)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K ₀ applied:	Yes
Earthquake magnitude M _w :	7.80	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.59	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	25.00 ft	Fill height:	N/A	Limit depth:	N/A

SBT legend

1. Sensitive fine grained	4. Clayey silt to silty	7. Gravely sand to sand
2. Organic material	5. Silty sand to sandy silt	8. Very stiff sand to
3. Clay to silty clay	6. Clean sand to silty sand	9. Very stiff fine grained

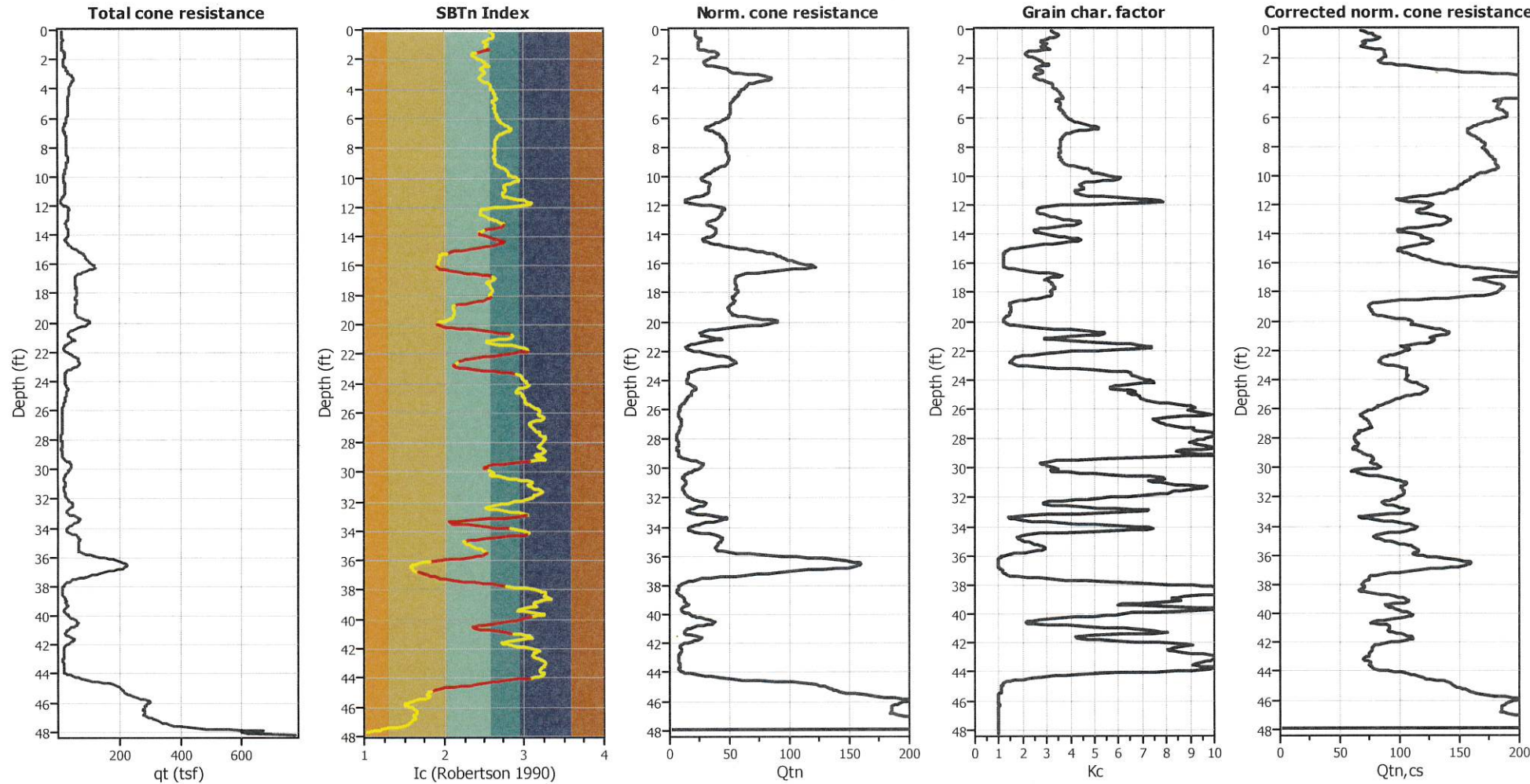
CPT basic interpretation plots (normalized)



Input parameters and analysis data

Analysis method:	NCEER (1998)	Depth to water table (erthq.):	20.00 ft	Fill weight:	N/A
Fines correction method:	NCEER (1998)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K _o applied:	Yes
Earthquake magnitude M _w :	7.80	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.59	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	25.00 ft	Fill height:	N/A	Limit depth:	N/A

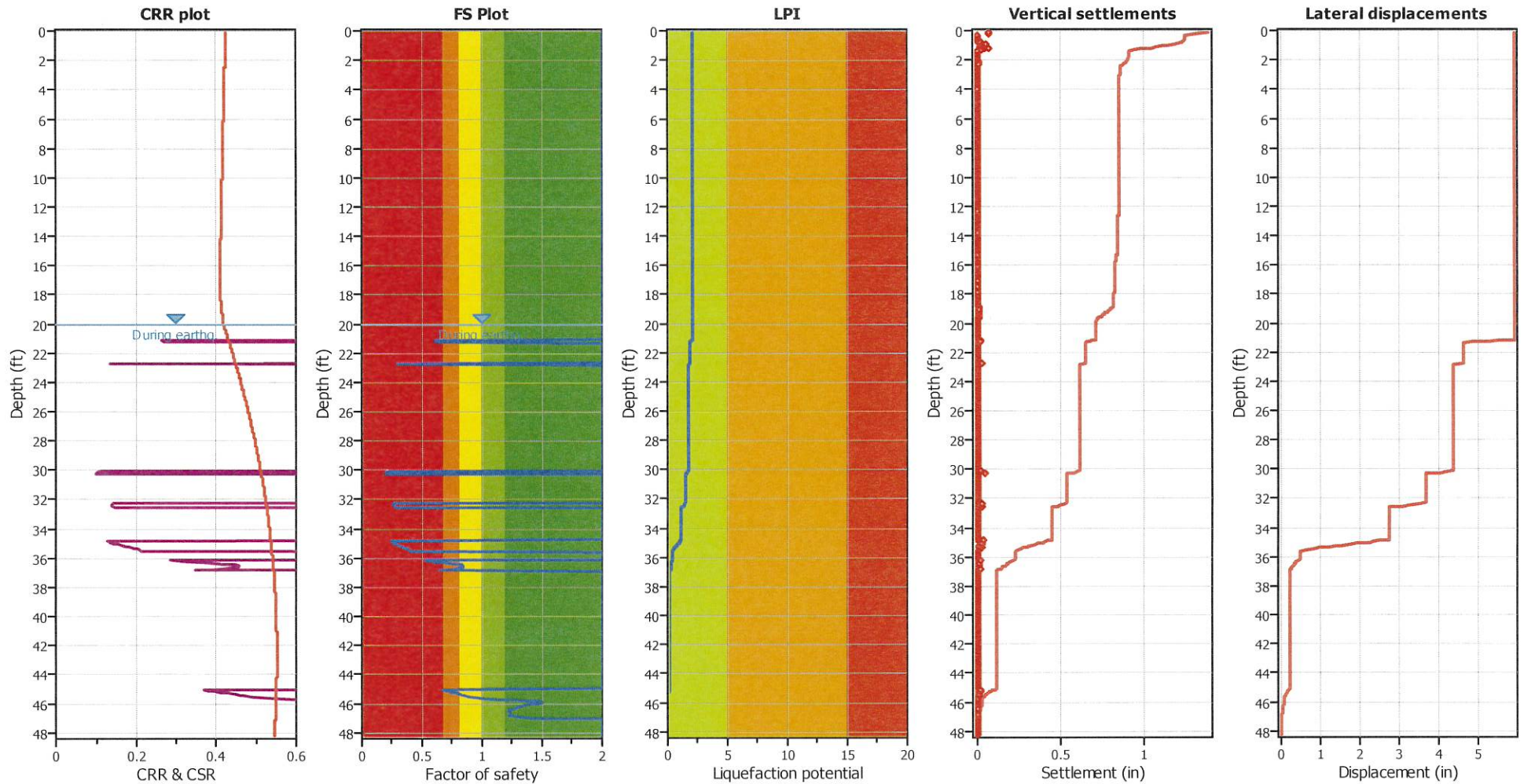
Liquefaction analysis overall plots (intermediate results)



Input parameters and analysis data

Analysis method:	NCEER (1998)	Depth to water table (erthq.):	20.00 ft	Fill weight:	N/A
Fines correction method:	NCEER (1998)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K ₀ applied:	Yes
Earthquake magnitude M _w :	7.80	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.59	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	25.00 ft	Fill height:	N/A	Limit depth:	N/A

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	NCEER (1998)	Depth to water table (earthq.):	20.00 ft	Fill weight:	N/A
Fines correction method:	NCEER (1998)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K _o applied:	Yes
Earthquake magnitude M _w :	7.80	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.59	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	25.00 ft	Fill height:	N/A	Limit depth:	N/A

F.S. color scheme

Red	Almost certain it will liquefy
Orange	Very likely to liquefy
Yellow	Liquefaction and no liq. are equally likely
Light Green	Unlike to liquefy
Dark Green	Almost certain it will not liquefy

LPI color scheme

Red	Very high risk
Orange	High risk
Yellow	Low risk

LIQUEFACTION ANALYSIS REPORT

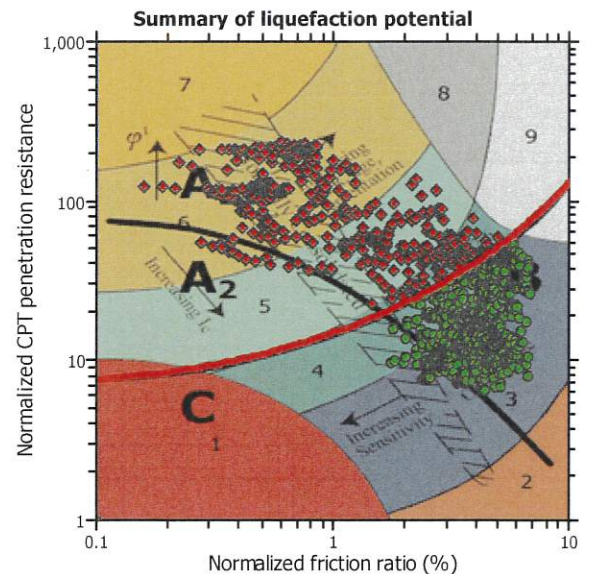
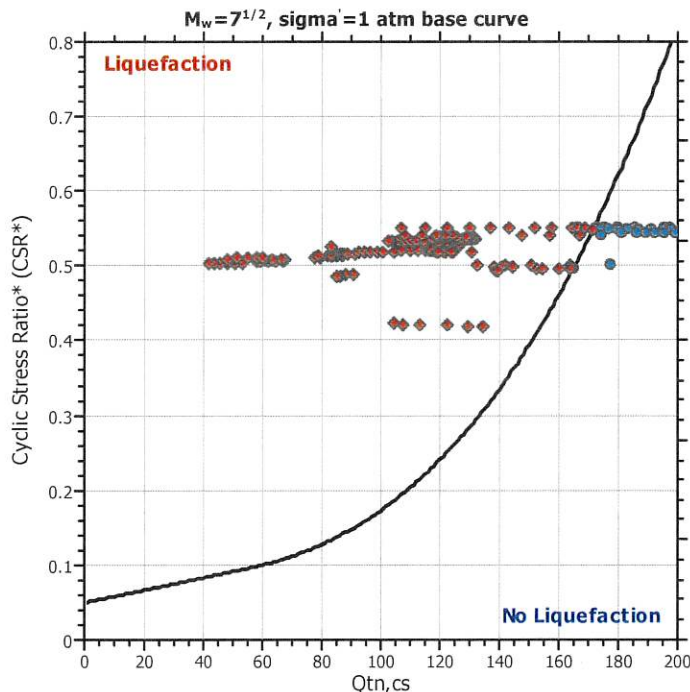
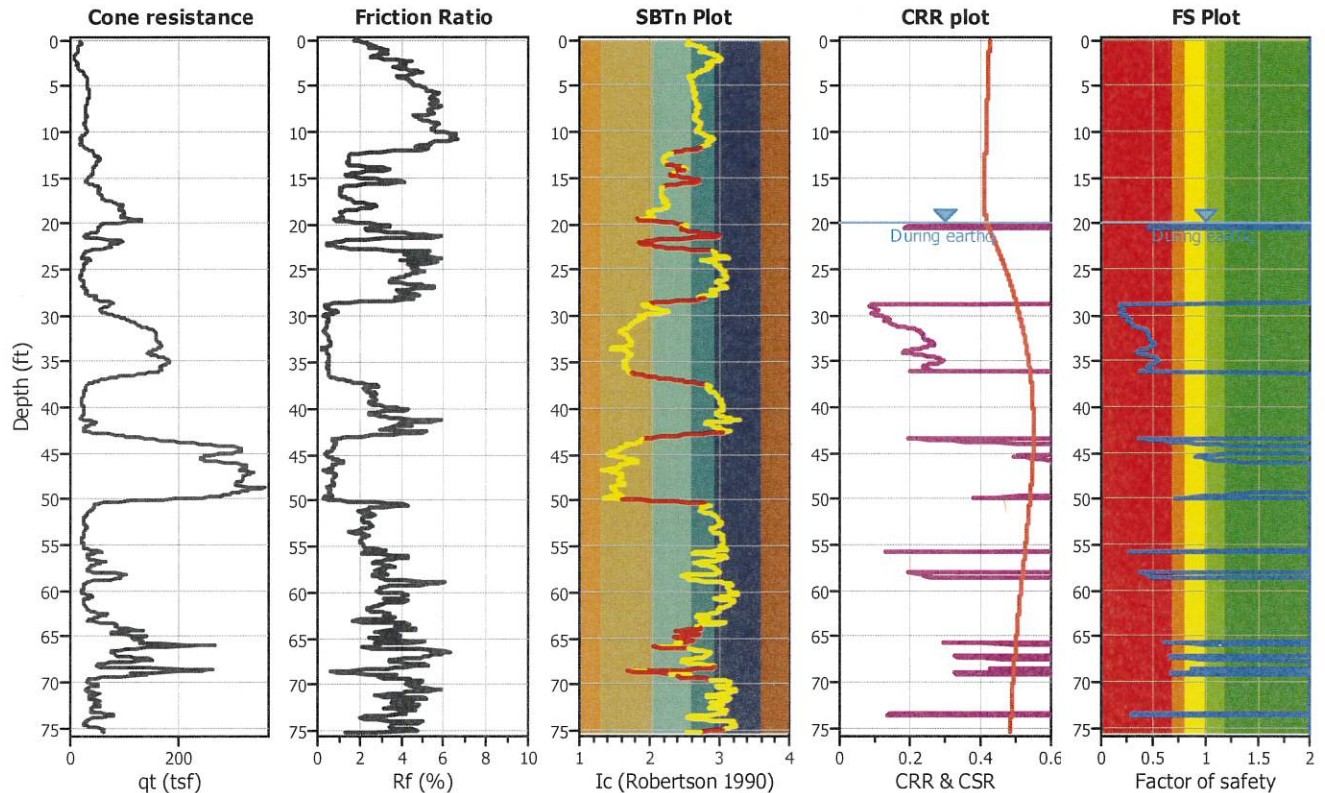
Project title :

Location :

CPT file : CPT-5

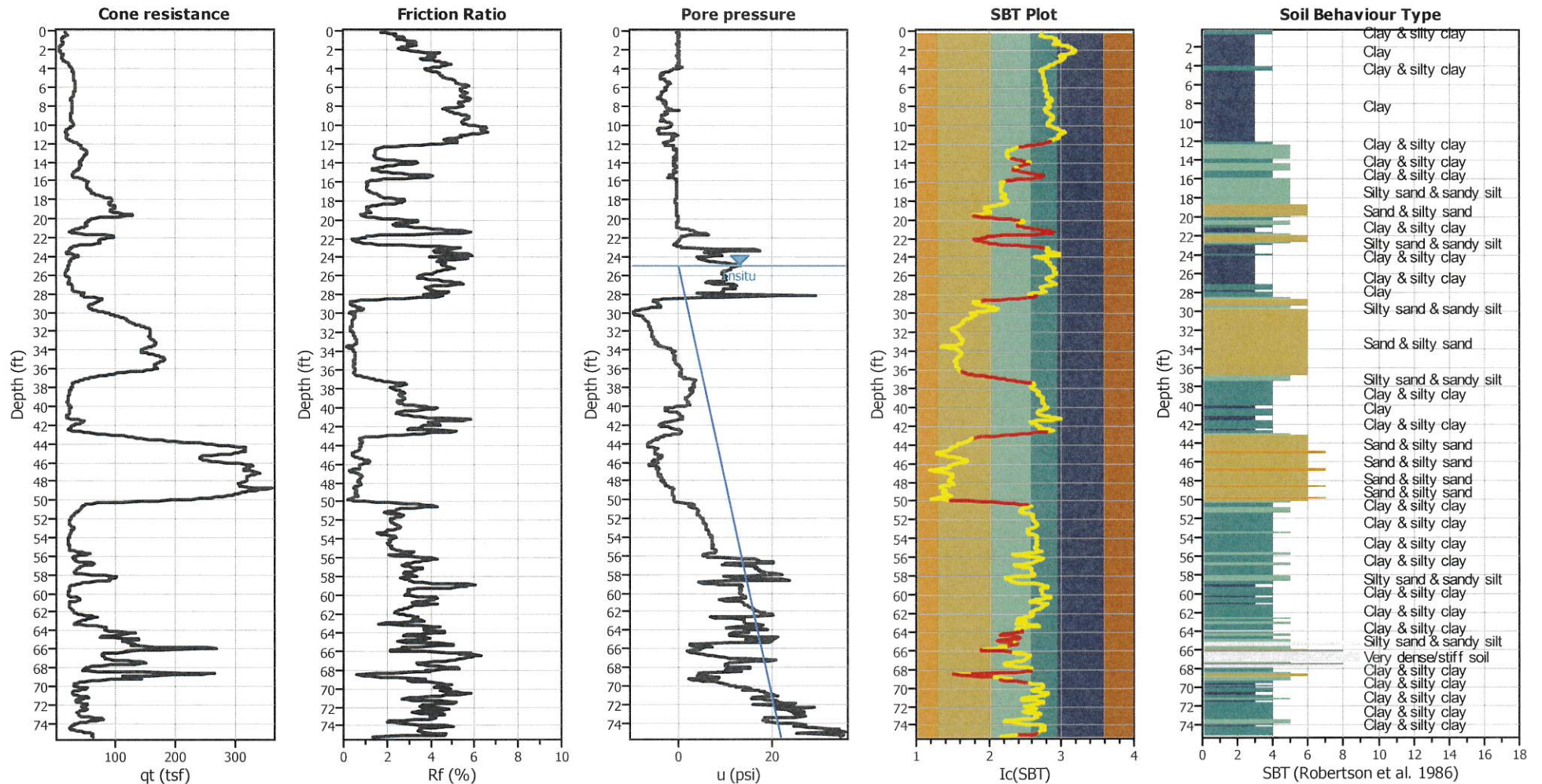
Input parameters and analysis data

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Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth applied:	No
Earthquake magnitude M_w :	7.80	Ic cut-off value:	2.60	Trans. detect. applied:	Yes	Limit depth:	N/A
Peak ground acceleration:	0.59	Unit weight calculation:	Based on SBT	K_0 applied:	Yes	MSF method:	Method based



Zone A₁: Cyclic liquefaction likely depending on size and duration of cyclic loading
 Zone A₂: Cyclic liquefaction and strength loss likely depending on loading and ground geometry
 Zone B: Liquefaction and post-earthquake strength loss unlikely, check cyclic softening
 Zone C: Cyclic liquefaction and strength loss possible depending on soil plasticity, brittleness/sensitivity, strain to peak undrained strength and ground geometry

CPT basic interpretation plots



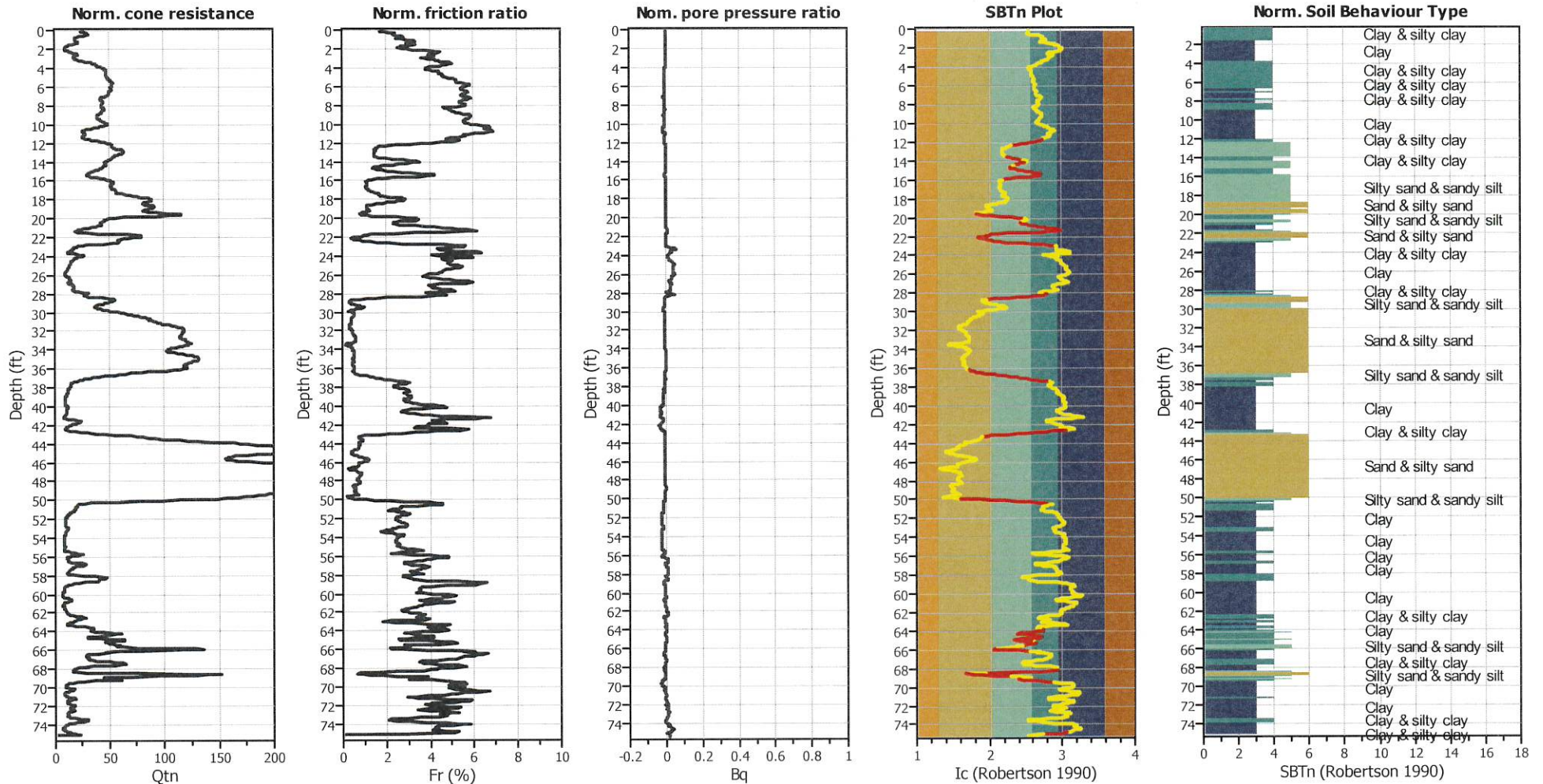
Input parameters and analysis data

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Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_0 applied:	Yes
Earthquake magnitude M_w :	7.80	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.59	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	25.00 ft	Fill height:	N/A	Limit depth:	N/A

SBT legend

1. Sensitive fine grained	4. Clayey silt to silty	7. Gravely sand to sand
2. Organic material	5. Silty sand to sandy silt	8. Very stiff sand to
3. Clay to silty clay	6. Clean sand to silty sand	9. Very stiff fine grained

CPT basic interpretation plots (normalized)



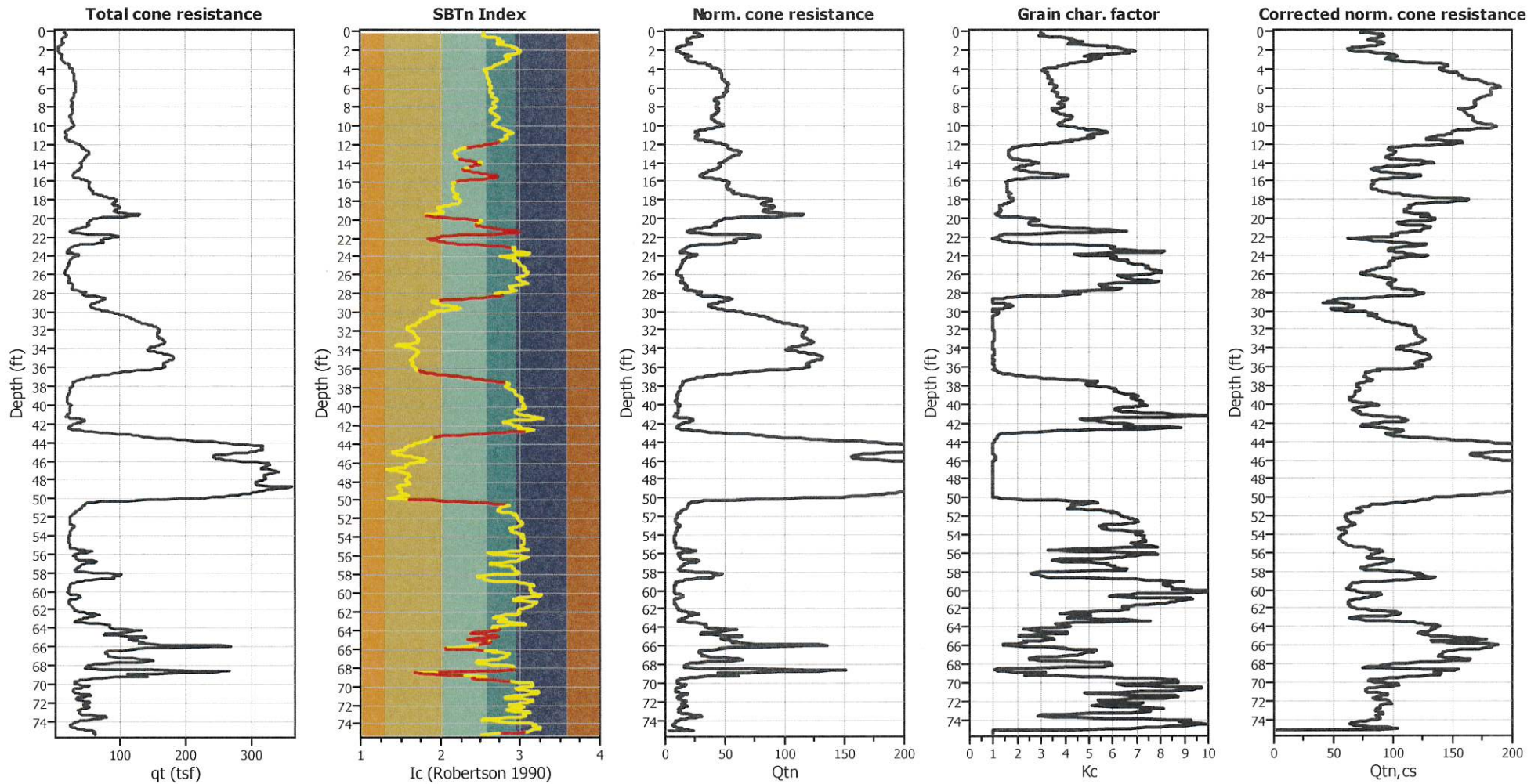
Input parameters and analysis data

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Fines correction method:	NCEER (1998)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K _o applied:	Yes
Earthquake magnitude M _w :	7.80	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.59	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	25.00 ft	Fill height:	N/A	Limit depth:	N/A

SBTn legend

1. Sensitive fine grained	4. Clayey silt to silty	7. Gravely sand to sand
2. Organic material	5. Silty sand to sandy silt	8. Very stiff sand to
3. Clay to silty clay	6. Clean sand to silty sand	9. Very stiff fine grained

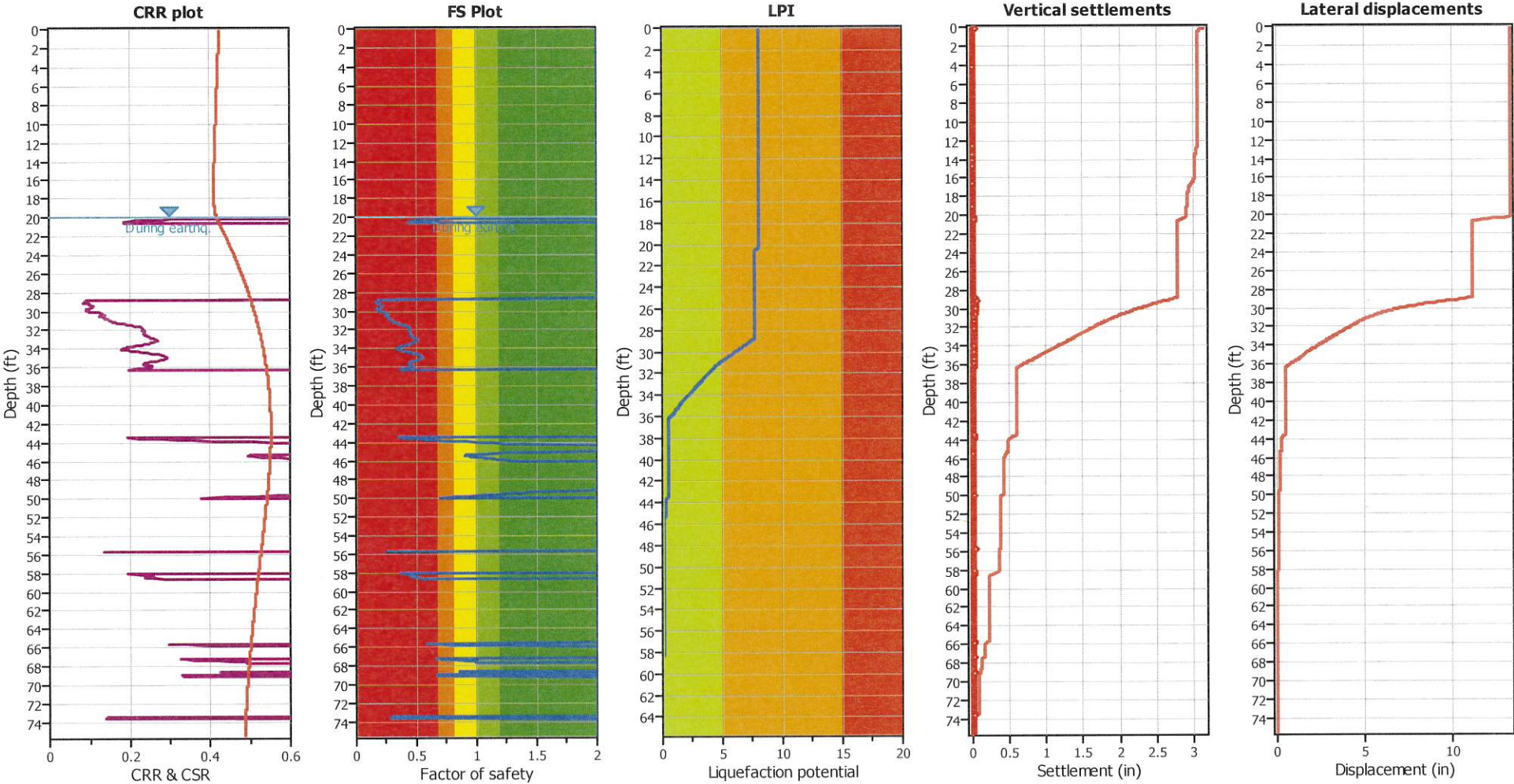
Liquefaction analysis overall plots (intermediate results)



Input parameters and analysis data

Analysis method:	NCEER (1998)	Depth to water table (erthq.):	20.00 ft	Fill weight:	N/A
Fines correction method:	NCEER (1998)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_{α} applied:	Yes
Earthquake magnitude M_w :	7.80	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.59	Use fill:	No	Limit depth applied:	No
Depth to water table (insitu):	25.00 ft	Fill height:	N/A	Limit depth:	N/A

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	NCEER (1998)	Depth to water table (earthq.):	20.00 ft	Fill weight:	N/A
Fines correction method:	NCEER (1998)	Average results interval:	3	Transition detect. applied:	Yes
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K ₀ applied:	Yes
Earthquake magnitude M _w :	7.80	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.59	Use fill:	No	Limit depth applied:	No
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F.S. color scheme

Red	Almost certain it will liquefy
Orange	Very likely to liquefy
Yellow	Liquefaction and no liq. are equally likely
Green	Unlike to liquefy
Dark Green	Almost certain it will not liquefy

LPI color scheme

Red	Very high risk
Orange	High risk
Yellow	Low risk



Kelvin Okino
Executive Director of Facilities Planning and Construction
Irvine Unified School District
5050 Barranca Parkway,
Irvine, CA 92604

December 8, 2025

**Subject: Third Engineering Geology and Seismology Review for
Irvine High School – William Woollett Jr. Aquatics Ctr – Proposed Additions
4601 Walnut Avenue, Irvine, CA 92604
CGS Application No. 04-CGS6810 DSA Application No. 04-124187**

Dear Kelvin Okino:

In accordance with your request and transmittal of additional documents received on October 21 and November 4, 2025, the California Geological Survey (CGS) has reviewed the engineering geology and seismology aspects of the consulting reports prepared for the subject project at William Woollett Jr. Aquatics Center adjacent to Irvine High School in Irvine. It is our understanding that this project involves construction of a swimming pool, a one-story permanent building to the southwest of the new pool, a one-story permanent building with a splash pad to the southeast of the new pool, a shaded bleacher structure with a pump equipment/storage structure, and related site work. We also understand that ground improvement is planned for seismic hazard mitigation. This review was performed in accordance with Title 24, California Code of Regulations, 2022 California Building Code (CBC) and followed CGS Note 48 guidelines. We reviewed the following documents for this additional review of the project:

5. **Supplemental Geotechnical Investigation, William Woollett Jr. Aquatics Center Improvements, 4601 Walnut Avenue, Irvine, California:** John R. Byerly, Inc., 2257 South Lilac Avenue, Bloomington, CA 92316; company Project No. S-14708A, report dated July 28, 2025, 21 pages, 2 enclosures.
6. **Design Submittal for a Geopier® Foundation System, Woollett Aquatic Center, Irvine, CA:** Western Ground Improvement, Inc., 209 Avenida Del Mar, Suite 201B, San Clemente, CA 92672; company Project No. GIE-23, report dated October 7, 2025, 1 page, 2 appendices (including the Geopier® Shop Drawings, Sheet Nos. GP0.1 & GP1.1).
7. **Review of Design Submittal for a Geopier Foundation System, William Woollett Jr. Aquatics Center Improvements, 4601 Walnut Avenue, Irvine, California:** John R. Byerly, Inc., 2257 South Lilac Avenue, Bloomington, California, 92316; company Project No. S-14708A, report dated October 15, 2025, 2 pages.

In addition, we previously reviewed the following reports:

1. **Geotechnical Investigation, William Woollett Jr. Aquatics Center Improvements, 4601 Walnut Avenue, Irvine, California:** John R. Byerly, Inc., 2257 South Lilac Avenue, Bloomington, California, 92316; company Project No. S-14708, report dated September 17, 2024, 21 pages, 9 enclosures (including the following Report 2).
2. **Geologic Hazards Report, Proposed Aquatic Center Improvements, William Woollett Jr. Aquatic Center, 4601 Walnut Avenue, Irvine, California:** Terra Geosciences, P.O. Box 1090, Loma Linda, California, 92354; company Project No. 244072-1, report dated July 10, 2024, 11 pages, 4 plates, 3 appendices (included as Enclosure 9 in Report 1).
3. **Response to Engineering Geology and Seismology Review, Proposed William Woollett Jr. Aquatics Center Improvements, 4601 Walnut Avenue, Irvine, California:** John R. Byerly, Inc., 2257 South Lilac Avenue, Bloomington, California, 92316; company Project No. S-14708, report dated March 3, 2025, 3 pages, 2 enclosures (including the following Report 4).
4. **Engineering Geology and Seismology Review, Irvine High School – William Woollett Jr. Aquatic Center, Proposed Additions, 4601 Walnut Avenue, Irvine, California:** Terra Geosciences, P.O. Box 1090, Loma Linda, California, 92354; company Project No. 244072-1L, report dated February 28, 2025, 2 pages, 1 attachment (included as Enclosure 1 in Report 3).

CGS has prepared letters dated February 27 and March 11, 2025, documenting our previous reviews of this project. Based on our second review letter for this project, CGS noted our acceptance of the geotechnical consultants' general recommendations for ground improvement, but we requested a specialty contractors' detailed design package and plans for the selected ground improvement method be provided for our review prior to initiation of the work. In addition, the consultants were requested to submit the formal documentation of their review of the contractors' ground improvement design and plans in fulfilling their role as Geotechnical Engineer of the Record (GEOR) for the project.

Discussion of Supplemental Investigation and Liquefaction Analysis

Based on the current submitted reports, CGS notes the consultants conducted a supplemental investigation of the soil conditions underlying the project site and prepared an additional report (Report 5). This report includes new/updated conclusions regarding potential geologic hazards and new/additional geotechnical recommendations provided after CGS issued our second review letter.

Supplemental Investigation

The consultants report that they performed five (5) cone penetration test (CPT) soundings that were advanced to maximum depth of 80.5 feet, and groundwater was encountered in the CPT soundings at depths of 24 feet to 25 feet below the ground surface.

Liquefaction, Seismic Settlement, and Lateral Spreading Analyses

The consultants perform additional liquefaction and seismic settlement analyses using the new CPT data with reasonable input seismic parameters. They report estimated seismic settlement and the potential lateral displacement due to liquefaction of the existing soils. The consultants now also consider the potential hazard of liquefaction-induced lateral spreading due to presence of the roughly 10 feet tall descending slope adjacent to the west of the proposed improvements, which was not addressed in their 2024 report (Report 1). Based on our review of additional information provided, **CGS requests the consultants address the following concerns regarding their analysis of the supplemental CPT data and conclusions regarding the existing, unimproved soils as presented in Report 5:**

- CGS observes the consultants set the in-situ groundwater at depth of 20 feet in their liquefaction and seismic settlement analyses, not at the depths of 24 feet or 25 feet as they report were encountered. Their approach **appears to underestimate the liquefaction-induced settlement of the existing soils**. Therefore, the consultants are requested to revise their analyses considering more accurate in-situ groundwater level and to report the updated values of total and differential seismic settlement.
- In the submitted ground improvement design package (Report 6), the specialty contractor reports the consultants performed the seismic settlement analysis with depth weighting. Based on provided copies of the analysis results in Report 5, it is unknown to CGS whether the depth-weighting factor has been applied in their analysis. Therefore, the consultants are requested to **clearly indicate if they have applied depth-weighting in their CPT-based analyses of seismic settlement** and, if so, to provide comparative results of the estimated liquefaction-induced settlement without applying the depth-weighting factor as these results are critical to informing the recommendations for performing ground improvement at the site. Further, the consultants are cautioned about the use and application of a depth-weighting factor for volumetric strain induced by post-liquefaction reconsolidation as proposed by Cetin, et al (2009) in combination with analysis of triggering of liquefaction by other methodologies, such as the NCEER (1998) method reported to be used by the consultants. CGS observes the Cetin, et al (2009) and NCEER (1998) methodologies are based on differing reviews and interpretations of available liquefaction case history data and include differing recommendations for calculation and correction of Cyclic Stress Ratio (CSR) with depth, among other items.

Discussion of Ground Improvement Recommendations

In Reports 1 and 3, the geotechnical consultants recommend ground improvement, either by deep soil mixing or the installation of stone columns, should be performed to improve soils to depths ranging from 25 to 35 feet to minimize the potential for ground surface disruption due to liquefaction and to reduce the potential for total and differential settlement for both static and seismic conditions. They recommend the ground improvement method should be designed so both static and liquefaction-induced total settlements will each be less than or equal to one inch, and the maximum differential settlement for both static and seismic conditions should be less than or equal to 0.5 inch across each building and pool. In our second review letter, CGS reported the consultants' general concept and recommendations to perform ground improvement at the site appears reasonable for mitigation of the seismic hazards at the site, but we requested that when the design and plans for the selected ground improvement system are prepared by a specialty contractor, the detailed design package and plans should be provided for CGS review.

In their supplemental report (Report 5), the consultants report the potential dynamic differential settlement across the swimming pool and the potential lateral displacement estimated by analysis of data from CPT-2 and CPT-5 (located at the proposed swimming pool and southwestern permanent building, respectively) are above tolerable limits based on their additional analyses. The consultants recommend the installation of deep soil mixing columns to control the lateral displacement. They also recommend the specialty ground improvement contractor should base their design on satisfaction of the differential settlement threshold requirements of ASCE 7-16, Section 12.13.9. In addition, the consultants recommend the swimming pool designer coordinate with the ground improvement contractor.

However, based on our review of Report 5 and **as noted above, CGS requests the consultants to revise their analyses of liquefaction and seismic settlement for the unimproved soils using the available CPT data for all areas of the site.** The consultants should then reconsider the area(s) of the site for which the recommended ground improvement should be performed and update their recommendations if warranted.

Discussion of Ground Improvement Design and Plans

Based on this third review, we understand that Western Ground Improvement, Inc. (WGI) has been chosen as the specialty design-build ground improvement contractor and has prepared a **design package and plans (Report 6) for a compacted aggregate pier (CAP) system of ground improvement proposed to be installed beneath the new pool and southwestern permanent building planned at the site,** instead of the deep soil mixing technique the consultants recommended in Report 5. The specialty contractor reports the structures to the east, including the southeastern permanent building and the shaded bleacher with a pump equipment/storage structure, achieve the liquefaction and lateral spread performance criteria without ground improvement, which **does not appear to be supported by the conclusions and recommendations provided by the geotechnical consultants in Report 5.** The contractor has provided a copy of their geotechnical analysis and design calculations to support their design plans for installation of the CAP ground improvement. Based on our review of the design package, **CGS requests the specialty contractor to provide additional information to address the following concerns regarding the design package for the CAP system of ground improvement:**

- Based on the results of their liquefaction and seismic settlement analysis provided in Appendix B of Report 6, CGS notes the specialty contractor applies the same incorrect in-situ groundwater level as the consultants did. In addition, CGS notes the contractor applies the CPT-based method of Zhang et al. (2002) for analysis of the CPT data and applies a depth-weighting factor for evaluation of liquefaction-induced settlement of the improved soils. CGS understands that the results from this methodology of Zhang et al. (2002) have provided good agreement with the measured liquefaction-induced ground settlements based on the case histories of liquefaction during the 1989 Loma Prieta earthquake. However, **further applying a depth-weighting factor for volumetric strain such as that from Cetin et al. (2009) does not appear to be appropriate and may significantly underestimate the liquefaction-induced settlement of the improved soils.** Analyses and calculations of potential post-liquefaction settlement of the improved soils should consider unweighted values, and weighting factors for settlement should be appropriate and consistent with the methodology used for evaluation of liquefaction triggering. Therefore, CGS requests the specialty contractor to

revise their analyses and calculations of potential liquefaction-induced settlement and to report and consider the unweighted values in their conclusions and design.

- The specialty contractor is requested to refer to the consultants' revised calculations and recommendations for areas where the ground improvement should be implemented (see discussion above) and to revise their ground improvement design and plans, if needed.
- The depth ranges and thickness of liquefiable layers presented in the soil profile in the specialty contractor' lateral spreading displacement analysis do not appear to be justified based on the results of their pre- and post-improvement liquefaction analysis. CGS observes there is a liquefiable layer present at depths between approximately 29 and 37 feet below the ground surface of the project site, which is at the similar elevation of top of slope. The specialty contractor is requested to revise their analysis of lateral spreading and to clearly present the results of factor of safety in the output figures. In addition, the specialty contractor is requested to provide the site plan that depicts the locations of two (2) cross sections they considered for their analysis of lateral spreading displacements.
- Based on the ground improvement designed layout plan (GP1.1), the distance beyond the footprint of structures does not appear to satisfy the minimum requirement in Section 1813A of CBC.
- Item No. 3 of "Geopier Design Notes" presented in design drawing Sheet GP0.1 indicates there is a design summary table presented in Detail 1 of this sheet, GP0.1. However, CGS notes this design summary table is missing and requests the specialty contractor to present it on updated version of the sheet.
- The specialty contractor is requested to clearly report the minimum amount of post-installation CPTs that should be performed for each planned improvement area. CGS reminds that GEOR should review and approve the locations of post-installation CPTs.
- The design criteria presented in Table 1 in Appendix B of ground improvement package (Report 6) does not appear to conform with the recommendations provided by the consultants in Report 3. The specialty contractor is requested to clarify and revise as warranted.

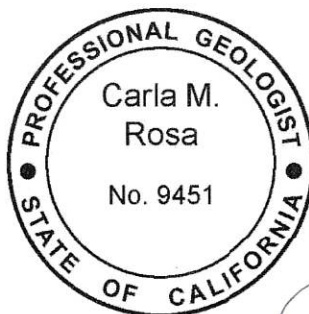
CGS advises and **requests the geotechnical consultants and the specialty contractor to collaborate in addressing our concerns noted above and to provide a revised submittal** with clear and complete geotechnical recommendations and consistent design of the planned ground improvement system for the project. In addition, CGS requests the consultants to review the specialty contractor's revised ground improvement package and provide the formal documentation of their additional review to CGS and DSA. They should include clear and complete statements regarding their opinion and recommendations for provision of ground improvement beneath each of the proposed new structures and full supporting analysis and justification for any recommendations to not provide ground improvement for any of the proposed structures.

Discussion of Swimming Pool Design

The consultants recommend the soils within 3 feet vertically below the bottom of the pool, 2 feet vertically below the bottom of the foundation elements supporting the surge tank, and within 7 feet horizontally of the sides of surge tank and swimming pool walls should be removed and replaced with engineered fill that has a very low expansion potential. These appear to be reasonable recommendations. The consultants provide reasonable active and at-rest lateral earth pressure for both drained and undrained (with hydrostatic pressure) conditions behind the walls. CGS notes that **if the pool walls are to be designed per Item 1 of Section 1803A.5.12 and Section 1807A.2.2 of CBC** due to the walls supporting more than 6 feet of backfill height, **the consultants should provide calculations to support a reasonable value of seismic increment of lateral earth pressure** to be applied in design.

Conclusions

In conclusion, ***the engineering geology and seismology issues at this site are not adequately assessed in the referenced reports.*** It is recommended that additional information be provided as requested in this letter. The consultants are reminded that all supplemental documents should include the CGS application number, and should be uploaded directly to CGS at this link: <https://www.conservation.ca.gov/cgs/upload-school>. If you have any further questions about this review letter, please contact the primary reviewer at Carla.Rosa@conservation.ca.gov or undersigned geotechnical engineer at YaoHsien.Chang@conservation.ca.gov.



Respectfully submitted,

Carla M Rosa

Carla M. Rosa
Engineering Geologist
PG 9451

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Yao Hsien Chang
Geotechnical Engineer
PE 77688, GE 3082



Concur:

Chase White

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Senior Engineering Geologist/Geotechnical Engineer
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Western Ground Improvement, Inc., 209 Avenida Del Mar, Suite 201B, San Clemente, CA 92672

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