PROJECT MANUAL

Gateway Annex School

550 Airport Way, Camarillo, CA 93010

File No. 56-44
A#03-122398

10/21/2026

BID # 2026-06

VENTURA COUNTY OFFICE OF EDUCATION

GATEWAY ANNEX SCHOOL

550 AIRPORT WAY, CAMARILLO, CA 93010

BY

PERKINS EASTMAN
3194D AIRPORT LOOP
COSTA MESA, CA 92626
(714) 427-0277

A#03-122398
FILE 56-44

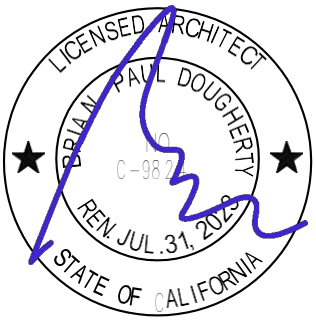
PROJECT SPECIFICATIONS

DSA SUBMITTAL

November 9, 2022

IDENTIFICATION STAMP
DIV. OF THE STATE ARCHITECT
APP: 03-122398 INC:
REVIEWED FOR
SS ☑ FLS ☑ ACS ☑
DATE: 02/21/2023

Signature Sheet
Gateway Annex School
Ventura County Office of Education



Architect
Perkins Eastman
3194-D Airport Loop Drive
Costa Mesa, CA 92626
Tel: (714) 427-0277

By: Brian Dougherty
No. C9824 Expires: Jul. 31, 2023



Mechanical Engineer
Salas O'Brien
8825 Research Drive
Irvine, CA 92618
Tel: (949) 753-1553

By James Zwingman
No. M35588 Expires: Seot. 30, 2023



Plumbing Engineer
Salas O'Brien
8825 Research Drive
Irvine, CA 92618
Tel: (949) 753-1553

By James Zwingman
No. M35588 Expires: Sept. 30, 2023



Electrical Engineer
Salas O'Brien
8825 Research Drive
Irvine, CA 92618
Tel: (949) 753-1553

By Chi Kit Chan
No. E18090 Expires: Jun. 30, 2023

IDENTIFICATION STAMP
DIV. OF THE STATE ARCHITECT
APP: 03-122398 INC:
REVIEWED FOR
SS ☑ FLS ☑ ACS ☑
DATE: 02/21/2023



Fire Prevention Engineer
Salas O'Brien
8825 Research Drive
Irvine, CA 92618
Tel: (949) 753-1553

By: Timothy R. Campbell
No. FP2004 Expires: Dec. 31, 2022



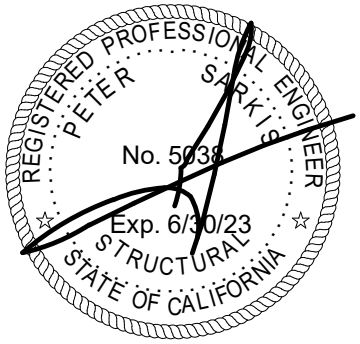
Civil Engineer
Delane Engineering, INC 400
W Ventura Blvb., Suite 265
Camarillo, CA 93010
Tel: (805) 330-9730

By Scott Delane Uhles
No. C72391 Expires: Jun. 30, 2024



Landscape Architect
Jordan, Gilbert & Brian Architects INC.
459 N. Ventura Ave.
Ventura, CA 93001
Tel: (805) 642-3641

By John James Bain
No. 3193 Expires: Apr. 2024



Stuctural
Petra Structural Engineers
17921 Skypark Circle, Suite 0
Irvine, CA 92614
Tel: (949) 753-1553

By Peter Sarkins
No. 5038 Expires: Jun. 30, 2023

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NOTICE TO BIDDERS

1. Notice is hereby given that Ventura County Office of Education ("VCOE") will receive sealed bids for the following project, **Gateway Annex School**, with an estimated construction cost range of **$14,500,000 - $16,500,000.**

2. To bid on this Project, the **Bidder is required to possess an "B", California contractors' license,** The Bidder's license must remain active and in good standing in California throughout the term of the Contract. Contractor must have current registration with the Department of Industrial Relations.

3. To bid on this Project, the Bidder is required to be registered as a public works contractor with the Department of Industrial Relations pursuant to the Labor Code. The Bidder's registration must remain active throughout the term of the Contract.

4. Contract Documents will be available on or after **Wednesday, October 21, 2026**, at www.vcoe.org/Facilities/Bid-Opportunities

5. Sealed bids will be received until **2:00 pm, Wednesday, November 18, 2026,** at the Ventura County Office of Education's Administrative Services Center, 5189 Verdugo Way, Camarillo CA 93012, at or after which time the bids will be opened and publicly read aloud. Any bid that is submitted after this time shall be nonresponsive and returned to the bidder. Any claim by a bidder of error in its bid must be made in compliance with section 5100 et seq. of the Public Contract Code.

6. All bids shall be on the form provided by the VCOE. Each bid must conform and be responsive to all pertinent Contract Documents, including, but not limited to, the Instructions to Bidders.

7. A bid bond by an admitted surety insurer on the form provided by the VCOE, cash, or a cashier's check or a certified check, drawn to the order of the Ventura County Office of Education, in the amount of ten percent (10%) of the total bid price, shall accompany the Bid Form and Proposal, as a guarantee that the Bidder will, within seven (7) calendar days after the date of the Notice of Award, enter into a contract with the VCOE for the performance of the services as stipulated in the bid.

8. A **mandatory pre-bid conference** and site visit will be held on **Wednesday, October 21, 2026 at 1:00 pm. at 550 Airport Way, Camarillo, CA.** All participants are required to sign the meeting sign-in sheet. The site visit is expected to take approximately one hour. Failure to attend or tardiness will render bid ineligible.

9. The successful Bidder shall be required to furnish a 100% Performance Bond and a 100% Payment Bond if it is awarded the Contract for the Work.

10. The successful Bidder may substitute securities for any monies withheld by the VCOE to ensure performance under the Contract, in accordance with the provisions of section 22300 of the Public Contract Code.

11. The successful bidder will be required to certify that it either meets the Disabled Veteran Business Enterprise ("DVBE") goal of three percent (3%) participation or made a good faith effort to solicit DVBE participation in this Contract if it is awarded the Contract for the Work.

12. The Contractor and all Subcontractors under the Contractor shall pay all workers on all Work performed pursuant to this Contract not less than the general prevailing rate of per diem wages and the general prevailing rate for holiday and overtime work as determined by the Director of the Department of Industrial Relations, State of California, for the type of work performed and the locality in which the work is to be performed within the boundaries of the VCOE, pursuant to section 1770 et seq. of the California Labor Code. Prevailing wage rates are also available from the VCOE or on the Internet at: <http://www.dir.ca.gov>.

13. This Project is subject to labor compliance monitoring and enforcement by the Department of Industrial Relations pursuant to Labor Code section 1771.4 and subject to the requirements of Title 8 of the California Code of Regulations. The Contractor and all Subcontractors under the Contractor shall furnish electronic certified payroll records directly to the Labor Commissioner weekly and within ten (10) days of any request by the VCOE or the Labor Commissioner. The successful Bidder shall comply with all requirements of Division 2, Part 7, Chapter 1, Articles 1-5 of the Labor Code.

14. The VCOE shall award the Contract, if it awards it at all, to the lowest responsive responsible bidder based on the base bid amount only.

15. VCOE reserves the right to reject any and all bids and/or waive any irregularity in any bid received. If the VCOE awards the Contract, the security of unsuccessful bidder(s) shall be returned within sixty (60) days from the time the award is made. Unless otherwise required by law, no bidder may withdraw its bid for ninety (90) days after the date of the bid opening.

16. **PRE-QUALIFICATION REQUIRED:**

Prequalification is required only for Class B contractors and mechanical, electrical, and plumbing (M/E/P) subcontractors.
The Quality Bidders qualification submission portal will be open from **October 14 through November 4, 2026.**

Prequalification Requirements Sources Cited below:
California Assembly Bill (AB) 1565 went into effect on January 1, 2014. AB 1565 requires ALL General Contractors and M/E/P Subcontractors be prequalified, if the project is valued at $1 million or more and funded whole or in part with State Facility Bond funds, per…

Public Contract Code 20111.5 enables districts to require prime contractors to be prequalified prior to accepting bids.

Public Contract Code 20111.6 requires the district to do so for certain projects. This applies to prime contractors and MEP sub-contractors with the following licenses:
General Contractors (A and B), Mechanical, Electrical, and Plumbing subcontractors (C-4, C-7, C-10, C-16, C-20, C-34, C-36, C-38, C-42, C-43, and C-46)

The District must receive complete applications at least ten (10) business days prior to the scheduled bid opening on any advertised project in order for the candidate to qualify for a project in excess of $1,000,000 and partially funded by the State. Pre-qualification approval will remain valid for one (1) calendar year from the date of notice of qualification except as noted in the pre-qualification documents.
Link to law: Click Here, (https://www.leginfo.ca.gov/pub/11-12/bill/asm/ab_1551-1600/ab_1565_bill_20120930_chaptered.html)

VCOE has contracted with Colbi Technologies to provide a web-based process for submitting to their Prequalified Contractor list called Quality Bidders. To get started Click Here to Sign Up, https://www.qualitybidders.com/users/sign_up

For detailed instructions in completing your application, please navigate to the bottom of the page from this link Contractor Instructions; https://s3.amazonaws.com/cnetwork-prod-ct/files/qb-cupccaa-instructions.pdf

Please contact qbsupport@colbitech.com with any questions about the use of the Quality Bidders web-based tool.

To be eligible to submit a bid, a contractor's approved prequalification application rating (maximum bidding capacity) must meet or exceed the minimum rating established by VCOE. Contractors whose approved rating falls below this requirement are not eligible to bid on this project.

The Minimum Required Prequalification Rating to Bid this project: **$13,000,000.00**

END OF DOCUMENT

DOCUMENT 00 21 13

INSTRUCTIONS TO BIDDERS

Bidders shall follow the instructions in this document, and shall submit all documents, forms, and information required for consideration of a bid.

Ventura County Office of Education ("VCOE") will evaluate information submitted by the apparent low Bidder and, if incomplete or unsatisfactory to VCOE, Bidder's bid may be rejected at the sole discretion of VCOE.

1. Bids are requested for a general construction contract, or work described in general, for the following project ("Project" or "Contract"):

Gateway Annex School

2. A Bidder and its subcontractors must possess the appropriate State of California contractors' license and must maintain the license throughout the duration of the project. Bidders must also be registered as a public works contractor with the Department of Industrial Relations pursuant to the Labor Code. Bids submitted by a contractor who is not properly licensed or registered shall be deemed nonresponsive and will not be considered.

3. Pursuant to Public Contract Code section 20111.5., only prequalified bidders will be eligible to submit a bid for this Project. Any bid submitted by a bidder who is not prequalified shall be deemed nonresponsive and will not be considered.

4. VCOE will receive sealed bids from bidders as stipulated in the Notice to Bidders.

    a. All bids must be sealed in an envelope, marked with the name and address of the Bidder, name of the Project, the Project Number and/or bid number, and time of bid opening.

    b. Bids must be submitted to the VCOE Office by date and time shown in the Notice to Bidders.

    c. Bids must contain all documents as required herein.

5. Bidders are advised that on the date that bids are opened, telephones will not be available at the VCOE Offices for use by bidders or their representatives.

6. Bids will be opened at or after the time indicated for receipt of bids.

7. Bidders must submit bids on the documents titled Bid Form and Proposal, and must submit all other required VCOE forms. Bids not submitted on the VCOE's required forms shall be deemed nonresponsive and shall not be considered. Additional sheets required to fully respond to requested information are permissible.

8. Bidders shall not modify the Bid Form and Proposal or qualify their bids. Bidders shall not submit to the VCOE a re-formatted, re-typed, altered, modified, or

otherwise recreated version of the Bid Form and Proposal or other VCOE-provided document.

9. Bids shall be clearly written and without erasure or deletions. VCOE reserves the right to reject any bid containing erasures, deletions, or illegible contents.

10. Bidders must supply all information required by each Bid Document. Bids must be full and complete. VCOE reserves the right in its sole discretion to reject any bid as nonresponsive as a result of any error or omission in the bid. Bidders must complete and submit all of the following documents with the Bid Form and Proposal:

    a. Bid Bond on the VCOE's form, or other security.

    b. Designated Subcontractors List.

    c. Site Visit Certification, if a site visit was required.

    d. Non-Collusion Declaration.

    e. Iran Contracting Act Certification, if contract value is $1,000,000 or more.

11. Bidders must submit with their bids cash, a cashier's check or a certified check payable to VCOE, or a bid bond by an admitted surety insurer of not less than ten percent (10%) of amount of Base Bid, plus all additive alternates ("Bid Bond"). If Bidder chooses to provide a Bid Bond as security, Bidder must use the required form of corporate surety provided by VCOE. The Surety on Bidder's Bid Bond must be an insurer admitted in the State of California and authorized to issue surety bonds in the State of California. Bids submitted without necessary bid security will be deemed nonresponsive and will not be considered.

12. If Bidder to whom the Contract is awarded fails or neglects to enter into the Contract and submit required bonds, insurance certificates, and all other required documents, within **SEVEN (7)** calendar days after the date of the Notice of Award, VCOE may deposit Bid Bond, cash, cashier's check, or certified check for collection, and proceeds thereof may be retained by VCOE as liquidated damages for failure of Bidder to enter into Contract, in the sole discretion of VCOE. It is agreed that calculation of damages VCOE may suffer as a result of Bidder's failure to enter into the Contract would be extremely difficult and impractical to determine and that the amount of the Bidder's required bid security shall be the agreed and conclusively presumed amount of damages.

13. Bidders must submit with the bid the Designated Subcontractors List for those subcontractors who will perform any portion of Work, including labor, rendering of service, or specially fabricating and installing a portion of the Work or improvement according to detailed drawings contained in the plans and specifications, in excess of one half of one percent (0.5%) of total bid. Failure to submit this list when required by law shall result in bid being deemed nonresponsive and the bid will not be considered.

14. All of the listed subcontractors are required to be registered as a public works contractor with the Department of Industrial Relations pursuant to the Labor Code.

    a. An inadvertent error in listing the California contractor license number on the Designated Subcontractors List shall not be grounds for filing a bid protest or grounds for considering the bid nonresponsive if the correct contractor's license number is submitted to the VCOE within 24 hours after the bid opening and the corrected number corresponds with the submitted name and location for that subcontractor.

    b. An inadvertent error listing an unregistered subcontractor shall not be grounds for filing a bid protest or grounds for considering the bid nonresponsive provided that any of the following apply:

        (1) The subcontractor is registered prior to the bid opening.

        (2) The subcontractor is registered and has paid the penalty registration fee within 24 hours after the bid opening.

        (3) The subcontractor is replaced by another registered subcontractor pursuant to Public Contract Code section 4107.

15. A mandatory pre-bid conference and site visit ("Site Visit") is required as referenced in the Notice to Bidders. Bidders must submit the Site Visit Certification with their Bid. VCOE will transmit to all prospective Bidders of record such Addenda as VCOE in its discretion considers necessary in response to questions arising at the Site Visit. Oral statements shall not be relied upon and will not be binding or legally effective. Addenda issued by the VCOE as a result of the Site Visit, if any, shall constitute the sole and exclusive record and statement of the results of the Site Visit.

16. Bidders shall submit the Non-Collusion Declaration with their bids. Bids submitted without the Non-Collusion Declaration shall be deemed nonresponsive and will not be considered.

17. The Contractor and all Subcontractors under the Contractor shall pay all workers on all work performed pursuant to the Contract not less than the general prevailing rate of per diem wages and the general prevailing rate for holiday and overtime work as determined by the Director of the Department of Industrial Relations, State of California, for the type of work performed and the locality in which the work is to be performed within the boundaries of the VCOE, pursuant to sections 1770 et seq. of the California Labor Code. Copies of the general prevailing rates of per diem wages for each craft, classification, or type of worker needed to execute the Contract, as determined by Director of the Department of Industrial Relations, are available upon request at the VCOE's principal office. Prevailing wage rates are also available on the internet at http://www.dir.ca.gov.

18. NOT USED.

19. Submission of bid signifies careful examination of Contract Documents and complete understanding of the nature, extent, and location of Work to be performed. Bidders must complete the tasks listed below as a condition to bidding, and submission of a

bid shall constitute the Bidder's express representation to VCOE that Bidder has fully completed the following:

a. Bidder has visited the Site, if required, and has examined thoroughly and understood the nature and extent of the Contract Documents, Work, Site, locality, actual conditions, as-built conditions, and all local conditions and federal, state and local laws, and regulations that in any manner may affect cost, progress, performance, or furnishing of Work or that relate to any aspect of the means, methods, techniques, sequences, or procedures of construction to be employed by Bidder and safety precautions and programs incident thereto;

b. Bidder has conducted or obtained and has understood all examinations, investigations, explorations, tests, reports, and studies that pertain to the subsurface conditions, as-built conditions, underground facilities, and all other physical conditions at or contiguous to the Site or otherwise that may affect the cost, progress, performance, or furnishing of Work, as Bidder considers necessary for the performance or furnishing of Work at the Contract Sum, within the Contract Time, and in accordance with the other terms and conditions of Contract Documents, including specifically the provisions of the General Conditions; and no additional examinations, investigations, explorations, tests, reports, studies, or similar information or data are or will be required by Bidder for such purposes;

c. Bidder has correlated its knowledge and the results of all such observations, examinations, investigations, explorations, tests, reports, and studies with the terms and conditions of the Contract Documents;

d. Bidder has given the VCOE prompt written notice of all conflicts, errors, ambiguities, or discrepancies that it has discovered in or among the Contract Documents and the actual conditions, and the written resolution(s) thereof by the VCOE is/are acceptable to Bidder;

e. Bidder has made a complete disclosure in writing to the VCOE of all facts bearing upon any possible interest, direct or indirect, that Bidder believes any representative of the VCOE or other officer or employee of the VCOE presently has or will have in this Contract or in the performance thereof or in any portion of the profits thereof;

f. Bidder must, prior to bidding, perform the work, investigations, research, and analysis required by this document and that Bidder represented in its Bid Form and Proposal and the Agreement that it performed prior to bidding. Contractor under this Contract is charged with all information and knowledge that a reasonable bidder would ascertain from having performed this required work, investigation, research, and analysis. Bid prices must include entire cost of all work "incidental" to completion of the Work.

g. Conditions Shown on the Contract Documents: Information as to underground conditions, as-built conditions, or other conditions or obstructions, indicated in the Contract Documents, e.g., on Drawings or in Specifications, has been obtained with reasonable care, and has been

recorded in good faith. However, VCOE only warrants, and Bidder may only rely, on the accuracy of limited types of information.

(1) As to above-ground conditions or as-built conditions shown or indicated in the Contract Documents, there is no warranty, express or implied, or any representation express or implied, that such information is correctly shown or indicated. This information is verifiable by independent investigation and Bidder is required to make such verification as a condition to bidding. In submitting its Bid, Bidder shall rely on the results of its own independent investigation. In submitting its Bid, Bidder shall not rely on VCOE-supplied information regarding above-ground conditions or as-built conditions.

(2) As to any subsurface condition shown or indicated in the Contract Documents, Bidder may rely only upon the general accuracy of actual reported depths, actual reported character of materials, actual reported soil types, actual reported water conditions, or actual obstructions shown or indicated. VCOE is not responsible for the completeness of such information for bidding or construction; nor is VCOE responsible in any way for any conclusions or opinions that the Bidder has drawn from such information; nor is the VCOE responsible for subsurface conditions that are not specifically shown (for example, VCOE is not responsible for soil conditions in areas contiguous to areas where a subsurface condition is shown).

20. Bids shall be based on products and systems specified in Contract Documents or listed by name in Addenda. Whenever in the Specifications any materials, process, or article is indicated or specified by grade, patent, or proprietary name, or by name of manufacturer, that Specification shall be deemed to be followed by the words "or equal." Bidder may, unless otherwise stated, offer any material, process, or article that shall be substantially equal or better in every respect to that so indicated or specified. The VCOE is not responsible and/or liable in any way for a Contractor's damages and/or claims related, in any way, to that Contractor's basing its bid on any requested substitution that the VCOE has not approved in advance and in writing. Contractors and materials suppliers who submit requests for substitutions prior to the award of the Contract must do so in writing and in compliance with Public Contract Code section 3400. All requests must comply with the following:

a. VCOE must receive any notice of request for substitution of a specified item a minimum of **TEN (10)** calendar days prior to bid opening. The Successful Bidder will not be allowed to substitute specified items unless properly noticed.

b. Approved substitutions, if any, shall be listed in Addenda. VCOE reserves the right not to act upon submittals of substitutions until after bid opening.

21. Bidders may examine any available "as-built" drawings of previous work by giving VCOE reasonable advance notice. VCOE will not be responsible for accuracy of "as-built" drawings. The document entitled Existing Conditions applies to all supplied "as-built" drawings.

22. All questions about the meaning or intent of the Contract Documents are to be directed via email to the VCOE to dfateh@vcoe.org. Interpretations or clarifications considered necessary by the VCOE in response to such questions will be issued in writing by Addenda and made available to all parties recorded by the VCOE as having received the Contract Documents. Questions received less than **SEVEN (7)** calendar days prior to the date for opening bids may not be answered. Only questions answered by formal written Addenda will be binding. Oral and other interpretations or clarifications will be without legal effect.

23. Addenda may also be issued to modify other parts of the Contract Documents as deemed advisable by the VCOE.

24. Each Bidder must acknowledge each Addendum in its Bid Form and Proposal by number or its Bid shall be considered non-responsive. Each Addendum shall be part of the Contract Documents. A complete listing of Addenda may be secured from the VCOE.

25. This Contract may include alternates. Alternates are defined as alternate products, materials, equipment, systems, methods, or major elements of the construction that may, at the VCOE's option and under terms established in the Contract and pursuant to section 20103.8 of the Public Contract Code, be selected for the Work.

26. The VCOE shall award the Contract, if it awards it at all, to the lowest responsive responsible bidder based on the criteria as indicated in the Notice to Bidders. In the event two or more responsible bidders submit identical bids, the VCOE shall select the Bidder to whom to award the Contract by lot.

27. Time for Completion: VCOE may issue a Notice to Proceed within **NINETY (90)** days from the date of the Notice of Award. Once Contractor has received the Notice to Proceed, Contractor shall complete the Work within the period of time indicated in the Contract Documents.

    a. In the event that the VCOE desires to postpone issuing the Notice to Proceed beyond this 90-day period, it is expressly understood that with reasonable notice to the Contractor, the VCOE may postpone issuing the Notice to Proceed.

    b. It is further expressly understood by Contractor that Contractor shall not be entitled to any claim of additional compensation as a result of the postponement of the issuance of the Notice to Proceed beyond a 90-day period. If the Contractor believes that a postponement of issuance of the Notice to Proceed will cause a hardship to the Contractor, the Contractor may terminate the Contract. Contractor's termination due to a postponement beyond this 90-day period shall be by written notice to VCOE within **TEN (10)** calendar days after receipt by Contractor of VCOE's notice of postponement.

    c. It is further understood by the Contractor that in the event that Contractor terminates the Contract as a result of postponement by the VCOE, the VCOE shall only be obligated to pay Contractor for the Work that Contractor had performed at the time of notification of postponement and which the VCOE had in writing authorized Contractor to perform prior to issuing a Notice to Proceed.

d. Should the Contractor terminate the Contract as a result of a notice of postponement, VCOE shall have the authority to award the Contract to the next lowest responsive responsible bidder.

28. The Bidder to whom Contract is awarded shall execute and submit the following documents by 5:00 p.m. of the **SEVENTH (7th)** calendar day following the date of the Notice of Award. Failure to properly and timely submit these documents entitles VCOE to reject the bid as nonresponsive.

a. Agreement: To be executed by successful Bidder. Submit three (3) copies, each bearing an original signature.

b. Performance Bond (100%): On the form provided in the Contract Documents and fully executed as indicated on the form.

c. Payment Bond (Contractor's Labor and Material Bond) (100%): On the form provided in the Contract Documents and fully executed as indicated on the form.

d. Insurance Certificates and Endorsements as required.

e. Workers' Compensation Certification.

f. Prevailing Wage and Related Labor Requirements Certification.

g. Drug-Free Workplace Certification.

h. Tobacco-Free Environment Certification.

i. Hazardous Materials Certification.

j. Criminal Background Investigation/Fingerprinting Certification.

k. Registered Subcontractors List: Must include Department of Industrial Relations (DIR) registration number of each subcontractor for all tiers.

29. Any bid protest by any Bidder regarding any other bid must be submitted in writing to the VCOE, before 5:00 p.m. of the **Fifth (5th.)** business day following bid opening.

a. Only a Bidder who has actually submitted a bid, and who could be awarded the Contract if the bid protest is upheld, is eligible to submit a bid protest. Subcontractors are not eligible to submit bid protests. A Bidder may not rely on the bid protest submitted by another Bidder.

b. A bid protest must contain a complete statement of any and all bases for the protest and all supporting documentation. Materials submitted after the bid protest deadline will not be considered.

c. The protest must refer to the specific portions of all documents that form the basis for the protest.

(1) Without limitation to any other basis for protest, an inadvertent error in listing the California contractor's license number on the Designated Subcontractors List shall not be grounds for filing a bid protest or grounds for considering the bid nonresponsive if the correct contractor's license number is submitted to the VCOE within 24 hours after the bid opening and the corrected number corresponds with the submitted name and location for that subcontractor.

(2) Without limitation to any other basis for protest, an inadvertent error listing an unregistered subcontractor shall not be grounds for filing a bid protest or grounds for considering the bid nonresponsive provided that any of the following apply:

(i) The subcontractor is registered prior to the bid opening.

(ii) The subcontractor is registered and has paid the penalty registration fee within 24 hours after the bid opening.

(iii) The subcontractor is replaced by another registered subcontractor pursuant to Public Contract Code section 4107.

d. The protest must include the name, address and telephone number of the person representing the protesting party.

e. The party filing the protest must concurrently transmit a copy of the protest and any attached documentation to all other parties with a direct financial interest that may be adversely affected by the outcome of the protest. Such parties shall include all other bidders or proposers who appear to have a reasonable prospect of receiving an award depending upon the outcome of the protest.

f. The procedure and time limits set forth in this paragraph are mandatory and are each bidder's sole and exclusive remedy in the event of bid protest. Failure to comply with these procedures shall constitute a waiver of any right to further pursue the bid protest, including filing a Government Code Claim or legal proceedings.

30. VCOE reserves the right to reject any or all bids, including without limitation the right to reject any or all nonconforming, nonresponsive, unbalanced, or conditional bids, to re-bid, and to reject the bid of any bidder if VCOE believes that it would not be in the best interest of the VCOE to make an award to that bidder, whether because the bid is not responsive or the bidder is unqualified or of doubtful financial ability or fails to meet any other pertinent standard or criteria established by VCOE. VCOE also reserves the right to waive any inconsequential deviations or irregularities in any bid. For purposes of this paragraph, an "unbalanced bid" is one having nominal prices for some work items and/or enhanced prices for other work items.

31. Discrepancies between written words and figures, or words and numerals, will be resolved in favor of figures or numerals.

32. It is the policy of the VCOE that no qualified person shall be excluded from participating in, be denied the benefits of, or otherwise be subjected to

discrimination in any consideration leading to the award of contract, based on race, color, gender, sexual orientation, political affiliation, age, ancestry, religion, marital status, national origin, medical condition or disability. The Successful Bidder and its subcontractors shall comply with applicable federal and state laws, including, but not limited to the California Fair Employment and Housing Act, beginning with Government Code section 12900, and Labor Code section 1735.

33. Prior to the award of Contract, VCOE reserves the right to consider the responsibility of the Bidder. VCOE may conduct investigations as VCOE deems necessary to assist in the evaluation of any bid and to establish the responsibility, including, without limitation, qualifications and financial ability of Bidders, proposed subcontractors, suppliers, and other persons and organizations to perform and furnish the Work in accordance with the Contract Documents to VCOE's satisfaction within the prescribed time.

34. **Disregard all references to the Deduct Alternate for Building C. There shall be no deduct alternate for this project. Include the full scope of work in your bid, including all requirements for the construction of Building C.**

END OF DOCUMENT

DOCUMENT 00 41 13

BID FORM AND PROPOSAL

To: Ventura County Office of Education ("VCOE" or "Owner")

From: _____
(Proper Name of Bidder)

The undersigned declares that Bidder has read and understands the Contract Documents, including, without limitation, the Notice to Bidders and the Instructions to Bidders, and agrees and proposes to furnish all necessary labor, materials, and equipment to perform and furnish all work in accordance with the terms and conditions of the Contract Documents, including, without limitation, the Drawings and Specifications of

Gateway Annex School ("Project" or "Contract") and will accept in full payment for that Work the following total lump sum amount, all taxes included:

TOTAL BASE BID

In words: _____

In numbers: $_____

Bidder acknowledges and agrees that the TOTAL BASE BID accounts for any and all costs (Bonds, taxes, insurances…etc.)

1. The undersigned has reviewed the Work outlined in the Contract Documents and fully understands the scope of Work required in this Proposal, understands the construction and project management function(s) is described in the Contract Documents, and that each Bidder who is awarded a contract shall be in fact a prime contractor, not a subcontractor, to the VCOE, and agrees that its Proposal, if accepted by the VCOE, will be the basis for the Bidder to enter into a contract with the VCOE in accordance with the intent of the Contract Documents.

2. The undersigned has notified the VCOE in writing of any discrepancies or omissions or of any doubt, questions, or ambiguities about the meaning of any of the Contract Documents, and has contacted the Construction Manager before bid date to verify the issuance of any clarifying Addenda.

3. The undersigned agrees to commence work under this Contract on the date established in the Contract Documents and to complete all work within the time specified in the Contract Documents.

4. The liquidated damages clause of the General Conditions and Agreement is hereby acknowledged.

5. It is understood that the VCOE reserves the right to reject this bid and that the bid shall remain open to acceptance and is irrevocable for a period of ninety (90) days.

6. The following documents are attached hereto:

   - Bid Bond on the VCOE's form or other security
   - Designated Subcontractors List
   - Site Visit Certification
   - Non-Collusion Declaration
   - Iran Contracting Act Certification, if contract value is $1,000,000 or more

7. Receipt and acceptance of the following Addenda is hereby acknowledged:

No. _____, Dated _____	No. _____, Dated _____
No. _____, Dated _____	No. _____, Dated _____
No. _____, Dated _____	No. _____, Dated _____

8. Bidder acknowledges that the license required for performance of the Work is a **B** Contractor license.

9. The undersigned hereby certifies that Bidder is able to furnish labor that can work in harmony with all other elements of labor employed or to be employed on the Work.

10. Bidder specifically acknowledges and understands that if it is awarded the Contract, that it shall perform the Work of the Project while complying with all requirements of the Department of Industrial Relations.

11. The Bidder represents that it is competent, knowledgeable, and has special skills with respect to the nature, extent, and inherent conditions of the Work to be performed. Bidder further acknowledges that there are certain peculiar and inherent conditions existent in the construction of the Work that may create, during the Work, unusual or peculiar unsafe conditions hazardous to persons and property.

12. Bidder expressly acknowledges that it is aware of such peculiar risks and that it has the skill and experience to foresee and to adopt protective measures to adequately and safely perform the Work with respect to such hazards.

13. Bidder expressly acknowledges that it is aware that if a false claim is knowingly submitted (as the terms "claim" and "knowingly" are defined in the California False Claims Act, Gov. Code, § 12650 et seq.), the VCOE will be entitled to civil remedies set forth in the California False Claim Act. It may also be considered fraud and the Contractor may be subject to criminal prosecution.

14. The undersigned Bidder certifies that it is, at the time of bidding, and shall be throughout the period of the Contract, licensed by the State of California to do the type of work required under the terms of the Contract Documents and registered as a public works contractor with the Department of Industrial Relations. Bidder further certifies that it is regularly engaged in the general class and type of work called for in the Contract Documents.

Furthermore, Bidder hereby certifies to the VCOE that all representations, certifications, and statements made by Bidder, as set forth in this bid form, are true and correct and are made under penalty of perjury.

Dated this _____ day of _____ 20 ____

Name of Bidder: _____

Type of Organization: _____

Signed by: _____

Title of Signer: _____

Address of Bidder: _____

Taxpayer Identification No. of Bidder: _____

Telephone Number: _____

Fax Number: _____

E-mail: _____ Web Page: _____

Contractor's License No(s): No.: _____ Class: _____ Expiration Date: _____

DIR Registration No. _____

Public Works Contractor Registration No.: _____

END OF DOCUMENT

DOCUMENT 00 43 13

BID BOND

(Note: If Bidder is providing a bid bond as its bid security, Bidder must use this form, NOT a surety company form.)

KNOW ALL PERSONS BY THESE PRESENTS:

That the undersigned,_____, as Principal ("Principal"),

and _____, as Surety ("Surety"), a corporation organized and existing under and by virtue of the laws of the State of California and authorized to do business as a surety in the State of California, are held and firmly bound unto the Ventura County Office of Education ("VCOE") of Ventura County, State of California, as Obligee, in an amount equal to ten percent (10%) of the Base Bid plus alternates, in the sum of

_____ Dollars ($ _____)

lawful money of the United States of America, for the payment of which sum well and truly to be made, we, and each of us, bind ourselves, our heirs, executors, administrators, successors, and assigns, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION IS SUCH that whereas the Principal has submitted a bid to the VCOE for all Work specifically described in the accompanying bid for the following project: **Gateway Annex School** ("Project" or "Contract").

NOW, THEREFORE, if the Principal is awarded the Contract and, within the time and manner required under the Contract Documents, after the prescribed forms are presented to Principal for signature, enters into a written contract, in the prescribed form in accordance with the bid, and files two bonds, one guaranteeing faithful performance and the other guaranteeing payment for labor and materials as required by law, and meets all other conditions to the Contract between the Principal and the Obligee becoming effective, or if the Principal shall fully reimburse and save harmless the Obligee from any damage sustained by the Obligee through failure of the Principal to enter into the written contract and to file the required performance and labor and material bonds, and to meet all other conditions to the Contract between the Principal and the Obligee becoming effective, then this obligation shall be null and void; otherwise, it shall be and remain in full force and effect. The full payment of the sum stated above shall be due immediately if Principal fails to execute the Contract within seven (7) days of the date of the VCOE's Notice of Award to Principal.

Surety, for value received, hereby stipulates and agrees that no change, extension of time, alteration or addition to the terms of the Contract or the call for bids, or to the work to be performed thereunder, or the specifications accompanying the same, shall in any way affect its obligation under this bond, and it does hereby waive notice of any such change, extension of time, alteration or addition to the terms of the Contract or the call for bids, or to the work, or to the specifications.

In the event suit is brought upon this bond by the Obligee and judgment is recovered, the Surety shall pay all costs incurred by the Obligee in such suit, including a reasonable attorneys' fee to be fixed by the Court.

If the VCOE awards the bid, the security of unsuccessful bidder(s) shall be returned within sixty (60) days from the time the award is made. Unless otherwise required by law, no bidder may withdraw its bid for ninety (90) days after the date of the bid opening.

IN WITNESS WHEREOF, this instrument has been duty executed by the Principal and Surety above named, on the _____ day of _____, 20___.

_____
Principal

_____
By

_____
Surety

_____
By

_____
Name of California Agent of Surety

_____
Address of California Agent of Surety

_____
Telephone Number of California Agent of Surety

Bidder must attach Power of Attorney and Certificate of Authority for Surety and a Notarial Acknowledgment for all Surety's signatures. The California Department of Insurance must authorize the Surety to be an admitted Surety Insurer.

END OF DOCUMENT

DOCUMENT 00 43 36

DESIGNATED SUBCONTRACTORS LIST
(Public Contact Code Sections 4100-4114)

Gateway Annex School

Bidder acknowledges and agrees that it must clearly set forth below the name, location and California contractor license number of each subcontractor who will perform work or labor or render service to the Bidder in or about the construction of the Work or who will specially fabricate and install a portion of the Work according to detailed drawings contained in the plans and specifications in an amount in excess of one-half of one percent (0.5%) of Bidder's total Base Bid and the kind of Work that each will perform. Vendors or suppliers of materials only do not need to be listed.

Bidder acknowledges and agrees that, if Bidder fails to list as to any portion of Work, or if Bidder lists more than one subcontractor to perform the same portion of Work, Bidder must perform that portion itself or be subjected to penalty under applicable law. In case more than one subcontractor is named for the same kind of Work, state the portion of the kind of Work that each subcontractor will perform.

If alternate bid(s) is/are called for and Bidder intends to use subcontractors different from or in addition to those subcontractors listed for work under the Base Bid, Bidder must list subcontractors that will perform Work in an amount in excess of one half of one percent (0.5%) of Bidder's total Base Bid plus alternate(s).

If further space is required for the list of proposed subcontractors, attach additional copies of page 2 showing the required information, as indicated below.

Subcontractor Name: _____

CA Cont. Lic. #: _____ Location: _____

Portion of Work: _____

Subcontractor Name: _____

CA Cont. Lic. #: _____ Location: _____

Portion of Work: _____

Subcontractor Name: _____

CA Cont. Lic. #: _____ Location: _____

Portion of Work: _____

Subcontractor Name: _____

CA Cont. Lic. #: _____ Location: _____

Portion of Work: _____

Subcontractor Name: _____

CA Cont. Lic. #: _____ Location: _____

Portion of Work: _____

Subcontractor Name: _____

CA Cont. Lic. #: _____ Location: _____

Portion of Work: _____

Subcontractor Name: _____

CA Cont. Lic. #: _____ Location: _____

Portion of Work: _____

Subcontractor Name: _____

CA Cont. Lic. #: _____ Location: _____

Portion of Work: _____

Subcontractor Name: _____

CA Cont. Lic. #: _____ Location: _____

Portion of Work: _____

Subcontractor Name: _____

CA Cont. Lic. #: _____ Location: _____

Portion of Work: _____

Subcontractor Name: _____

CA Cont. Lic. #: _____ Location: _____

Portion of Work: _____

Date: _____

Proper Name of Bidder: _____

Signature: _____

Print Name: _____

Title: _____

END OF DOCUMENT

CONDITIONAL WAIVER AND RELEASE ON PROGRESS PAYMENT

NOTICE: THIS DOCUMENT WAIVES THE CLAIMANT'S LIEN, STOP PAYMENT NOTICE, AND PAYMENT BOND RIGHTS EFFECTIVE ON RECEIPT OF PAYMENT. A PERSON SHOULD NOT RELY ON THIS DOCUMENT UNLESS SATISFIED THAT THE CLAIMANT HAS RECEIVED PAYMENT.

Identifying Information

Name of Claimant:

Name of Customer:

Job Location:

Owner:

Through Date:

Conditional Waiver and Release

This document waives and releases lien, stop payment notice, and payment bond rights the claimant has for labor and service provided, and equipment and material delivered, to the customer on this job through the Through Date of this document. Rights based upon labor or service provided, or equipment or material delivered, pursuant to a written change order that has been fully executed by the parties prior to the date that this document is signed by the claimant, are waived and released by this document, unless listed as an Exception below. This document is effective only on the claimant's receipt of payment from the financial institution on which the following check is drawn:

Maker of Check:

Amount of Check: $

Check Payable to:

Exceptions

This document does not affect any of the following:
(1) Retentions.
(2) Extras for which the claimant has not received payment.
(3) The following progress payments for which the claimant has previously given a conditional waiver and release but has not received payment:
Date(s) of waiver and release:_____
Amount(s) of unpaid progress payment(s): $_____
(4) Contract rights, including (A) a right based on rescission, abandonment, or breach of contract, and (B) the right to recover compensation for work not compensated by the payment.

Signature

Claimant's Signature:

Claimant's Title:

Date of Signature:

UNCONDITIONAL WAIVER AND RELEASE ON PROGRESS PAYMENT

NOTICE TO CLAIMANT: THIS DOCUMENT WAIVES AND RELEASES LIEN, STOP PAYMENT NOTICE, AND PAYMENT BOND RIGHTS UNCONDITIONALLY AND STATES THAT YOU HAVE BEEN PAID FOR GIVING UP THOSE RIGHTS. THIS DOCUMENT IS ENFORCEABLE AGAINST YOU IF YOU SIGN IT, EVEN IF YOU HAVE NOT BEEN PAID. IF YOU HAVE NOT BEEN PAID, USE A CONDITIONAL WAIVER AND RELEASE FORM.

Identifying Information
Name of Claimant:
Name of Customer:
Job Location:
Owner:
Through Date:

Unconditional Waiver and Release

This document waives and releases lien, stop payment notice, and payment bond rights the claimant has for labor and service provided, and equipment and material delivered, to the customer on this job through the Through Date of this document. Rights based upon labor or service provided, or equipment or material delivered, pursuant to a written change order that has been fully executed by the parties prior to the date that this document is signed by the claimant, are waived and released by this document, unless listed as an Exception below. The claimant has received the following progress payment:

$_____

Exceptions

This document does not affect any of the following:

(1) Retentions.

(2) Extras for which the claimant has not received payment.

(3) Contract rights, including (A) a right based on rescission, abandonment, or breach of contract, and (B) the right to recover compensation for work not compensated by the payment.

Signature
Claimant's Signature:
Claimant's Title:
Date of Signature:

CONDITIONAL WAIVER AND RELEASE ON FINAL PAYMENT

NOTICE: THIS DOCUMENT WAIVES THE CLAIMANT'S LIEN, STOP PAYMENT NOTICE, AND PAYMENT BOND RIGHTS EFFECTIVE ON RECEIPT OF PAYMENT. A PERSON SHOULD NOT RELY ON THIS DOCUMENT UNLESS SATISFIED THAT THE CLAIMANT HAS RECEIVED PAYMENT.

Identifying Information
Name of Claimant:
Name of Customer:
Job Location:
Owner:

Conditional Waiver and Release

This document waives and releases lien, stop payment notice, and payment bond rights the claimant has for labor and service provided, and equipment and material delivered, to the customer on this job. Rights based upon labor or service provided, or equipment or material delivered, pursuant to a written change order that has been fully executed by the parties prior to the date that this document is signed by the claimant, are waived and released by this document, unless listed as an Exception below. This document is effective only on the claimant's receipt of payment from the financial institution on which the following check is drawn:

Maker of Check:
Amount of Check: $
Check Payable to:

Exceptions
This document does not affect any of the following: Disputed claims for extras in the amount of: $

Signature
Claimant's Signature:
Claimant's Title:
Date of Signature:

UNCONDITIONAL WAIVER AND RELEASE ON FINAL PAYMENT

NOTICE TO CLAIMANT: THIS DOCUMENT WAIVES AND RELEASES LIEN, STOP PAYMENT NOTICE, AND PAYMENT BOND RIGHTS UNCONDITIONALLY AND STATES THAT YOU HAVE BEEN PAID FOR GIVING UP THOSE RIGHTS. THIS DOCUMENT IS ENFORCEABLE AGAINST YOU IF YOU SIGN IT, EVEN IF YOU HAVE NOT BEEN PAID. IF YOU HAVE NOT BEEN PAID, USE A CONDITIONAL WAIVER AND RELEASE FORM.

Identifying Information
Name of Claimant:
Name of Customer:
Job Location:
Owner:

Unconditional Waiver and Release

This document waives and releases lien, stop payment notice, and payment bond rights the claimant has for all labor and service provided, and equipment and material delivered, to the customer on this job. Rights based upon labor or service provided, or equipment or material delivered, pursuant to a written change order that has been fully executed by the parties prior to the date that this document is signed by the claimant, are waived and released by this document, unless listed as an Exception below. The claimant has been paid in full.

Exceptions
This document does not affect any of the following: Disputed claims for extras in the amount of: $

Signature
Claimant's Signature:
Claimant's Title:
Date of Signature:

DOCUMENT 00 45 01

SITE VISIT CERTIFICATION

TO BE EXECUTED BY BIDDER AND SUBMITTED WITH BID
SITE VISIT IS MANDATORY

Gateway Annex School

Check option that applies:

_____ I certify that I visited the Site of the proposed Work and became fully acquainted with the conditions relating to construction and labor. I fully understand the facilities, difficulties, and restrictions attending the execution of the Work under contract.

_____ I certify that _____ (Bidder's representative) visited the Site of the proposed Work and became fully acquainted with the conditions relating to construction and labor. The Bidder's representative fully understood the facilities, difficulties, and restrictions attending the execution of the Work under contract.

Bidder fully indemnifies the Ventura County Office of Education, its Architect, its Engineer, its Construction Manager, and all of their respective officers, agents, employees, and consultants from any damage, or omissions, related to conditions that could have been identified during my visit and/or the Bidder's representative's visit to the Site.

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

Date: _____

Proper Name of Bidder: _____

Signature: _____

Print Name: _____

Title: _____

END OF DOCUMENT

DOCUMENT 00 45 19

NON-COLLUSION DECLARATION
(Public Contract Code Section 7106)

Gateway Annex School ("Contract" or "Project") between the Ventura County Office of Education ("VCOE") and _____ ("Contractor").

The undersigned declares:

I am the _____ of _____, the party making the foregoing bid.
[Title] [Name of Firm]

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]

Date: _____

Proper Name of Bidder: _____

Signature: _____

Print Name: _____

Title: _____

END OF DOCUMENT

DOCUMENT 00 45 19.01

IRAN CONTRACTING ACT CERTIFICATION
(Public Contract Code Sections 2202-2208)

PROJECT/CONTRACT NO.: Gateway Annex School between the Ventura County Office of Education ("VCOE") and _____ ("Contractor" or "Bidder") ("Contract" or "Project").

Prior to bidding on or submitting a proposal for a contract for goods or services of $1,000,000 or more, the bidder/proposer must submit this certification pursuant to Public Contract Code section 2204.

The bidder/proposer must complete **ONLY ONE** of the following two options. To complete OPTION 1, check the corresponding box **and** complete the certification below. To complete OPTION 2, check the corresponding box, complete the certification below, and attach documentation demonstrating the exemption approval.

☐ **OPTION 1.** Bidder/Proposer 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 we are 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.

☐ **OPTION 2.** Bidder/Proposer has received a written exemption from the certification requirement pursuant to Public Contract Code sections 2203(c) and (d). *A copy of the written documentation demonstrating the exemption approval is included with our bid/proposal.*

CERTIFICATION:

I, the official named below, CERTIFY UNDER PENALTY OF PERJURY, that I am duly authorized to legally bind the bidder/proposer to the OPTION selected above. This certification is made under the laws of the State of California.

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

END OF DOCUMENT

DOCUMENT 00 45 26

WORKERS' COMPENSATION CERTIFICATION

Gateway Annex School ("Contract" or "Project") between the Ventura County Office of Education ("VCOE") and _____("Contractor").

Labor Code section 3700, in relevant part, provides:

> Every employer except the State shall secure the payment of compensation in one or more of the following ways:
>
> a. By being insured against liability to pay compensation by one or more insurers duly authorized to write compensation insurance in this state; and/or
>
> b. By securing from the Director of Industrial Relations a certificate of consent to self-insure, which may be given upon furnishing proof satisfactory to the Director of Industrial Relations of ability to self-insure and to pay any compensation that may become due to his employees.

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

Date: _____

Proper Name of Contractor: _____

Signature: _____

Print Name: _____

Title: _____

(In accordance with Labor Code sections 1860 and 1861, the above certificate must be signed and filed with the awarding body prior to performing any Work under this Contract.)

END OF DOCUMENT

DOCUMENT 00 45 46.01

PREVAILING WAGE AND RELATED LABOR REQUIREMENTS CERTIFICATION

Gateway Annex School ("Contract" or "Project") between the Ventura County Office of Education ("VCOE") and _____(Contractor)

I hereby certify that I will conform to the State of California Public Works Contract requirements regarding prevailing wages, benefits, on-site audits with 48-hours' notice, payroll records, and apprentice and trainee employment requirements, for all Work on the above Project including, without limitation, labor compliance monitoring and enforcement by the Department of Industrial Relations.

Date: _____

Proper Name of Contractor: _____

Signature: _____

Print Name: _____

Title: _____

END OF DOCUMENT

DOCUMENT 00 45 46.02

DISABLED VETERAN BUSINESS ENTERPRISE PARTICIPATION CERTIFICATION

Bid 2026-06 Gateway Annex School

between the Ventura County Office of Education ("District") and

_____ ("Contractor" or "Bidder")
("Contract" or "Project").

GENERAL INSTRUCTIONS

Section 17076.11 of the Education Code requires school districts using, or planning to use, funds allocated pursuant to the State of California School Facility Program ("Program") for the construction and/or modernization of school buildings to have a participation goal for disabled veteran business enterprises ("DVBE") of at least three percent (3%) per year of the overall dollar amount expended each year by the school district on projects that receive state funding. Therefore, the lowest responsive responsible Bidder awarded the Contract must submit this document to the District with its executed Agreement, identifying the steps contractor took to solicit DVBE participation in conjunction with this Contract. **Do not submit this form with your bids.**

PART I – Method of Compliance with DVBE Participation Goals. Check the appropriate box to indicate your method of committing the contract dollar amount.

YOUR BUSINESS ENTERPRISE IS:	**AND YOU WILL**	**AND YOU WILL**
A. ☐ Disabled veteran owned and your forces will perform at least 3% of this Contract	Include a copy of your DVBE letter from Office of Small Business and Disabled Veterans Business Enterprise Services ("OSDS")*	Complete Part 1 of this form and the Certification
B. ☐ Disabled veteran owned but is unable to perform 3% of this Contract with your forces	Use DVBE subcontractors /suppliers to bring the Contract participation to at least 3%	Include a copy of each DVBE's letter from OSDS (including yours, if applicable), and complete Part 1 of this form and the Certification
C. ☐ **NOT** disabled veteran owned	Use DVBE subcontractors /suppliers for at least 3% of this Contract	
D. ☐ Unable to meet the required participation goals	Complete all of this form and the Certification	

* A DVBE letter from OSDS is obtained from the participating DVBE.

You must complete the following table to show the dollar amount of DVBE participation:

	TOTAL CONTRACT PRICE
A. Prime Bidder, if DVBE (own participation)	$
B. DVBE Subcontractor or Supplier	
1.	
2.	
3.	
4.	
C. Subtotal (A & B)	
D. Non-DVBE	
E. Total Bid	

PART II – Contacts. To identify DVBE subcontractors/suppliers for participation in your contract, you must contact each of the following categories. You should contact several DVBE organizations.

CATEGORY	**TELEPHONE NUMBER**	**DATE CONTACTED**	**PERSON CONTACTED**
1. The District, if any			*
2. OSDS, provides assistance locating DVBEs at https://caleprocure.ca.gov/pages/PublicSearch/supplier-search.aspx	(916) 375-4940		*
3. DVBE Organization (List)			*

*Write "recorded message" in this column, if applicable.

PART III – Advertisement. You must advertise for DVBE participation in both a trade and focus paper. List the advertisement you place to solicit DVBE participation. Advertisements should be published at least fourteen (14) days prior to bid/proposal opening; if you cannot advertise fourteen (14) days prior, advertisements should be published as soon as possible. Advertisements must include that your firm is seeking DVBE participation, the project name and location, and your firm's name, your contact person, and telephone number. Attach copies of advertisements to this form.

FOCUS/TRADE PAPER NAME	**CHECK ONE**		**DATE OF ADVERTISEMENT**
	TRADE	**FOCUS**	

PART IV – DVBE Solicitations. List DVBE subcontractors/suppliers that were invited to bid. Use the following instructions to complete the remainder of this section (read the three columns as a sentence from left to right). If you need additional space to list DVBE solicitations, please use a separate page and attach to this form.

IF THE DVBE…..	**THEN…..**	**AND…..**
was selected to participate	Check "YES" in the "SELECTED" column	include a copy of their DVBE letter(s) from OSDS
was **NOT** selected to participate	Check "NO" in the "SELECTED" column	state why in the "REASON NOT SELECTED" column
did not respond to your solicitation	Check the "NO RESPONSE" column.	

DVBE CONTACTED	**SELECTED**		**REASON NOT SELECTED**	**NO RESPONSE**
	YES	**NO**		

A copy of this form must be retained by you and may be subject to a future audit.

CERTIFICATION

I, _____, certify that I am the bidder's _____ and that I have made a diligent effort to ascertain the facts with regard to the representations made herein. In making this certification, I am aware of section 12650 et seq. of the Government Code providing for the imposition of treble damages for making false claims.

Date: _____

Proper Name of Contractor: _____

Signature: _____

Print Name: _____

Title: _____

END OF DOCUMENT

DOCUMENT 00 45 46.03

DRUG-FREE WORKPLACE CERTIFICATION

Gateway Annex School ("Contract" or "Project") between the Ventura County Office of Education ("VCOE") and _____"Contractor").

This Drug-Free Workplace Certification form is required from the successful Bidder pursuant to Government Code section 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 or grant for the procurement of any property or service 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 or grant awarded by a state agency may be subject to suspension of payments or termination of the contract or grant, and the contractor or grantee may be subject to debarment from future contracting, if the contracting agency determines that specified acts have occurred.

The VCOE is not a "state agency" as defined in the applicable section(s) of the Government Code, but the VCOE is a local agency and public school VCOE under California law and requires all contractors on VCOE projects to comply with the provisions and requirements of the Drug-Free Workplace Act of 1990.

Contractor 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 or grant be given a copy of the statement required above, and that, as a condition of employment on the contract or grant, 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.

I also understand that if the VCOE 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 termination, suspension of payments, 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 the aforementioned Act.

I acknowledge that I am aware of the provisions of and hereby certify that I will adhere to the requirements of the Drug-Free Workplace Act of 1990.

Date: _____

Proper Name of Contractor: _____

Signature: _____

Print Name: _____

Title: _____

END OF DOCUMENT

DOCUMENT 00 45 46.04

TOBACCO-FREE ENVIRONMENT CERTIFICATION

Gateway Annex School ("Contract" or "Project") between the Ventura County Office of Education ("VCOE") and_____ ("Contractor").

This Tobacco-Free Environment Certification form is required from the successful Bidder.

Pursuant to, without limitation, 20 U.S.C section 6083, Labor Code section 6400 et seq., Health & Safety Code section 104350 et seq., and VCOE Board policies, all VCOE sites, including the Project site, are tobacco-free environments. Smoking and the use of tobacco products by all persons is prohibited on or in VCOE property. VCOE property includes school buildings, school grounds, school-owned vehicles and vehicles owned by others while on VCOE property.

I acknowledge that I am aware of the VCOE's policy regarding tobacco-free environments at VCOE sites, including the Project site and hereby certify that I will adhere to the requirements of that policy and not permit any of my firm's employees, agents, subcontractors, or my firm's subcontractors' employees or agents, to use tobacco and/or smoke on the Project site.

Date: _____

Proper Name of Contractor: _____

Signature: _____

Print Name: _____

Title: _____

END OF DOCUMENT

DOCUMENT 00 45 46.05

HAZARDOUS MATERIALS CERTIFICATION

Gateway Annex School ("Contract" or "Project") between Ventura County Office of Education ("VCOE") and J & H Engineering General Contractors, Inc.("Contractor").

1. Contractor hereby certifies that no asbestos, or asbestos-containing materials, polychlorinated biphenyl (PCB), or any material listed by the federal or state Environmental Protection Agency or federal or state health agencies as a hazardous material, or any other material defined as being hazardous under federal or state laws, rules, or regulations, ("New Hazardous Material"), shall be furnished, installed, or incorporated in any way into the Project or in any tools, devices, clothing, or equipment used to affect any portion of Contractor's work on the Project for VCOE.

2. Contractor further certifies that it has instructed its employees with respect to the above-mentioned standards, hazards, risks, and liabilities.

3. Asbestos and/or asbestos-containing material shall be defined as all items containing but not limited to chrysotile, crocidolite, amosite, anthophyllite, tremolite, and actinolite. Any or all material containing greater than one-tenth of one percent (0.1%) asbestos shall be defined as asbestos-containing material.

4. Any disputes involving the question of whether or not material is New Hazardous Material shall be settled by electron microscopy or other appropriate and recognized testing procedure, at the VCOE's determination. The costs of any such tests shall be paid by Contractor if the material is found to be New Hazardous Material.

5. All Work or materials found to be New Hazardous Material or Work or material installed with equipment containing New Hazardous Material will be immediately rejected and this Work will be removed at Contractor's expense at no additional cost to the VCOE.

6. Contractor has read and understood the document titled Hazardous Materials Procedures & Requirements, and shall comply with all the provisions outlined therein.

Date: _____

Proper Name of Contractor: _____

Signature: _____

Print Name: _____

Title: _____

END OF DOCUMENT

DOCUMENT 00 45 46.06

LEAD-BASED MATERIALS CERTIFICATION

PROJECT/CONTRACT NO.: **Gateway Annex School** between the Ventura County Office of Education ("VCOE") and _____(Contractor" or "Bidder") ("Contract" or "Project").

This certification provides notice to the Contractor that:

(1) Contractor's work may disturb lead-containing building materials.

(2) Contractor shall notify the VCOE if any work may result in the disturbance of lead-containing building materials.

(3) Contractor shall comply with the Renovation, Repair and Painting Rule, if lead-based paint is disturbed in a six-square-foot or greater area indoors or a 20-square-foot or greater area outdoors.

1. Lead as a Health Hazard

Lead poisoning is recognized as a serious environmental health hazard facing children today. Even at low levels of exposure, much lower than previously believed, lead can impair the development of a child's central nervous system, causing learning disabilities, and leading to serious behavioral problems. Lead enters the environment as tiny lead particles and lead dust disburses when paint chips, chalks, peels, wears away over time, or is otherwise disturbed. Ingestion of lead dust is the most common pathway of childhood poisoning; lead dust gets on a child's hands and toys and then into a child's mouth through common hand-to-mouth activity. Exposures may result from construction or remodeling activities that disturb lead paint, from ordinary wear and tear of windows and doors, or from friction on other surfaces.

Ordinary construction and renovation or repainting activities carried out without lead-safe work practices can disturb lead-based paint and create significant hazards. Improper removal practices, such as dry scraping, sanding, or water blasting painted surfaces, are likely to generate high volumes of lead dust.

Because the Contractor and its employees will be providing services for the VCOE, and because the Contractor's work may disturb lead-containing building materials, CONTRACTOR IS HEREBY NOTIFIED of the potential presence of lead-containing materials located within certain buildings utilized by the VCOE. All school buildings built prior to 1978 are presumed to contain some lead-based paint until sampling proves otherwise.

2. Overview of California Law

Education Code section 32240 et seq. is known as the Lead-Safe Schools Protection Act. Under this act, the Department of Health Services is to conduct a sample

survey of schools in the State of California for the purpose of developing risk factors to predict lead contamination in public schools. (Ed. Code, § 32241.)

Any school that undertakes any action to abate existing risk factors for lead is required to utilize trained and state-certified contractors, inspectors, and workers. (Ed. Code, § 32243, subd. (b).) Moreover, lead-based paint, lead plumbing, and solders, or other potential sources of lead contamination, shall not be utilized in the construction of any new school facility or the modernization or renovation of any existing school facility. (Ed. Code, § 32244.)

Both the Federal Occupational Safety and Health Administration ("Fed/OSHA") and the California Division of Occupational Safety and Health ("Cal/OSHA") have implemented safety orders applicable to all construction work where a contractor's employee may be occupationally exposed to lead.

The OSHA Regulations apply to all construction work where a contractor's employee may be occupationally exposed to lead. The OSHA Regulations contain specific and detailed requirements imposed on contractors subject to those regulations. The OSHA Regulations define construction work as work for construction, alteration, and/or repair, including painting and decorating. Regulated work includes, but is not limited to, the following:

a. Demolition or salvage of structures where lead or materials containing lead are present;

b. Removal or encapsulation of materials containing lead;

c. New construction, alteration, repair, or renovation of structures, substrates, or portions thereof, that contain lead, or materials containing lead;

d. Installation of products containing lead;

e. Lead contamination/emergency cleanup;

f. Transportation, disposal, storage, or containment of lead or materials containing lead on the site or location at which construction activities are performed; and

g. Maintenance operations associated with the construction activities described in the subsection.

Because it is assumed by the VCOE that all painted surfaces (interior as well as exterior) within the VCOE contain some level of lead, it is imperative that the Contractor, its workers and subcontractors fully and adequately comply with all applicable laws, rules and regulations governing lead-based materials (including title 8, California Code of Regulations, section 1532.1).

Contractor shall notify the VCOE if any Work may result in the disturbance of lead-containing building materials. Any and all Work that may result in the disturbance of lead-containing building materials shall be coordinated

through the VCOE. A signed copy of this Certification shall be on file prior to beginning Work on the Project, along with all current insurance certificates.

3. Renovation, Repair and Painting Rule, Section 402(c)(3) of the Toxic Substances Control Act

The EPA requires lead safe work practices to reduce exposure to lead hazards created by renovation, repair and painting activities that disturb lead-based paint. Pursuant to the Renovation, Repair and Painting Rule (RRP), renovations in homes, childcare facilities, and schools built prior to 1978 must be conducted by certified renovations firms, using renovators with training by a EPA-accredited training provider, and fully and adequately complying with all applicable laws, rules and regulations governing lead-based materials, including those rules and regulations appearing within title 40 of the Code of Federal Regulations as part 745 (40 CFR 745).

The RRP requirements apply to all contractors who disturb lead-based paint in a six-square-foot or greater area indoors or a 20-square-foot or greater area outdoors. If a DPH-certified inspector or risk assessor determines that a home constructed before 1978 is lead-free, the federal certification is not required for anyone working on that particular building.

4. Contractor's Liability

If the Contractor fails to comply with any applicable laws, rules, or regulations, and that failure results in a site or worker contamination, the Contractor will be held solely responsible for all costs involved in any required corrective actions, and shall defend, indemnify, and hold harmless the VCOE, pursuant to the indemnification provisions of the Contract, for all damages and other claims arising therefrom.

If lead disturbance is anticipated in the Work, only persons with appropriate accreditation, registrations, licenses, and training shall conduct this Work.

It shall be the responsibility of the Contractor to properly dispose of any and all waste products, including, but not limited to, paint chips, any collected residue, or any other visual material that may occur from the prepping of any painted surface. It will be the responsibility of the Contractor to provide the proper disposal of any hazardous waste by a certified hazardous waste hauler. This company shall be registered with the Department of Transportation (DOT) and shall be able to issue a current manifest number upon transporting any hazardous material from any school site within the VCOE.

The Contractor shall provide the VCOE with any sample results prior to beginning Work, during the Work, and after the completion of the Work. The VCOE may request to examine, prior to the commencement of the Work, the lead training records of each employee of the Contractor.

THE CONTRACTOR HEREBY ACKNOWLEDGES, UNDER PENALTY OF PERJURY, THAT IT:

1. HAS RECEIVED NOTIFICATION OF POTENTIAL LEAD-BASED MATERIALS ON THE OWNER'S PROPERTY;

2. IS KNOWLEDGEABLE REGARDING AND WILL COMPLY WITH ALL APPLICABLE LAWS, RULES, AND REGULATIONS GOVERNING WORK WITH, AND DISPOSAL, OF LEAD.

THE UNDERSIGNED WARRANTS THAT HE/SHE HAS THE AUTHORITY TO SIGN ON BEHALF OF AND BIND THE CONTRACTOR. THE VCOE MAY REQUIRE PROOF OF SUCH AUTHORITY.

Date: _____

Proper Name of Contractor: _____

Signature: _____

Print Name: _____

Title: _____

END OF DOCUMENT

DOCUMENT 00 45 46.07

IMPORTED MATERIALS CERTIFICATION

Gateway Annex School ("Contract" or "Project") between the Ventura County Office of Education ("VCOE") and _____("Contractor" or "Bidder").

This form shall be executed by all entities that, in any way, provide or deliver and/or supply any soils, aggregate, or related materials ("Fill") to the Project Site and shall be provided to the VCOE at least ten (10) days before delivery. All Fill shall satisfy all 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 all 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.

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 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 Firm: _____

Signature: _____

Print Name: _____

Title: _____ END OF DOCUMENT

DOCUMENT 00 45 46.08

CRIMINAL BACKGROUND INVESTIGATION /FINGERPRINTING CERTIFICATION

Gateway Annex School ("Contract" or "Project") between the Ventura County Office of Education ("VCOE") and _____("Contractor" or "Bidder").

The undersigned does hereby certify to the governing board of the VCOE as follows:

That I am a representative of the Contractor currently under contract with the VCOE; that I am familiar with the facts herein certified; and that I am authorized and qualified to execute this certificate on behalf of Contractor.

Contractor certifies that it has taken at least one of the following actions with respect to the construction Project that is the subject of the Contract (check all that apply):

☐ The Contractor is a sole proprietor and intends to comply with the fingerprinting requirements of Education Code section 45125.1(k) with respect to all Contractor's employees who may have contact with VCOE pupils in the course of providing services pursuant to the Contract, and hereby agrees to the VCOE's preparation and submission of fingerprints such that the California Department of Justice may determine that none of those employees has been convicted of a felony, as that term is defined in Education Code section 45122.1. No work shall commence until such determination by DOJ has been made.

☐ The Contractor, who is not a sole proprietor, has complied with the fingerprinting requirements of Education Code section 45125.1 with respect to all Contractor's employees and all of its Subcontractors' employees who may have contact with VCOE pupils in the course of providing services pursuant to the Contract, and the California Department of Justice has determined that none of those employees has been convicted of a felony, as that term is defined in Education Code section 45122.1. A complete and accurate list of Contractor's employees and of all of its subcontractors' employees who may come in contact with VCOE pupils during the course and scope of the Contract is attached hereto; and/or

☐ Pursuant to Education Code section 45125.2, Contractor has installed or will install, prior to commencement of Work, a physical barrier at the Work Site, that will limit contact between Contractor's employees and VCOE pupils at all times; and/or

☐ Pursuant to Education Code section 45125.2, Contractor certifies that all employees will be under the continual supervision of, and monitored by, an employee of the Contractor who the California Department of Justice has ascertained, or as described below, will ascertain, has not been convicted of a violent or serious felony. The name and title of the employee who will be supervising Contractor's and its subcontractors' employees is:

Name: _____

Title: _____

NOTE: If the Contractor is a sole proprietor, and elects the above option, Contractor must have the above-named employee's fingerprints prepared and submitted by the VCOE, in accordance with Education Code section 45125.1(k). No work shall commence until such determination by DOJ has been made.

☐ The Work on the Contract is either (i) at an unoccupied school site and no employee and/or subcontractor or supplier of any tier of the Contract shall come in contact with the VCOE pupils or (ii) Contractor's employees or any subcontractor or supplier of any tier of the Contract will have only limited contact, if any, with VCOE pupils and the VCOE will take appropriate steps to protect the safety of any pupils that may come in contact with Consultant's employees, subcontractors or suppliers so that the fingerprinting and criminal background investigation requirements of Education Code section 45125.1 shall not apply to Contractor under the Contract.

Contractor's responsibility for background clearance extends to all of its employees, Subcontractors, and employees of Subcontractors coming into contact with VCOE pupils regardless of whether they are designated as employees or acting as independent contractors of the Contractor.

Date: _____
Proper Name of Contractor: _____
Signature: _____
Print Name: _____
Title: _____

DOCUMENT 00 45 46.09

BUY AMERICAN CERTIFICATION

PROJECT/CONTRACT NO.: **Gateway Annex School** between the Ventura County Office of Education ("VCOE") and _____("Contractor" or "Bidder") ("Contract" or "Project").

Federal regulations require that all of the iron, steel, and manufactured goods used in projects for the construction, installation, repairs, renovation, modernization, or maintenance of a public building or public work funded in part or in whole by federal stimulus funds, with the exception of projects funded by Qualified School Construction Bonds, be produced in the United States of America, unless a federal department waives this requirement because (1) it is inconsistent with the public interest, (2) the goods are not produced in sufficient quantities or of satisfactory quality in the United States, or (3) the requirement would increase the cost of the Project overall by more than twenty-five percent (25%) ("Buy American").

Contractor shall submit this Certification with its executed agreement, identifying the steps Contractor will take to use goods produced in the United States of America in carrying out this Contract. Bidder should not submit this form with its bid.

Contractor shall retain a copy of this form and may be subject to a future audit.

CERTIFICATION

On behalf of Contractor, I represent and covenant that Contractor will use on the Project only iron, steel and manufactured goods produced in the United States of America except goods for which a federal department has waived this requirement.

I, _____, certify that I am the Contractor's _____ _____ and that the representations and covenants made herein are true and correct. In making this certification, I am aware of section 12650 et seq. of the Government Code providing for the imposition of treble damages for making false claims.

Date: _____

Proper Name of Contractor: _____

Signature: _____

Print Name: _____

Title: _____

END OF DOCUMENT

DOCUMENT 00 45 49

REGISTERED SUBCONTRACTORS LIST
(Labor Code Section 1771.1)

PROJECT: **Gateway Annex School**

Contractor acknowledges and agrees that it must clearly set forth below the name and Department of Industrial Relations (DIR) registration number of each subcontractor **for all tiers** who will perform work or labor or render service to Contractor or its subcontractors in or about the construction of the Work **at least two (2) weeks before the subcontractor is scheduled to perform work**. This document is to be updated as all tiers of subcontractors are identified.

Contractor acknowledges and agrees that, if Contractor fails to list as to any subcontractor of any tier who performs any portion of Work, the Contract is subject to cancellation and the Contractor will be subjected to penalty under applicable law.

If further space is required for the list of proposed subcontractors, attach additional copies of page 2 showing the required information, as indicated below.

Subcontractor Name: _____

DIR Registration #: _____

Portion of Work: _____

Subcontractor Name: _____

DIR Registration #: _____

Portion of Work: _____

Subcontractor Name: _____

DIR Registration #: _____

Portion of Work: _____

Subcontractor Name: _____

DIR Registration #: _____

Portion of Work: _____

Subcontractor Name: _____

DIR Registration #: _____

Portion of Work: _____

Subcontractor Name: _____

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DIR Registration #: _____

Portion of Work: _____

Subcontractor Name: _____

DIR Registration #: _____

Portion of Work: _____

Subcontractor Name: _____

DIR Registration #: _____

Portion of Work: _____

Subcontractor Name: _____

DIR Registration #: _____

Portion of Work: _____

Date: _____

Name of Contractor: _____

Signature: _____

Print Name: _____

Title: _____

END OF DOCUMENT

NOTICE OF AWARD

Dated:

To:

(Address)

From: Ventura County Office of Education ("Owner")

PROJECT: **Gateway Annex School**

Contractor has been awarded the referenced Contract on _____ (date) by the Ventura County Office of Education.

The Contract Price is:

_____

($000,000.00).

You must comply with the following conditions precedent within **SEVEN (7)** calendar days of the date of this Notice of Award.

The Contractor shall execute and submit the following documents by 5:00 p.m. of the **SEVENTH (7th)** calendar day following the date of the Notice of Award.

a. Agreement: To be executed by successful Bidder. Submit four (4) copies, each bearing an original signature.

b. Performance Bond (100%): On the form provided in the Contract Documents and fully executed as indicated on the form.

c. Payment Bond (Contractor's Labor & Material Bond) (100%): On the form provided in the Contract Documents and fully executed as indicated on the form.

d. Insurance Certificates and Endorsements as required.

e. Workers' Compensation Certification.

f. Prevailing Wage and Related Labor Requirements Certification.

g. Drug-Free Workplace Certification.

h. Tobacco-Free Environment Certification.

2.

a. Hazardous Materials Certification.

b. Lead-Based Materials Certification.

c. Imported Material Certification.

d. Criminal Background Investigation/Fingerprinting Certification.

e. Buy American Certification.

f. Roofing Project Certification: from Contractor, Material Manufacturer and/or Vendor.

g. Registered Subcontractors List: Must include Department of Industrial Relations (DIR) registration number of each subcontractor for all tiers.

Failure to comply with these conditions within the time specified will entitle VCOE to consider your bid abandoned, to annul this Notice of Award, and to declare your Bid Security forfeited, as well as any other rights the VCOE may have against the Contractor.

After you comply with those conditions, VCOE will return to you one fully signed counterpart of the Agreement.

VENTURA COUNTY OFFICE OF EDUCATION

BY: _____

NAME: N. David Fateh

TITLE: Facilities Director

END OF DOCUMENT

DOCUMENT 00 52 13

AGREEMENT

THIS AGREEMENT IS MADE AND ENTERED INTO THIS_____by and between the Ventura County Office of Education ("VCOE") and _____ ("Contractor") ("Agreement").

WITNESSETH: That the parties hereto have mutually covenanted and agreed, and by these presents do covenant and agree with each other, as follows:

1. **The Work**: Contractor agrees to furnish all tools, equipment, apparatus, facilities, labor, and material necessary to perform and complete in a good and workmanlike manner, the work of the following project:

   Gateway Annex School ("Project" or "Contract" or "Work")

   It is understood and agreed that the Work shall be performed and completed as required in the Contract Documents including, without limitation, the Drawings and Specifications and submission of all documents required to secure funding or by the Division of the State Architect for close-out of the Project, under the direction and supervision of, and subject to the approval of, the VCOE or its authorized representative.

2. **The Contract Documents**: The complete Contract consists of all Contract Documents as defined in the General Conditions and incorporated herein by this reference. Any and all obligations of the VCOE and Contractor are fully set forth and described in the Contract Documents. All Contract Documents are intended to cooperate so that any Work called for in one and not mentioned in the other or vice versa is to be executed the same as if mentioned in all Contract Documents.

3. **Interpretation of Contract Documents**: Should any question arise concerning the intent or meaning of Contract Documents, including the Drawings or Specifications, the question shall be submitted to the VCOE for interpretation. If a conflict exists in the Contract Documents, valid, written modifications, beginning with the most recent, shall control over this Agreement (if any), which shall control over the Special Conditions, which shall control over any Supplemental Conditions, which shall control over the General Conditions, which shall control over the remaining Division 0 documents, which shall control over Division 1 Documents which shall control over Division 2 through Division 49 documents, which shall control over figured dimensions, which shall control over large-scale drawings, which shall control over small-scale drawings. In no case shall a document calling for lower quality and/or quantity material or workmanship control. The decision of the VCOE in the matter shall be final.

4. **Time for Completion**: It is hereby understood and agreed that the Work under this Contract shall commence on or about **January 4th.** and be completed within **six hundred and nine days (609 days)**

5. **Completion - Extension of Time**: Should the Contractor fail to complete this Contract, and the Work provided herein, within the time fixed for completion, due

allowance being made for the contingencies provided for herein, the Contractor shall become liable to the VCOE for all loss and damage that the VCOE may suffer on account thereof. The Contractor shall coordinate its Work with the Work of all other contractors. The VCOE shall not be liable for delays resulting from Contractor's failure to coordinate its Work with other contractors in a manner that will allow timely completion of Contractor's Work. Contractor shall be liable for delays to other contractors caused by Contractor's failure to coordinate its Work with the Work of other contractors.

6. **Liquidated Damages**: Time is of the essence for all work under this Agreement. It is hereby understood and agreed that it is and will be difficult and/or impossible to ascertain and determine the actual damage that the VCOE will sustain in the event of and by reason of Contractor's delay; therefore, Contractor agrees that it shall pay to the VCOE the sum of One Thousand dollars ($1,000.00) per day as liquidated damages for each and every day's delay beyond the time herein prescribed in finishing the Work. It is hereby understood and agreed that this amount is not a penalty. In the event that any portion of the liquidated damages is not paid to the VCOE, the VCOE may deduct that amount from any money due or that may become due the Contractor under this Agreement, and such deduction does not constitute a withholding or penalty. The VCOE's right to assess liquidated damages is as indicated herein and in the General Conditions.

   The time during which the Contract is delayed for cause, as hereinafter specified, may extend the time of completion for a reasonable time as the VCOE may grant, provided that Contractor has complied with the claims procedure of the Contract Documents. This provision does not exclude the recovery of damages by either party under other provisions in the Contract Documents.

7. **Loss Or Damage**: The VCOE and its agents and authorized representatives shall not in any way or manner be answerable or suffer loss, damage, expense, or liability for any loss or damage that may happen to the Work, or any part thereof, or in or about the same during its construction and before acceptance, and the Contractor shall assume all liabilities of every kind or nature arising from the Work, either by accident, negligence, theft, vandalism, or any cause whatsoever; and shall hold the VCOE and its agents and authorized representatives harmless from all liability of every kind and nature arising from accident, negligence, or any cause whatsoever.

8. **Insurance and Bonds**: Prior to issuance of the Notice to Proceed by the VCOE, Contractor shall provide all required certificates of insurance, insurance endorsements, and payment and performance bonds as evidence thereof.

9. **Prosecution of Work**: If the Contractor should neglect to prosecute the Work properly or fail to perform any provisions of this Contract, the VCOE, may, pursuant to the General Conditions and without prejudice to any other remedy it may have, make good such deficiencies and may deduct the cost thereof from the payment then or thereafter due the Contractor.

10. **Authority of Architect, Project Inspector, and DSA**: Contractor hereby acknowledges that the Architect(s), the Project Inspector(s), and the Division of the State Architect ("DSA") have authority to approve and/or suspend Work if the Contractor's Work does not comply with the requirements of the Contract Documents, Title 24 of the California Code of Regulations, and all applicable laws and

regulations. The Contractor shall be liable for any delay caused by its non-compliant Work.

11. **Assignment of Contract**: Neither the Contract, nor any part thereof, nor any moneys due or to become due thereunder, may be assigned by the Contractor without the prior written approval of the VCOE, nor without the written consent of the Surety on the Contractor's Performance Bond (the "Surety"), unless the Surety has waived in writing its right to notice of assignment.

12. **Classification of Contractor's License**: Contractor hereby acknowledges that it currently holds valid Type**"B" General Contractor's license**(s) issued by the State of California, Contractors' State License Board, in accordance with division 3, chapter 9, of the Business and Professions Code and in the classification called for in the Contract Documents.

13. **Registration as Public Works Contractor**: The Contractor and all Subcontractors currently are registered as public works contractors with the Department of Industrial Relations, State of California, in accordance with Labor Code section 1771.1.

14. **Payment of Prevailing Wages**: The Contractor and all Subcontractors shall pay all workers on all Work performed pursuant to this Contract not less than the general prevailing rate of per diem wages and the general prevailing rate for holiday and overtime work as determined by the Director of the Department of Industrial Relations, State of California, for the type of work performed and the locality in which the work is to be performed within the boundaries of the VCOE, pursuant to sections 1770 et seq. of the California Labor Code. The Contractor and all Subcontractors shall comply with the Davis Bacon Act, applicable reporting requirements, and any other applicable requirements for federal funding. If a conflict exists, the more stringent provision shall control over this Agreement.

15. This Project is subject to labor compliance monitoring and enforcement by the Department of Industrial Relations pursuant to Labor Code section 1771.4 and Title 8 of the California Code of Regulations. Contractor specifically acknowledges and understands that it shall perform the Work of this Agreement while complying with all the applicable provisions of Division 2, Part 7, Chapter 1, of the Labor Code, including, without limitation, the requirement that the Contractor and all of its Subcontractors shall timely submit complete and accurate electronic certified payroll records as required by the Contract Documents, or the VCOE may not issue payment

16. **Contract Price**: In consideration of the foregoing covenants, promises, and agreements on the part of the Contractor, and the strict and literal fulfillment of each and every covenant, promise, and agreement, and as compensation agreed upon for the Work and construction, erection, and completion as aforesaid, the VCOE covenants, promises, and agrees that it will well and truly pay and cause to be paid to the Contractor in full, and as the full Contract Price and compensation for construction, erection, and completion of the Work hereinabove agreed to be performed by the Contractor, the following price:

_____ ($000,000.00),

in lawful money of the United States, which sum is to be paid according to the schedule provided by the Contractor and accepted by the VCOE and subject to additions and deductions as provided in the Contract. This amount supersedes any previously stated and/or agreed to amount(s).

17. No Representations: No representations have been made other than as set forth in writing in the Contract Documents, including this Agreement. Each of the Parties to this Agreement warrants that it has carefully read and understood the terms and conditions of this Agreement and all Contract Documents, and that it has not relied upon the representations or advice of any other Party or any attorney not its own.

18. Entire Agreement: The Contract Documents, including this Agreement, set forth the entire agreement between the parties hereto and fully supersede any and all prior agreements, understandings, written or oral, between the parties hereto pertaining to the subject matter thereof.

19. Severability: If any term, covenant, condition, or provision in any of the Contract Documents is held by a court of competent jurisdiction to be invalid, void or unenforceable, the remainder of the provisions in the Contract Documents shall remain in full force and effect and shall in no way be affected, impaired, or invalidated thereby.

IN WITNESS WHEREOF, accepted and agreed on the date indicated above:

CONTRACTOR	**VENTURA COUNTY OFFICE OF EDUCATION**
_____	_____
By: _____	By: _____
Title: _____	Title: _____

NOTE: If the party executing this Contract is a corporation, a certified copy of the by-laws, or of the resolution of the Board of Directors, authorizing the officers of said corporation to execute the Contract and the bonds required thereby must be attached hereto.

END OF DOCUMENT

DOCUMENT 00 55 00

NOTICE TO PROCEED

Dated: _____

TO:_____
("Contractor")

ADDRESS: _____

PROJECT: **Gateway Annex School** between the Ventura County Office of Education and Contractor ("Contract").

You are notified that the Contract Time under the above Contract will commence to run on _____. By that date, or earlier if possible, you are to start performing your obligations under the Contract Documents. In accordance with the Agreement executed by Contractor the Work under this Contract shall be completed by

_____

The contractor must restrict all work to between hours of 6 AM and 6 PM and leave the facility in fully functioning and clean condition for use every morning (Monday through Sunday).

You must submit the following documents by 5:00 p.m. of the TENTH (10th) calendar day following the date of this Notice to Proceed:

a. Contractor's preliminary schedule of construction.

b. Contractor's preliminary schedule of values for all of the Work.

c. Contractor's preliminary schedule of submittals, including Shop Drawings, Product Data, and Samples submittals

d. Contractor's Safety Plan specifically adapted for the Project.

e. A complete subcontractors list, including the name, address, telephone number, email address, facsimile number, California State Contractors License number, license classification, Department of Industrial Relations registration number, and monetary value of all Subcontracts.

Thank you. We look forward to a very successful Project.

VENTURA COUNTY OFFICE OF EDUCATION

BY: _____

NAME: N. David Fateh

TITLE: Facilities Director

DOCUMENT 00 61 13.13

PERFORMANCE BOND
(100% of Contract Price)

(Note: Contractor must use this form, NOT a surety company form.)

KNOW ALL PERSONS BY THESE PRESENTS:

WHEREAS, the governing board ("Board") of the Ventura County Office of Education, ("VCOE") and _____. ("Principal") have entered into a contract for the furnishing of all materials and labor, services and transportation, necessary, convenient, and proper to perform the following project:

Gateway Annex School ("Project" or "Contract") which Contract dated _____, and all of the Contract Documents attached to or forming a part of the Contract, are hereby referred to and made a part hereof; and

WHEREAS, said Principal is required under the terms of the Contract to furnish a bond for the faithful performance of the Contract.

NOW, THEREFORE, the Principal and _____ _____ ("Surety") are held and firmly bound unto the Board of the VCOE in the penal sum of

_____

Dollars ($_____), lawful money of the United States, for the payment of which sum well and truly to be made we bind ourselves, our heirs, executors, administrators, successors, and assigns jointly and severally, firmly by these presents, to:

- Promptly perform all the work required to complete the Project; and

- Pay to the VCOE all damages the VCOE incurs as a result of the Principal's failure to perform all the Work required to complete the Project.

Or, at the VCOE's sole discretion and election, the Surety shall obtain a bid or bids for completing the Contract in accordance with its terms and conditions, and upon determination by the VCOE of the lowest responsible bidder, arrange for a contract between such bidder and the VCOE and make available as Work progresses sufficient funds to pay the cost of completion less the "balance of the Contract Price," and to pay and perform all obligations of Principals under the Contract, including, without limitation, all obligations with respect to warranties, guarantees and the payment of liquidated damages. The term "balance of the Contract Price," as used in this paragraph, shall mean the total amount payable to Principal by the VCOE under the Contract and any modifications thereto, less the amount previously paid by the VCOE to the Principal, less any withholdings by the VCOE allowed under the Contract. VCOE shall not be required or obligated to accept a tender of a completion contractor from the Surety for any or no reason.

The condition of the obligation is such that, if the above bound Principal, its heirs, executors, administrators, successors, or assigns, shall in all things stand to and abide by, and well and truly keep and perform the covenants, conditions, and agreements in the

Contract and any alteration thereof made as therein provided, on its part to be kept and performed at the time and in the intent and meaning, including all contractual guarantees and warrantees of materials and workmanship, and shall indemnify and save harmless the VCOE, its trustees, officers and agents, as therein stipulated, then this obligation shall become null and void, otherwise it shall be and remain in full force and virtue.

Surety expressly agrees that the VCOE may reject any contractor or subcontractor proposed by Surety to fulfill its obligations in the event of default by the Principal. Surety shall not utilize Principal in completing the Work nor shall Surety accept a Bid from Principal for completion of the Work if the VCOE declares the Principal to be in default and notifies Surety of the VCOE's objection to Principal's further participation in the completion of the Work.

As a condition precedent to the satisfactory completion of the Contract, the above obligation shall hold good for a period equal to the warranty and/or guarantee period of the Contract, during which time Surety's obligation shall continue if Contractor shall fail to make full, complete, and satisfactory repair and replacements and totally protect the VCOE from loss or damage resulting from or caused by defective materials or faulty workmanship. The obligations of Surety hereunder shall continue so long as any obligation of Contractor remains. Nothing herein shall limit the VCOE's rights or the Contractor or Surety's obligations under the Contract, law or equity, including, but not limited to, California Code of Civil Procedure section 337.15.

The Surety, for value received, hereby stipulates and agrees that no change, extension of time, alteration, or addition to the terms of the contract or to the work to be performed thereunder or the specifications accompanying the same shall in any way affect its obligation on this bond. The Surety also stipulates and agrees that it shall not be exonerated or released from the obligation of this bond by any overpayment or underpayment by the VCOE that is based upon estimates approved by the Architect. The Surety does hereby waive notice of any such change, extension of time, alteration, or addition to the terms of the Contract or to the work or to the specifications.

IN WITNESS WHEREOF, two (2) identical counterparts of this instrument, each of which shall for all purposes be deemed an original thereof, have been duly executed by the Principal and Surety above named, on the _____ day of _____, 20___.

Principal	Surety
By	By
	Name of California Agent of Surety
	Address of California Agent of Surety
	Telephone No. of California Agent of Surety

Contractor must attach a Notarial Acknowledgment for all Surety's signatures and a Power of Attorney and Certificate of Authority for Surety. The California

Department of Insurance must authorize the Surety to be an admitted surety insurer.

END OF DOCUMENT

DOCUMENT 00 61 13.16

PAYMENT BOND
Contractor's Labor & Material Bond
(100% Of Contract Price)

(Note: Contractor must use this form, NOT a surety company form.)

KNOW ALL PERSONS BY THESE PRESENTS:

WHEREAS, the governing board ("Board") of the Ventura County Office of Education, ("VCOE") and _____("Principal") have entered into a contract for the furnishing of all materials and labor, services and transportation, necessary, convenient, and proper to perform the following project:

Gateway Annex School ("Project" or "Contract") which Contract dated_____, and all of the Contract Documents attached to or forming a part of the Contract, are hereby referred to and made a part hereof; and

WHEREAS, pursuant to law and the Contract, the Principal is required, before entering upon the performance of the work, to file a good and sufficient bond with the body by which the Contract is awarded in an amount equal to one hundred percent (100%) of the Contract price, to secure the claims to which reference is made in sections 9000 through 9510 and 9550 through 9566 of the Civil Code, and division 2, part 7, of the Labor Code.

NOW, THEREFORE, the Principal and_____ _____ ("Surety") are held and firmly bound unto all laborers, material men, and other persons referred to in said statutes in the sum of _____ Dollars ($_____), lawful money of the United States, being a sum not less than the total amount payable by the terms of Contract, for the payment of which sum well and truly to be made, we bind ourselves, our heirs, executors, administrators, successors, or assigns, jointly and severally, by these presents.

The condition of this obligation is that if the Principal or any of its subcontractors, or their heirs, executors, administrators, successors, or assigns of any, all, or either of them shall fail to pay for any labor, materials, provisions, or other supplies, used in, upon, for or about the performance of the work contracted to be done, or for any work or labor thereon of any kind, or for amounts required to be deducted, withheld, and paid over to the Employment Development Department from the wages of employees of the Principal or any of his or its subcontractors of any tier under Section 13020 of the Unemployment Insurance Code with respect to such work or labor, that the Surety will pay the same in an amount not exceeding the amount herein above set forth, and also in case suit is brought upon this bond, will pay a reasonable attorney's fee to be awarded and fixed by the court, and to be taxed as costs and to be included in the judgment therein rendered.

It is hereby expressly stipulated and agreed that this bond shall inure to the benefit of any and all persons, companies, and corporations entitled to file claims under section 9100 of the Civil Code, so as to give a right of action to them or their assigns in any suit brought upon this bond.

Should the condition of this bond be fully performed, then this obligation shall become null and void; otherwise it shall be and remain in full force and affect.

And the Surety, for value received, hereby stipulates and agrees that no change, extension of time, alteration, or addition to the terms of Contract or the specifications accompanying the same shall in any manner affect its obligations on this bond, and it does hereby waive notice of any such change, extension, alteration, or addition.

IN WITNESS WHEREOF, two (2) identical counterparts of this instrument, each of which shall for all purposes be deemed an original thereof, have been duly executed by the Principal and Surety above named, on the _____ day of _____, 20___.

Principal	Surety
By	By
	Name of California Agent of Surety
	Address of California Agent of Surety
	Telephone No. of California Agent of Surety

Contractor must attach a Notarial Acknowledgment for all Surety's signatures and a Power of Attorney and Certificate of Authority for Surety. The California Department of Insurance must authorize the Surety to be an admitted surety insurer.

END OF DOCUMENT

DOCUMENT 00 63 57

PROPOSED CHANGE ORDER FORM

Ventura County Office of Education
5189 Verdugo Way
Camarillo , CA 93012

PCO NO.:

Project: _____
Bid No.: _____
RFI #:_____

Date: _____
DSA File No.: _____
DSA Appl. No.:_____

Contractor hereby submits for VCOE's review and evaluation this Proposed Change Order ("PCO"), submitted in accordance with and subject to the terms of the Contract Documents, including Sections 17.7 and 17.8 of the General Conditions. Any spaces left blank below are deemed no change to cost or time.

Contractor understands and acknowledges that documentation supporting Contractor's PCO must be attached and included for VCOE review and evaluation. Contractor further understands and acknowledges that failure to include documentation sufficient to, in VCOE's discretion, support some or all of the PCO, shall result in a rejected PCO.

	WORK PERFORMED OTHER THAN BY CONTRACTOR	**ADD**	**DEDUCT**
(a)	**Material** (attach suppliers' invoice or itemized quantity and unit cost plus sales tax)		
(b)	**Add Labor** (attach itemized hours and rates, fully encumbered)		
(c)	**Add Equipment** (attach suppliers' invoice)		
(d)	**Subtotal**		
(e)	**Add overhead and profit for any and all tiers of Subcontractor**, the total not to exceed ten percent (10%) of Item (d)		
(f)	**Subtotal**		
(g)	**Add Overhead and Profit for Contractor**, not to exceed five percent (5%) of Item (f)		
(h)	**Subtotal**		
(i)	**Add Bond and Insurance**, not to exceed one and a half percent (1.5%) of Item (h)		
(j)	**TOTAL**		
(k)	**Time** (zero unless indicated; "TBD" not permitted)	**____ Calendar Days**	

[REMAINDER OF PAGE LEFT BLANK INTENTIONALLY]

	WORK PERFORMED BY CONTRACTOR	**ADD**	**DEDUCT**
(a)	**Material** (attach itemized quantity and unit cost plus sales tax)		
(b)	**Add Labor** (attach itemized hours and rates, fully encumbered)		
(c)	**Add Equipment** (attach suppliers' invoice)		
(d)	**Subtotal**		
(e)	**Add Overhead and Profit for Contractor**, not to exceed fifteen percent (15%) of Item (d)		
(f)	**Subtotal**		
(g)	**Add Bond and Insurance**, not to exceed one and a half percent (1.5%) of Item (f)		
(h)	**TOTAL**		
(i)	**Time** (zero unless indicated; "TBD" not permitted)	**____ Calendar Days**	

The undersigned Contractor approves the foregoing as to the changes, if any, to the Contract Price specified for each item, and as to the extension of time allowed, if any, for completion of the entire Work as stated herein, and agrees to furnish all labor, materials, and service, and perform all work necessary to complete any additional work specified for the consideration stated herein. Submission of sums which have no basis in fact or which Contractor knows are false are at the sole risk of Contractor and may be a violation of the False Claims Act set forth under Government Code section 12650 et seq. It is understood that the changes herein to the Contract shall only be effective when approved by the governing board of the VCOE.

It is expressly understood that the value of the extra Work or changes expressly includes any and all of the Contractor's costs and expenses, direct and indirect, resulting from additional time required on the Project or resulting from delay to the Project including, without limitation, cumulative impacts. Contractor is not entitled to separately recover amounts for overhead or other indirect costs. Any costs, expenses, damages, or time extensions not included are deemed waived.

SUBMITTED BY:

Contractor:

_____ _____

[Name] Date

END OF DOCUMENT

DOCUMENT 00 63 63

CHANGE ORDER FORM

Ventura County Office of Education
5189 Verdugo Way
Camarillo, CA 93012

CHANGE ORDER NO.:

CHANGE ORDER

Project: _____
Bid No.: _____

Date: _____
DSA File No.: _____
DSA Appl. No.:_____

The following parties agree to the terms of this Change Order:

Owner: _____
[Name / Address]
_____
_____

Contractor: _____
[Name / Address]
_____
_____

Architect: _____
[Name / Address]
_____
_____

Project Inspector: _____
[Name / Address]
_____
_____

Reference	**Description**	**Cost**	**Days Ext.**
PCO # Requested by: Performed by: Reason:	[Description of change] [Requester] [Performer] [Reason]	$	
PCO # Requested by: Performed by: Reason:	[Description of change] [Requester] [Performer] [Reason]	$	
PCO # Requested by: Performed by: Reason:	[Description of change] [Requester] [Performer] [Reason]	$	

Contract time will be adjusted as follows: Previous Completion Date: [Date] _____[#] Calendar Days Extension (zero unless otherwise indicated) Current Completion Date: [Date]	Original Contract Amount:	$
	Amount of Previously Approved Change Order(s):	$
	Amount of this Change Order:	$
	Contract Amount:	$

The undersigned Contractor approves the foregoing as to the changes, if any, to the Contract Price specified for each item, and as to the extension of time allowed, if any, for completion of the entire work as stated therein, and agrees to furnish all labor, materials and services and perform all work necessary to complete any additional work specified for the consideration stated therein. Submission of sums which have no basis in fact or which Contractor knows are false are at the sole risk of Contractor and may be a violation of the False Claims Act set forth under Government Code section 12650 et seq.

This change order is subject to approval by the governing board of this VCOE and must be signed by the VCOE. Until such time as this change order is approved by the VCOE's governing board and executed by a duly authorized VCOE representative, this change order is not effective and not binding.

It is expressly understood that the compensation and time, if any, granted herein represent a full accord and satisfaction for any and all time and cost impacts of the items herein, and Contractor waives any and all further compensation or time extension based on the items herein. The value of the extra work or changes expressly includes any and all of the Contractor's costs and expenses, and its subcontractors, both direct and indirect, resulting from additional time required on the project or resulting from delay to the project including without limitation, cumulative impacts. Any costs, expenses, damages or time extensions not included are deemed waived.

Signatures:

VCOE:		Contractor:	
_____	_____	_____	_____
[Name]	Date	[Name]	Date
Architect:		Project Inspector:	
_____	_____	_____	_____
[Name]	Date	[Name]	Date

END OF DOCUMENT

DOCUMENT 00 65 19.26

AGREEMENT AND RELEASE OF ANY AND ALL CLAIMS

THIS AGREEMENT AND RELEASE OF CLAIMS ("Agreement and Release") IS MADE AND ENTERED INTO THIS _____ DAY OF _____, 20___ by and between the VENTURA COUNTY OFFICE OF EDUCATION ("District") and _____ _____ ("Contractor"), whose place of business is _____ _____.

RECITALS

WHEREAS, District and Contractor entered into PROJECT/CONTRACT NO.: _____ _____ ("Contract" or "Project") in the County of Ventura, California; and

WHEREAS, the Work under the Contract was completed on _____, and a Notice of Completion was recorded with the County Recorder on _____.

NOW, THEREFORE, it is mutually agreed between District and Contractor as follows:

AGREEMENT AND RELEASE

1. Contractor will only be assessed liquidated damages as detailed below:

   Original Contract Sum $_____

   Modified Contract Sum $_____

   Payment to Date $_____

   Liquidated Damages $_____

   Payment Due Contractor $_____

2. Subject to the provisions hereof, District shall forthwith pay to Contractor the undisputed sum of _____ Dollars ($_____) under the Contract, less any amounts represented by any notice to withhold funds on file with District as of the date of such payment.

3. Contractor acknowledges and hereby agrees that there are no unresolved or outstanding claims in dispute against District arising from the performance of work under the Contract, except for the claims described in Paragraph 4 and continuing obligations described in Paragraph 6. It is the intention of the parties in executing this Agreement and Release that this Agreement and Release shall be effective as a full, final and general release of all claims, demands, actions, causes of action, obligations, costs, expenses, damages, losses and liabilities of Contractor against District and all of its respective agents, employees, trustees, inspectors, assignees, consultants and transferees, except for any Disputed Claim that may be set forth in Paragraph 4 and the continuing obligations described in Paragraph 6 hereof.

4. The following claims are disputed (hereinafter, the "Disputed Claims") and are specifically excluded from the operation of this Agreement and Release:

Claim No.	Description of Claim	Amount of Claim	Date Claim Submitted
_____	_____	$_____	_____
_____	_____	$_____	_____
_____	_____	$_____	_____
_____	_____	$_____	_____
_____	_____	$_____	_____
_____	_____	$_____	_____

[If further space is required, attach additional sheets showing the required information.]

5. Consistent with California Public Contract Code section 7100, Contractor hereby agrees that, in consideration of the payment set forth in Paragraph 2 hereof, Contractor hereby releases and forever discharges District, all its agents, employees, inspectors, assignees, and transferees from any and all liability, claims, demands, actions, or causes of action of whatever kind or nature arising out of or in any way concerned with the Work under the Contract.

6. Guarantees and warranties for the Work, and any other continuing obligation of Contractor, including without limitation, the duty to defend, indemnify and hold harmless the District, shall remain in full force and effect as specified in the Contract Documents.

7. Contractor hereby waives the provisions of California Civil Code section 1542 which provides as follows:

> A GENERAL RELEASE DOES NOT EXTEND TO CLAIMS THAT THE CREDITOR OR RELEASING PARTY DOES NOT KNOW OR SUSPECT TO EXIST IN HIS OR HER FAVOR AT THE TIME OF EXECUTING THE RELEASE AND THAT, IF KNOWN BY HIM OR HER, WOULD HAVE MATERIALLY AFFECTED HIS OR HER SETTLEMENT WITH THE DEBTOR OR RELEASED PARTY.

8. The provisions of this Agreement and Release are contractual in nature and not mere recitals and shall be considered independent and severable. If any such provision or any part thereof shall be at any time held invalid in whole or in part under any federal, state, county, municipal, or other law, ruling, or regulations, then such provision, or part thereof, shall remain in force and effect to the extent permitted by law, and the remaining provisions of this Agreement and Release shall also remain in full force and effect, and shall be enforceable.

9. All rights of District shall survive completion of the Work or termination of Contract, and execution of this Release.

* * * CAUTION: THIS IS A RELEASE - READ BEFORE EXECUTING * * *

VENTURA COUNTY OFFICE OF EDUCATION

Signature: _____

Print Name: _____

Title: _____

CONTRACTOR: _____

Signature: _____

Print Name: _____

Title: _____

END OF DOCUMENT

DOCUMENT 00 65 36

GUARANTEE FORM

_____ ("Contractor") hereby agrees that the _____ _____ ("Work" of Contractor) which Contractor has installed for the Ventura County Office of Education ("VCOE") for the following project:

PROJECT: **Gateway Annex School** ("Project" or "Contract") has been performed in accordance with the requirements of the Contract Documents and that the Work as installed will fulfill the requirements of the Contract Documents.

The undersigned agrees to repair or replace any or all of such Work that may prove to be defective in workmanship or material together with any other adjacent Work that may be displaced in connection with such replacement within a period of one (1) year from the date of completion as defined in Public Contract Code section 7107, subdivision (c), ordinary wear and tear and unusual abuse or neglect excepted. The date of completion is _____, 20___.

In the event of the undersigned's failure to comply with the above-mentioned conditions within a reasonable period of time, as determined by the VCOE, but not later than seven (7) days after being notified in writing by the VCOE, the undersigned authorizes the VCOE to proceed to have said defects repaired and made good at the expense of the undersigned. The undersigned shall pay the costs and charges therefor upon demand.

Date: _____

Proper Name of Contractor: _____

Signature: _____

Print Name: _____

Title: _____

Representatives to be contacted for service subject to terms of Contract:

Name: _____

Address: _____

Phone No.: _____

Email: _____

END OF DOCUMENT

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GENERAL CONDITIONS

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GENERAL CONDITIONS

1. CONTRACT TERMS AND DEFINITIONS

1.1 Definitions

Wherever used in the Contract Documents, the following terms shall have the meanings indicated, which shall be applicable to both the singular and plural thereof:

1.1.1 Adverse Weather: Shall be only weather that satisfies all of the following conditions: (1) unusually severe precipitation, sleet, snow, hail, or extreme temperature conditions in excess of the norm for the location and time of year it occurred based on the closest weather station data averaged over the past five years, (2) that is unanticipated and would cause unsafe work conditions and/or is unsuitable for scheduled work that should not be performed during inclement weather (i.e., exterior finishes), and (3) at the Project.

1.1.2 Allowance Expenditure Directive: Written authorization for expenditure of allowance, if any.

1.1.3 Approval, Approved, and/or Accepted: Written authorization, unless stated otherwise.

1.1.4 Architect (or "Design Professional in General Responsible Charge"): The individual, partnership, corporation, joint venture, or any combination thereof, named as Architect, who will have the rights and authority assigned to the Architect in the Contract Documents. The term Architect means the Design Professional in General Responsible Charge as defined in DSA PR 13-02 on this Project or the Architect's authorized representative.

1.1.5 As-Builts: Reproducible blue line prints of drawings to be prepared on a monthly basis pursuant to the Contract Documents, that reflect changes made during the performance of the Work, recording differences between the original design of the Work and the Work as constructed since the preceding monthly submittal. See **Record Drawings**.

1.1.6 Bidder: A contractor who intends to provide a proposal to the OWNER to perform the Work of this Contract.

1.1.7 Change Order: A written order to the Contractor authorizing an addition to, deletion from, or revision in the Work, and/or authorizing an adjustment in the Contract Price or Contract Time.

1.1.8 Claim: A Dispute that remains unresolved at the conclusion of the all the applicable Dispute Resolution requirements provided herein.

1.1.9 Construction Change Directive: A written order prepared and issued by the OWNER, the Construction Manager, and/or the Architect and signed by the OWNER and the Architect, directing a change in the Work.

1.1.10 Construction Manager: The individual, partnership, corporation, joint venture, or any combination thereof, or its authorized representative, named as such by the OWNER. If no Construction Manager is used on the Project that is the subject of this Contract, then all references to Construction Manager herein shall be read to refer to OWNER.

1.1.11 Construction Schedule: The progress schedule of construction of the Project as provided by Contractor and approved by OWNER.

1.1.12 Contract, Contract Documents: The Contract consists exclusively of the documents evidencing the agreement of the OWNER and Contractor, identified as the Contract Documents. The Contract Documents consist of the following documents:

1.1.12.1 Notice to Bidders
1.1.12.2 Instructions to Bidders
1.1.12.3 Bid Form and Proposal
1.1.12.4 Bid Bond
1.1.12.5 Designated Subcontractors List
1.1.12.6 Site Visit Certification
1.1.12.7 Non-Collusion Declaration
1.1.12.8 Notice of Award
1.1.12.9 Notice to Proceed
1.1.12.10 Agreement
1.1.12.11 Not used
1.1.12.12 Not used
1.1.12.13 Performance Bond
1.1.12.14 Payment Bond (Contractor's Labor & Material Bond)
1.1.12.15 General Conditions
1.1.12.16 Not used
1.1.12.17 Not used
1.1.12.18 Hazardous Materials Procedures and Requirements
1.1.12.19 Workers' Compensation Certification
1.1.12.20 Prevailing Wage Certification
1.1.12.21 Disabled Veteran Business Enterprise Participation Certification
1.1.12.22 Drug-Free Workplace Certification
1.1.12.23 Tobacco-Free Environment Certification
1.1.12.24 Hazardous Materials Certification
1.1.12.25 Not used
1.1.12.26 Not used
1.1.12.27 Criminal Background Investigation/Fingerprinting Certification
1.1.12.28 Not used
1.1.12.29 Not used
1.1.12.30 Registered Subcontractors List
1.1.12.31 Not used
1.1.12.32 Not used
1.1.12.33 All Plans, Technical Specifications, and Drawings
1.1.12.34 Any and all addenda to any of the above documents

1.1.12.35 Any and all change orders or written modifications to the above documents if approved in writing by the OWNER

1.1.13 Contract Price: The total monies payable to the Contractor under the terms and conditions of the Contract Documents.

1.1.14 Contract Time: The time period stated in the Agreement for the completion of the Work.

1.1.15 Contractor: The person or persons identified in the Agreement as contracting to perform the Work to be done under this Contract, or the legal representative of such a person or persons.

1.1.16 Daily Job Report(s): Daily Project reports prepared by the Contractor's employee(s) who are present on Site, which shall include the information required herein.

1.1.17 Day(s): Unless otherwise designated, day(s) means calendar day(s).

1.1.18 Department of Industrial Relations (or "DIR"): is responsible, among other things, for labor compliance monitoring and enforcement of California prevailing wage laws and regulations for public works contracts.

1.1.19 Design Professional in General Responsible Charge: See definition of **Architect** above.

1.1.20 Dispute: A separate demand by Contractor for a time extension, or payment of money or damages arising from Work done by or on behalf of the Contractor pursuant to the Contract and payment of which is not otherwise expressly provided for or Contractor is not otherwise entitled to; or an amount of payment disputed by the OWNER.

1.1.21 OWNER: The public agency or the school OWNER for which the Work is performed. The governing board of the OWNER or its designees will act for the OWNER in all matters pertaining to the Contract. The OWNER may, at any time,

1.1.21.1 Direct the Contractor to communicate with or provide notice to the Construction Manager or the Architect on matters for which the Contract Documents indicate the Contractor will communicate with or provide notice to the OWNER; and/or

1.1.21.2 Direct the Construction Manager or the Architect to communicate with or direct the Contractor on matters for which the Contract Documents indicate the OWNER will communicate with or direct the Contractor.

1.1.22 Drawings (or "Plans"): The graphic and pictorial portions of the Contract Documents showing the design, location, scope and dimensions of the work, generally including plans, elevations, sections, details, schedules, sequence of operation, and diagrams.

1.1.23 DSA: Division of the State Architect.

1.1.24 Force Account Directive: A process that may be used when the OWNER and the Contractor cannot agree on a price for a specific portion of work or before the Contractor prepares a price for a specific portion of work and whereby the Contractor performs the work as indicated herein on a time and materials basis.

1.1.25 Job Cost Reports: Any and all reports or records detailing the costs associated with work performed on or related to the Project that Contractor shall maintain for the Project. Specifically, Job Cost Reports shall contain, but are not limited by or to, the following information: a description of the work performed or to be performed on the Project; quantity, if applicable, of work performed (hours, square feet, cubic yards, pounds, etc.) for the Project; Project budget; costs for the Project to date; estimated costs to complete the Project; and expected costs at completion. The Job Cost Reports shall also reflect all Contract cost codes, change orders, elements of non-conforming work, back charges, and additional services.

1.1.26 Labor Commissioner's Office (or "Labor Commissioner", also known as the Division of Labor Standards Enforcement ("DLSE")): Division of the DIR responsible for adjudicating wage claims, investigating discrimination and public works complaints, and enforcing Labor Code statutes and Industrial Welfare Commission orders.

1.1.27 Municipal Separate Storm Sewer System (or "MS4"): A system of conveyances used to collect and/or convey storm water, including, without limitation, catch basins, curbs, gutters, ditches, man-made channels, and storm drains.

1.1.28 Plans: See **Drawings**.

1.1.29 Premises: The real property owned by the OWNER on which the Site is located.

1.1.30 Product(s): New material, machinery, components, equipment, fixtures and systems forming the Work, including existing materials or components required and approved by the OWNER for reuse.

1.1.31 Product Data: Illustrations, standard schedules, performance charts, instructions, brochures, diagrams, and other information furnished by the Contractor to illustrate a material, product, or system for some portion of the Work.

1.1.32 Program Manager: The individual, partnership, corporation, joint venture, or any combination thereof, or its authorized representative, named as such by the OWNER. If no Program Manager is designated for Project that is the subject of this Contract, then all references to Project Manager herein shall be read to refer to OWNER.

1.1.33 Project: The planned undertaking as provided for in the Contract Documents.

1.1.34 Project Inspector (or "Inspector"): The individual(s) retained by the OWNER in accordance with title 24 of the California Code of Regulations to monitor and inspect the Project.

1.1.35 Project Labor Agreement (or "PLA"): a prehire collective bargaining agreement in accordance with Public Contract Code section 2500 et seq. that establishes terms and conditions of employment for a specific construction project or projects and/or is an agreement described in Section 158(f) of Title 29 of the United States Code.

1.1.36 Proposed Change Order (or "PCO"): a written request prepared by the Contractor requesting that the OWNER and the Architect issue a Change Order based upon a proposed change to the Work.

1.1.37 Provide: Shall include "provide complete in place," that is, "furnish and install," and "provide complete and functioning as intended in place" unless specifically stated otherwise.

1.1.38 Qualified SWPPP Practitioners (or "QSP"): certified personnel that attended a State Water Resources Control Board sponsored or approved training class and passed the qualifying exam.

1.1.39 Record Drawings: Reproducible drawings (or Plans) prepared pursuant to the requirements of the Contract Documents that reflect all changes made during the performance of the Work, recording differences between the original design of the Work and the Work as constructed upon completion of the Project. See also **As-Builts**.

1.1.40 Request for Information (or "RFI"): A written request prepared by the Contractor requesting that the Architect provide additional information necessary to clarify or amplify an item in the Contract Documents that the Contractor believes is not clearly shown or called for in the Drawings or Specifications or other portions of the Contract Documents, or to address problems that have arisen under field conditions.

1.1.41 Request for Substitution for Specified Item: A request by Contractor to substitute an equal or superior material, product, thing, or service for a specific material, product, thing, or service that has been designated in the Contract Documents by a specific brand or trade name.

1.1.42 Safety Orders: Written and/or verbal orders for construction issued by the California Division of Occupational Safety and Health ("CalOSHA") or by the United States Occupational Safety and Health Administration ("OSHA").

1.1.43 Safety Plan: Contractor's safety plan specifically adapted for the Project. Contractor's Safety Plan shall comply with all provisions regarding Project safety, including all applicable provisions in these General Conditions.

1.1.44 Samples: Physical examples that illustrate materials, products, equipment, finishes, colors, or workmanship and that, when approved in accordance with the Contract Documents, establish standards by which portions of the Work will be judged.

1.1.45 Shop Drawings: All drawings, prints, diagrams, illustrations, brochures, schedules, and other data that are prepared by the Contractor, a subcontractor,

manufacturer, supplier, or distributor, that illustrate how specific portions of the Work shall be fabricated or installed.

1.1.46 Site: The Project site as shown on the Drawings.

1.1.47 Specifications: That portion of the Contract Documents, Division 1 through Division 49, and all technical sections, and addenda to all of these, if any, consisting of written descriptions and requirements of a technical nature of materials, equipment, construction methods and systems, standards, and workmanship.

1.1.48 State: The State of California.

1.1.49 Storm Water Pollution Prevention Plan (or "SWPPP"): A document which identifies sources and activities at a particular facility that may contribute pollutants to storm water and contains specific control measures and time frames to prevent or treat such pollutants.

1.1.50 Subcontractor: A contractor and/or supplier who is under contract with the Contractor or with any other subcontractor, regardless of tier, to perform a portion of the Work of the Project.

1.1.51 Submittal Schedule: The schedule of submittals as provided by Contractor and approved by OWNER.

1.1.52 Surety: The person, firm, or corporation that executes as surety the Contractor's Performance Bond and Payment Bond, and must be a California admitted surety insurer as defined in the Code of Civil Procedure section 995.120.

1.1.53 Work: All labor, materials, equipment, components, appliances, supervision, coordination, and services required by, or reasonably inferred from, the Contract Documents, that are necessary for the construction and completion of the Project.

1.2 Laws Concerning the Contract

Contract is subject to all provisions of the Constitution and laws of California and the United States governing, controlling, or affecting OWNER, or the property, funds, operations, or powers of OWNER, and such provisions are by this reference made a part hereof. Any provision required by law to be included in this Contract shall be deemed to be inserted.

1.3 No Oral Agreements

No oral agreement or conversation with any officer, agent, or employee of OWNER, either before or after execution of Contract, shall affect or modify any of the terms or obligations contained in any of the documents comprising the Contract.

1.4 No Assignment

Contractor shall not assign this Contract or any part thereof including, without limitation, any services or money to become due hereunder without the prior written consent of the OWNER. Assignment without OWNER's prior written consent shall be null and void. Any

assignment of money due or to become due under this Contract shall be subject to a prior lien for services rendered or material supplied for performance of work called for under this Contract in favor of all persons, firms, or corporations rendering services or supplying material to the extent that claims are filed pursuant to the Civil Code, Code of Civil Procedure, Government Code, Labor Code, and/or Public Contract Code, and shall also be subject to deductions for liquidated damages or withholding of payments as determined by OWNER in accordance with this Contract. Contractor shall not assign or transfer in any manner to a Subcontractor or supplier the right to prosecute or maintain an action against the OWNER.

1.5 Notice and Service Thereof

1.5.1 Any notice from one party to the other or otherwise under Contract shall be in writing and shall be dated and signed by the party giving notice or by a duly authorized representative of that party. Any notice shall not be effective for any purpose whatsoever unless served in one of the following manners:

1.5.1.1 If notice is given by personal delivery thereof, it shall be considered delivered on the day of delivery.

1.5.1.2 If notice is given by overnight delivery service, it shall be considered delivered one (1) day after date deposited, as indicated by the delivery service.

1.5.1.3 If notice is given by depositing same in United States mail, enclosed in a sealed envelope, it shall be considered delivered three (3) days after date deposited, as indicated by the postmarked date.

1.5.1.4 If notice is given by registered or certified mail with postage prepaid, return receipt requested, it shall be considered delivered on the day the notice is signed for.

1.5.1.5 Electronic mail may be used for convenience but is not a substitute for the notice and service requirements herein.

1.6 No Waiver

The failure of OWNER in any one or more instances to insist upon strict performance of any of the terms of this Contract or to exercise any option herein conferred shall not be construed as a waiver or relinquishment to any extent of the right to assert or rely upon any such terms or option on any future occasion. No action or failure to act by the OWNER, Architect, or Construction Manager shall constitute a waiver of any right or duty afforded the OWNER under the Contract, nor shall any action or failure to act constitute an approval of or acquiescence in any breach thereunder, except as may be specifically agreed in writing.

1.7 Substitutions for Specified Items

Unless the Special Conditions contain different provisions, Contractor shall not substitute different items for any items identified in the Contract Documents without prior written approval of the OWNER.

1.8 Materials and Work

1.8.1 Except as otherwise specifically stated in this Contract, Contractor shall provide and pay for all materials, labor, tools, equipment, transportation, supervision, temporary constructions of every nature, and all other services, management, and facilities of every nature whatsoever necessary to execute and complete this Contract, in a good and workmanlike manner, within the Contract Time.

1.8.2 Unless otherwise specified, all materials shall be new and of the best quality of their respective kinds and grades as noted or specified, workmanship shall be of good quality, and Contractor shall use all diligence to inform itself fully as to the required manufacturer's instructions and to comply therewith.

1.8.3 Materials shall be furnished in ample quantities and at such times as to insure uninterrupted progress of Work and shall be stored properly and protected from the elements, theft, vandalism, or other loss or damage as required.

1.8.4 For all materials and equipment specified or indicated in the Drawings, the Contractor shall provide all labor, materials, equipment, and services necessary for complete assemblies and complete working systems, functioning as intended. Incidental items not indicated on Drawings, nor mentioned in the Specifications, that can legitimately and reasonably be inferred to belong to the Work described, or be necessary in good practice to provide a complete assembly or system, shall be furnished as though itemized here in every detail. In all instances, material and equipment shall be installed in strict accordance with each manufacturer's most recent published recommendations and specifications.

1.8.5 Contractor shall, after award of Contract by OWNER and after relevant submittals have been approved, place orders for materials and/or equipment as specified so that delivery of same may be made without delays to the Work. Contractor shall, upon demand from OWNER, present documentary evidence showing that orders have been placed.

1.8.6 OWNER reserves the right but has no obligation, in response to Contractor's neglect or failure in complying with the above instructions, to place orders for such materials and/or equipment as the OWNER may deem advisable in order that the Work may be completed at the date specified in the Agreement, and all expenses incidental to the procuring of said materials and/or equipment shall be paid for by Contractor or deducted from payment(s) to Contractor.

1.8.7 Contractor warrants good title to all material, supplies, and equipment installed or incorporated in Work and agrees upon completion of all Work to deliver the Site to OWNER, together with all improvements and appurtenances constructed or placed thereon by it, and free from any claims, liens, or charges. Contractor further agrees that neither it nor any person, firm, or corporation furnishing any materials or labor for any work covered by the Contract shall have any right to lien any portion of the Premises or any improvement or appurtenance thereon, except that Contractor may install metering devices or other equipment of utility companies or of political subdivision, title to which is commonly retained by utility company or political subdivision. In the event of installation of any such metering device or equipment, Contractor shall advise OWNER as to owner thereof.

1.8.7.1 If a lien or a claim based on a stop payment notice of any nature should at any time be filed against the Work or any OWNER property, by any entity that has supplied material or services at the request of the Contractor, Contractor and Contractor's Surety shall promptly, on demand by OWNER and at Contractor's and Surety's own expense, take any and all action necessary to cause any such lien or a claim based on a stop payment notice to be released or discharged immediately therefrom.

1.8.7.2 If the Contractor fails to furnish to the OWNER within ten (10) calendar days after demand by the OWNER, satisfactory evidence that a lien or a claim based on a stop payment notice has been so released, discharged, or secured, the OWNER may discharge such indebtedness and deduct the amount required therefor, together with any and all losses, costs, damages, and attorney's fees and expense incurred or suffered by OWNER from any sum payable to Contractor under the Contract.

1.8.8 Nothing contained in this Article, however, shall defeat or impair the rights of persons furnishing materials or labor under any bond given by Contractor for their protection or any rights under any law permitting such protection or any rights under any law permitting such persons to look to funds due Contractor in hands of OWNER (e.g., stop payment notices), and this provision shall be inserted in all subcontracts and material contracts and notice of its provisions shall be given to all persons furnishing material for work when no formal contract is entered into for such material.

1.8.9 Title to new materials and/or equipment for the Work of this Contract and attendant liability for its protection and safety shall remain with Contractor until incorporated in the Work of this Contract and accepted by OWNER. No part of any materials and/or equipment shall be removed from its place of storage except for immediate installation in the Work of this Contract. Should the OWNER, in its discretion, allow the Contractor to store materials and/or equipment for the Work off-site, Contractor will store said materials and/or equipment at a bonded warehouse and with appropriate insurance coverage at no cost to OWNER. Contractor shall keep an accurate inventory of all materials and/or equipment in a manner satisfactory to OWNER or its authorized representative and shall, at the OWNER's request, forward it to the OWNER.

2. [RESERVED]

3. ARCHITECT

3.1 The Architect shall represent the OWNER during the Project and will observe the progress and quality of the Work on behalf of the OWNER. Architect shall have the authority to act on behalf of OWNER to the extent expressly provided in the Contract Documents and to the extent determined by OWNER. Architect shall have authority to reject materials, workmanship, and/or the Work whenever rejection may be necessary, in Architect's reasonable opinion, to insure the proper execution of the Contract.

3.2 Architect shall, with the OWNER and on behalf of the OWNER, determine the amount, quality, acceptability, and fitness of all parts of the Work, and interpret the Specifications, Drawings, and shall, with the OWNER, interpret all other Contract Documents.

3.3 Architect shall have all authority and responsibility established by law, including title 24 of the California Code of Regulations.

3.4 Contractor shall provide OWNER and the Construction Manager with a copy of all written communication between Contractor and Architect at the same time as that communication is made to Architect, including, without limitation, all RFIs, correspondence, submittals, claims, and proposed change orders.

4. CONSTRUCTION MANAGER

4.1 If a Construction Manager is used on this Project ("Construction Manager" or "CM"), the Construction Manager will provide administration of the Contract on the OWNER's behalf. After execution of the Contract and Notice to Proceed, all correspondence and/or instructions from Contractor and/or OWNER shall be forwarded through the Construction Manager. The Construction Manager will not be responsible for and will not have control or charge of construction means, methods, techniques, sequences, or procedures or for safety precautions in connection with the Work, which shall all remain the Contractor's responsibility.

4.2 The Construction Manager, however, will have authority to reject materials and/or workmanship not conforming to the Contract Documents, as determined by the OWNER, the Architect, and/or the Project Inspector. The Construction Manager shall also have the authority to require special inspection or testing of any portion of the Work, whether it has been fabricated, installed, or fully completed. Any decision made by the Construction Manager, in good faith, shall not give rise to any duty or responsibility of the Construction Manager to: the Contractor; any Subcontractor; the Contractor or Subcontractor's respective agents, employees; or other persons performing any of the Work. The Construction Manager shall have free access to any or all parts of Work at any time.

4.3 If the OWNER does not use a Construction Manager on this Project, all references to Construction Manager or CM shall be read as OWNER.

5. INSPECTOR, INSPECTIONS, AND TESTS

5.1 Project Inspector

5.1.1 One or more Project Inspector(s), including special Project Inspector(s), as required, will be assigned to the Work by OWNER, in accordance with requirements of title 24, part 1, of the California Code of Regulations, to enforce the building code and monitor compliance with Plans and Specifications for the Project previously approved by the DSA. Duties of Project Inspector(s) are specifically defined in section 4-342 of said part 1 of title 24.

5.1.2 No Work shall be carried on except with the knowledge and under the inspection of the Project Inspector(s). The Project Inspector(s) shall have free access to any or all parts of Work at any time. Contractor shall furnish Project Inspector(s) reasonable opportunities for obtaining such information as may be necessary to keep Project Inspector(s) fully informed respecting progress and manner of work and character of materials, including, but not limited to, submission of form DSA 156 (or the most current version applicable at the time the Work is performed) to the Project Inspector at least 48 hours in advance of the

commencement and completion of construction of each and every aspect of the Work. Forms are available on the DSA's website at: http://www.dgs.ca.gov/dsa/Forms.aspx. Inspection of Work shall not relieve Contractor from an obligation to fulfill this Contract. Project Inspector(s) and the DSA are authorized to suspend work whenever the Contractor and/or its Subcontractor(s) are not complying with the Contract Documents. Any work stoppage by the Project Inspector(s) and/or DSA shall be without liability to the OWNER. Contractor shall instruct its Subcontractors and employees accordingly.

5.1.3 If Contractor and/or any Subcontractor requests that the Project Inspector(s) perform any inspection off-site, this shall only be done if it is allowable pursuant to applicable regulations and DSA approval, if the Project Inspector(s) agree to do so, and at the expense of the Contractor.

5.2 Tests and Inspections

5.2.1 Tests and Inspections shall comply with title 24, part 1, California Code of Regulations, group 1, article 5, section 4-335, and with the provisions of the Specifications.

5.2.2 The OWNER will select an independent testing laboratory to conduct the tests. Selection of the materials required to be tested shall be by the laboratory or the OWNER's representative and not by the Contractor. The Contractor shall notify the OWNER's representative a sufficient time in advance of its readiness for required observation or inspection.

5.2.3 The Contractor shall notify the OWNER's representative a sufficient time in advance of the manufacture of material to be supplied under the Contract Documents, which must by terms of the Contract Documents be tested, in order that the OWNER may arrange for the testing of same at the source of supply. This notice shall be provided, at a minimum, seventy-two (72) hours prior to the manufacture of the material that needs to be tested.

5.2.4 Any material shipped by the Contractor from the source of supply prior to having satisfactorily passed such testing and inspection or prior to the receipt of notice from said representative that such testing and inspection will not be required, shall not be incorporated into and/or onto the Project.

5.2.5 The OWNER will select the testing laboratory and pay for the cost of all tests and inspections. Contractor shall reimburse the OWNER for any and all laboratory costs or other testing costs for any materials found to be not in compliance with the Contract Documents. At the OWNER's discretion, OWNER may elect to deduct laboratory or other testing costs for noncompliant materials from the Contract Price, and such deduction shall not constitute a withholding.

5.3 Costs for After Hours and/or Off Site Inspections

If the Contractor performs Work outside the Inspector's regular working hours or requests the Inspector to perform inspections off Site, costs of any inspections required outside regular working hours or off Site shall be borne by the Contractor and may be invoiced to the Contractor by the OWNER or the OWNER may deduct those expenses from the next Progress Payment.

6. CONTRACTOR

Contractor shall construct and complete, in a good and workmanlike manner, the Work for the Contract Price including any adjustment(s) to the Contract Price pursuant to provisions herein regarding changes to the Contract Price. Except as otherwise noted, Contractor shall provide and pay for all labor, materials, equipment, permits (excluding DSA), fees, licenses, facilities, transportation, taxes, bonds and insurance, and services necessary for the proper execution and completion of the Work, except as indicated herein.

6.1 Status of Contractor

6.1.1 Contractor is and shall at all times be deemed to be an independent contractor and shall be wholly responsible for the manner in which it and its Subcontractors perform the services required of it by the Contract Documents. Nothing herein contained shall be construed as creating the relationship of employer and employee, or principal and agent, between the OWNER, or any of the OWNER's employees or agents, and Contractor or any of Contractor's Subcontractors, agents or employees. Contractor assumes exclusively the responsibility for the acts of its agents, and employees as they relate to the services to be provided during the course and scope of their employment. Contractor, its Subcontractors, agents, and its employees shall not be entitled to any rights or privileges of OWNER employees. OWNER shall be permitted to monitor the Contractor's activities to determine compliance with the terms of this Contract.

6.1.2 As required by law, Contractor and all Subcontractors shall be properly licensed and regulated by the Contractors State License Board, 9821 Business Park Drive, Sacramento, California 95827, http://www.cslb.ca.gov.

6.1.3 As required by law, Contractor and all Subcontractors shall be properly registered as public works contractors by the Department of Industrial Relations at: https://efiling.dir.ca.gov/PWCR/ActionServlet?action=displayPWCRegistrationForm or current URL.

6.1.4 Contractor represents that it has no existing interest and will not acquire any interest, direct or indirect, which could conflict in any manner or degree with the performance of Work required under this Contractor and that no person having any such interest shall be employed by Contractor.

6.2 Project Inspection Card(s)

Contractor shall verify that forms DSA 152 (or the current version applicable at the time the Work is performed) are issued for the Project prior to the commencement of construction.

6.3 Contractor's Supervision

6.3.1 During progress of the Work, Contractor shall keep on the Premises, and at all other locations where any Work related to the Contract is being performed, an experienced and competent project manager and construction superintendent who are employees of the Contractor, to whom the OWNER does not object and at least one of whom shall be fluent in English, written and verbal.

6.3.2 The project manager and construction superintendent shall both speak fluently the predominant language of the Contractor's employees.

6.3.3 Before commencing the Work herein, Contractor shall give written notice to OWNER of the name of its project manager and construction superintendent. Neither the Contractor's project manager nor construction superintendent shall be changed except with prior written notice to OWNER. If the Contractor's project manager and/or construction superintendent proves to be unsatisfactory to Contractor, or to OWNER, any of the OWNER's employees, agents, the Construction Manager, or the Architect, Contractor shall notify OWNER in writing before any change occurs, but no less than two (2) business days prior. Any replacement of the project manager and/or construction superintendent shall be made promptly and must be satisfactory to the OWNER. The Contractor's project manager and construction superintendent shall each represent Contractor, and all directions given to Contractor's project manager and/or construction superintendent shall be as binding as if given to Contractor.

6.3.4 Contractor shall give efficient supervision to Work, using its best skill and attention. Contractor shall carefully study and compare all Contract Documents, Drawings, Specifications, and other instructions and shall at once report to OWNER, Construction Manager, and Architect any error, inconsistency, or omission that Contractor or its employees and Subcontractors may discover, in writing, with a copy to OWNER's Project Inspector(s). The Contractor shall have responsibility for discovery of errors, inconsistencies, or omissions.

6.4 Duty to Provide Fit Workers

6.4.1 Contractor and Subcontractor(s) shall at all times enforce strict discipline and good order among their employees and shall not employ or work any unfit person or anyone not skilled in work assigned to that person. It shall be the responsibility of Contractor to ensure compliance with this requirement. OWNER may require Contractor to permanently remove unfit persons from Project Site.

6.4.2 Any person in the employ of Contractor or Subcontractor(s) whom OWNER may deem incompetent or unfit shall be excluded from working on the Project and shall not again be employed on the Project except with the prior written consent of OWNER.

6.4.3 The Contractor shall furnish labor that can work in harmony with all other elements of labor employed or to be employed in the Work.

6.4.4 If Contractor intends to make any change in the name or legal nature of the Contractor's entity, Contractor must first notify the OWNER in writing prior to making any contemplated change. The OWNER shall determine in writing if Contractor's intended change is permissible while performing this Contract.

6.5 Field Office

6.5.1 Contractor shall provide a temporary office on the Work Site for the OWNER's use exclusively, during the term of the Contract.

6.6 Purchase of Materials and Equipment

The Contractor is required to order, obtain, and store materials and equipment sufficiently in advance of its Work at no additional cost or advance payment from OWNER to assure that there will be no delays.

6.7 Documents on Work

6.7.1 Contractor shall at all times keep on the Work Site, or at another location as the OWNER may authorize in writing, one legible copy of all Contract Documents, including Addenda and Change Orders, and Titles 19 and 24 of the California Code of Regulations, the specified edition(s) of the Uniform Building Code, all approved Drawings, Plans, Schedules, and Specifications, and all codes and documents referred to in the Specifications, and made part thereof. These documents shall be kept in good order and available to OWNER, Construction Manager, Architect, Architect's representatives, the Project Inspector(s), and all authorities having jurisdiction. Contractor shall be acquainted with and comply with the provisions of these titles as they relate to this Project. (See particularly the duties of Contractor, Title 24, Part 1, California Code of Regulations, section 4-343.) Contractor shall also be acquainted with and comply with all California Code of Regulations provisions relating to conditions on this Project, particularly Titles 8 and 17. Contractor shall coordinate with Architect and Construction Manager and shall submit its verified report(s) according to the requirements of Title 24.

6.7.2 Daily Job Reports.

6.7.2.1 Contractor shall maintain, at a minimum, at least one (1) set of Daily Job Reports on the Project. These must be prepared by the Contractor's employee(s) who are present on Site, and must include, at a minimum, the following information:

6.7.2.1.1 A brief description of all Work performed on that day.
6.7.2.1.2 A summary of all other pertinent events and/or occurrences on that day.
6.7.2.1.3 The weather conditions on that day.
6.7.2.1.4 A list of all Subcontractor(s) working on that day, including DIR registration numbers.
6.7.2.1.5 A list of each Contractor employee working on that day and the total hours worked for each employee.
6.7.2.1.6 A complete list of all equipment on Site that day, whether in use or not.
6.7.2.1.7 A complete list of all materials, supplies, and equipment delivered on that day.
6.7.2.1.8 A complete list of all inspections and tests performed on that day.

6.7.2.2 Each day Contractor shall provide a copy of the previous day's Daily Job Report to the OWNER or the Construction Manager.

6.8 Preservation of Records

Contractor shall maintain, and OWNER shall have the right to inspect, Contractor's financial records for the Project, including, without limitation, Job Cost Reports for the Project in compliance with the criteria set forth herein. The OWNER shall have the right to examine and audit all Daily Job Reports or other Project records of Contractor's project manager(s), project superintendent(s), and/or project foreperson(s), all certified payroll records and/or related documents including, without limitation, Job Cost Reports, payroll, payment, timekeeping and tracking documents; all books, estimates, records, contracts, documents, bid documents, bid cost data, subcontract job cost reports, and other data of the Contractor, any Subcontractor, and/or supplier, including computations and projections related to bidding, negotiating, pricing, or performing the Work or Contract modification, in order to evaluate the accuracy, completeness, and currency of the cost, manpower, coordination, supervision, or pricing data at no additional cost to the OWNER. These documents may be duplicative and/or be in addition to any Bid Documents held in escrow by the OWNER. The Contractor shall make available at its office at all reasonable times the materials described in this paragraph for the examination, audit, or reproduction until three (3) years after final payment under this Contract. Notwithstanding the provisions above, Contractor shall provide any records requested by any governmental agency, if available, after the time set forth above.

6.9 Integration of Work

6.9.1 Contractor shall do all cutting, fitting, patching, and preparation of Work as required to make its several parts come together properly, to fit it to receive or be received by work of other contractors, and to coordinate tolerances to various pieces of work, showing upon, or reasonably implied by, the Drawings and Specifications for the completed structure, and shall conform them as OWNER and/or Architect may direct.

6.9.2 Contractor shall make its own layout of lines and elevations and shall be responsible for the accuracy of both Contractor's and Subcontractors' work resulting therefrom.

6.9.3 Contractor and all Subcontractors shall take all field dimensions required in performance of the Work, and shall verify all dimensions and conditions on the Site. All dimensions affecting proper fabrication and installation of all Work must be verified prior to fabrication by taking field measurements of the true conditions. If there are any discrepancies between dimensions in drawings and existing conditions which will affect the Work, Contractor shall bring such discrepancies to the attention of the OWNER and Architect for adjustment before proceeding with the Work. In doing so, it is recognized that Contractor is not acting in the capacity of a licensed design professional, and that Contractor's examination is made in good faith to facilitate construction and does not create an affirmative responsibility to detect errors, omissions or inconsistencies in the Contract Documents or to ascertain compliance with applicable laws, building codes or regulations. Following receipt of written notice from Contractor, the OWNER and/or Architect shall inform Contractor what action, if any, Contractor shall take with regard to such discrepancies.

6.9.4 All costs caused by noncompliant, defective, or delayed Work shall be borne by Contractor, inclusive of repair work.

6.9.5 Contractor shall not endanger any work performed by it or anyone else by cutting, excavating, or otherwise altering work and shall not cut or alter work of any other contractor except with consent of OWNER.

6.10 Notifications

6.10.1 Contractor shall notify the Architect and Project Inspector, in writing, of the commencement of construction of each and every aspect of the Work at least 48 hours in advance by submitting form DSA 156 (or the most current version applicable at the time the Work is performed) to the Project Inspector. Forms are available on the DSA's website at: http://www.dgs.ca.gov/dsa/Forms.aspx.

6.10.2 Contractor shall notify the Architect and Project Inspector, in writing, of the completion of construction of each and every aspect of the Work at least 48 hours in advance by submitting form DSA 156 (or current version) to the Project Inspector.

6.11 Obtaining of Permits, Licenses and Registrations

Contractor shall secure and pay for all permits (except DSA), licenses, registrations, approvals and certificates necessary for prosecution of Work, including but not limited to those listed in the Special Conditions, if any, before the date of the commencement of the Work or before the permits, licenses, registrations, approvals and certificates are legally required to continue the Work without interruption. The Contractor shall obtain and pay, only when legally required, for all licenses, registrations, approvals, permits, inspections, and inspection certificates required to be obtained from or issued by any authority having jurisdiction over any part of the Work included in the Contract. All final permits, licenses, registrations, approvals and certificates shall be delivered to OWNER before demand is made for final payment.

6.12 Royalties and Patents

6.12.1 Contractor shall obtain and pay, only when legally required, all royalties and license fees necessary for prosecution of Work before the earlier of the date of the commencement of the Work or the date that the license is legally required to continue the Work without interruption. Contractor shall defend suits or claims of infringement of patent, copyright, or other rights and shall hold the OWNER, the Architect, and the Construction Manager harmless and indemnify them from loss on account thereof except when a particular design, process, or make or model of product is required by the Contract Documents. However, if the Contractor has reason to believe that the required design, process, or product is an infringement of a patent or copyright, the Contractor shall indemnify and defend the OWNER, Architect and Construction Manager against any loss or damage unless the Contractor promptly informs the OWNER of its information.

6.12.2 The review by the OWNER or Architect of any method of construction, invention, appliance, process, article, device, or material of any kind shall be only its adequacy for the Work and shall not approve use by the Contractor in violation of any patent or other rights of any person or entity.

6.13 Work to Comply With Applicable Laws and Regulations

6.13.1 Contractor shall give all notices and comply with the following specific laws, ordinances, rules, and regulations and all other applicable laws, ordinances, rules, and regulations bearing on conduct of Work as indicated and specified, including but not limited to the appropriate statutes and administrative code sections. If Contractor observes that Drawings and Specifications are at variance therewith, or should Contractor become aware of the development of conditions not covered by Contract Documents that may result in finished Work being at variance therewith, Contractor shall promptly notify OWNER in writing and any changes deemed necessary by OWNER shall be made as provided in Contract for changes in Work.

6.13.1.1 National Electrical Safety Code, U. S. Department of Commerce

6.13.1.2 National Board of Fire Underwriters' Regulations

6.13.1.3 International Building Code, latest addition, and the California Code of Regulations, title 24, and other amendments

6.13.1.4 Manual of Accident Prevention in Construction, latest edition, published by A.G.C. of America

6.13.1.5 Industrial Accident Commission's Safety Orders, State of California

6.13.1.6 Regulations of the State Fire Marshall (title 19, California Code of Regulations) and Pertinent Local Fire Safety Codes

6.13.1.7 Americans with Disabilities Act

6.13.1.8 Education Code of the State of California

6.13.1.9 Government Code of the State of California

6.13.1.10 Labor Code of the State of California, division 2, part 7, Public Works and Public Agencies

6.13.1.11 Public Contract Code of the State of California

6.13.1.12 California Art Preservation Act

6.13.1.13 U. S. Copyright Act

6.13.1.14 U. S. Visual Artists Rights Act

6.13.2 Contractor shall comply with all applicable mitigation measures, if any, adopted by any public agency with respect to this Project pursuant to the California Environmental Quality Act (Public Resources Code section 21000 et seq.).

6.13.3 If Contractor performs any Work that it knew, or through exercise of reasonable care should have known, to be contrary to any applicable laws,

ordinance, rules, or regulations, Contractor shall bear all costs arising therefrom and arising from the correction of said Work.

6.13.4 Where Specifications or Drawings state that materials, processes, or procedures must be approved by the DSA, State Fire Marshall, or other body or agency, Contractor shall be responsible for satisfying requirements of such bodies or agencies applicable at the time the Work is performed, and as determined by those bodies or agencies.

6.14 Safety/Protection of Persons and Property

6.14.1 The Contractor will be solely and completely responsible for conditions of the Work Site, including safety of all persons and property during performance of the Work. This requirement will apply continuously and not be limited to normal working hours.

6.14.2 The wearing of hard hats will be mandatory at all times for all personnel on Site. Contractor shall supply sufficient hard hats to properly equip all employees and visitors.

6.14.3 Any construction review of the Contractor's performance is not intended to include review of the adequacy of the Contractor's safety measures in, on, or near the Work Site.

6.14.4 Implementation and maintenance of safety programs shall be the sole responsibility of the Contractor.

6.14.5 The Contractor shall furnish to the OWNER a copy of the Contractor's safety plan within the time frame indicated in the Contract Documents and specifically adapted for the Project.

6.14.6 Contractor shall be responsible for all damages to persons or property that occur as a result of its fault or negligence in connection with the prosecution of this Contract and shall take all necessary measures and be responsible for the proper care and completion and final acceptance by OWNER. All Work shall be solely at Contractor's risk with the exception of damage to the Work caused by "acts of God" as defined in Public Contract Code section 7105.

6.14.7 Contractor shall take, and require Subcontractors to take, all necessary precautions for safety of workers on the Project and shall comply with all applicable federal, state, local, and other safety laws, standards, orders, rules, regulations, and building codes to prevent accidents or injury to persons on, about, or adjacent to premises where Work is being performed and to provide a safe and healthful place of employment. Contractor shall furnish, erect, and properly maintain at all times, all necessary safety devices, safeguards, construction canopies, signs, nets, barriers, lights, and watchmen for protection of workers and the public and shall post danger signs warning against hazards created by such features in the course of construction.

6.14.8 Hazards Control – Contractor shall store volatile wastes in covered metal containers and remove them from the Site daily. Contractor shall prevent accumulation of wastes that create hazardous conditions. Contractor shall provide adequate ventilation during use of volatile or noxious substances.

6.14.9 Contractor shall designate a responsible member of its organization on the Project, whose duty shall be to post information regarding protection and obligations of workers and other notices required under occupational safety and health laws, to comply with reporting and other occupational safety requirements, and to protect the life, safety, and health of workers. Name and position of person so designated shall be reported to OWNER by Contractor.

6.14.10 Contractor shall correct any violations of safety laws, rules, orders, standards, or regulations. Upon the issuance of a citation or notice of violation by the Division of Occupational Safety and Health, Contractor shall correct such violation promptly.

6.14.11 Contractor shall comply with any OWNER storm water requirements that are approved by the OWNER and applicable to the Project, at no additional cost to the OWNER.

6.14.12 In an emergency affecting safety of life or of work or of adjoining property, Contractor, without special instruction or authorization, shall act, at its discretion, to prevent such threatened loss or injury. Any compensation claimed by Contractor on account of emergency work shall be determined by agreement.

6.14.13 All salvage materials will become the property of the Contractor and shall be removed from the Site unless otherwise called for in the Contract Documents. However, the OWNER reserves the right to designate certain items of value that shall be turned over to the OWNER unless otherwise directed by OWNER.

6.14.14 All connections to public utilities and/or existing on-site services shall be made and maintained in such a manner as to not interfere with the continuing use of same by the OWNER during the entire progress of the Work.

6.14.15 Contractor shall provide such heat, covering, and enclosures as are necessary to protect all Work, materials, equipment, appliances, and tools against damage by weather conditions, such as extreme heat, cold, rain, snow, dry winds, flooding, or dampness.

6.14.16 The Contractor shall protect and preserve the Work from all damage or accident, providing any temporary roofs, window and door coverings, boxings, or other construction as required by the Architect. The Contractor shall be responsible for existing structures, walks, roads, trees, landscaping, and/or improvements in working areas; and shall provide adequate protection therefore. If temporary removal is necessary of any of the above items, or damage occurs due to the Work, the Contractor shall replace same at his expense with same kind, quality, and size of Work or item damaged. This shall include any adjoining property of the OWNER and others.

6.14.17 Contractor shall take adequate precautions to protect existing roads, sidewalks, curbs, pavements, utilities, adjoining property, and structures (including, without limitation, protection from settlement or loss of lateral support), and to avoid damage thereto, and repair any damage thereto caused by construction operations.

6.14.18 Contractor shall confine apparatus, the storage of materials, and the operations of workers to limits indicated by law, ordinances, permits, or directions of

Architect, and shall not interfere with the Work or unreasonably encumber Premises or overload any structure with materials. Contractor shall enforce all instructions of OWNER and Architect regarding signs, advertising, fires, and smoking, and require that all workers comply with all regulations while on Project Site.

6.14.19 Contractor, Contractor's employees, Subcontractors, Subcontractors' employees, or any person associated with the Work shall conduct themselves in a manner appropriate for a school site. No verbal or physical contact with neighbors, students, and faculty, profanity, or inappropriate attire or behavior will be permitted. OWNER may require Contractor to permanently remove non-complying persons from Project Site.

6.14.20 Contractor shall take care to prevent disturbing or covering any survey markers, monuments, or other devices marking property boundaries or corners. If such markers are disturbed, Contractor shall have a civil engineer, registered as a professional engineer in California, replace them at no cost to OWNER.

6.14.21 In the event that the Contractor enters into any agreement with owners of any adjacent property to enter upon the adjacent property for the purpose of performing the Work, Contractor shall fully indemnify, defend, and hold harmless each person, entity, firm, or agency that owns or has any interest in adjacent property. The form and content of the agreement of indemnification shall be approved by the OWNER prior to the commencement of any Work on or about the adjacent property. The Contractor shall also indemnify the OWNER as provided in the indemnification provision herein. These provisions shall be in addition to any other requirements of the owners of the adjacent property.

6.15 Working Evenings and Weekends

Contractor may be required to work increased hours, evenings, and/or weekends at no additional cost to the OWNER. Contractor shall give the OWNER seventy-two (72) hours' notice prior to performing any evening and/or weekend work. Contractor shall perform all evening and/or weekend work only upon OWNER's approval and in compliance with all applicable rules, regulations, laws, and local ordinances including, without limitation, all noise and light limitations. Contractor shall reimburse the OWNER for any increased or additional Inspector charges as a result of Contractor's increased hours, or evening and/or weekend work.

6.16 Cleaning Up

6.16.1 The Contractor shall provide all services, labor, materials, and equipment necessary for protecting and securing the Work, all school occupants, furnishings, equipment, and building structure from damage until its completion and final acceptance by OWNER. Dust barriers shall be provided to isolate dust and dirt from construction operations. At completion of the Work and portions thereof, Contractor shall clean to the original state any areas beyond the Work area that become dust laden as a result of the Work. The Contractor must erect the necessary warning signs and barricades to ensure the safety of all school occupants. The Contractor at all times must maintain good housekeeping practices to reduce the risk of fire damage and must make a fire extinguisher, fire blanket, and/or fire watch, as applicable, available at each location where cutting, braising, soldering, and/or welding is being performed or where there is an increased risk of fire.

6.16.2 Contractor at all times shall keep Premises, including property immediately adjacent thereto, free from debris such as waste, rubbish (including personal rubbish of workers, e.g., food wrappers, etc.), and excess materials and equipment caused by the Work. Contractor shall not leave debris under, in, or about the Premises (or surrounding property or neighborhood), but shall promptly remove same from the Premises on a daily basis. If Contractor fails to clean up, OWNER may do so and the cost thereof shall be charged to Contractor. If Contract is for work on an existing facility, Contractor shall also perform specific clean-up on or about the Premises upon request by the OWNER as it deems necessary for the continuing education process. Contractor shall comply with all related provisions of the Specifications.

6.16.3 If the Construction Manager, Architect, or OWNER observes the accumulation of trash and debris, the OWNER will give the Contractor a 24-hour written notice to mitigate the condition.

6.16.4 Should the Contractor fail to perform the required clean-up, or should the clean-up be deemed unsatisfactory by the OWNER, the OWNER will then perform the clean-up. All cost associated with the clean-up work (including all travel, payroll burden, and costs for supervision) will be deducted from the Contract Price, or OWNER may withhold those amounts from payment(s) to Contractor.

7. SUBCONTRACTORS

7.1 Contractor shall provide the OWNER with information for all Subcontracts as indicated in the Contractor's Submittals and Schedules Section herein.

7.2 No contractual relationship exists between the OWNER and any Subcontractor, supplier, or sub-subcontractor by reason of this Contract.

7.3 Contractor agrees to bind every Subcontractor by terms of this Contract as far as those terms that are applicable to Subcontractor's work including, without limitation, all labor, wage & hour, apprentice and related provisions and requirements. If Contractor shall subcontract any part of this Contract, Contractor shall be as fully responsible to OWNER for acts and omissions of any Subcontractor and of persons either directly or indirectly employed by any Subcontractor, including Subcontractor caused Project delays, as it is for acts and omissions of persons directly employed by Contractor. The divisions or sections of the Specifications and/or the arrangement of the drawings are not intended to control the Contractor in dividing the Work among Subcontractors or limit the work performed by any trade.

7.4 OWNER's consent to, or approval of, or failure to object to, any Subcontractor under this Contract shall not in any way relieve Contractor of any obligations under this Contract and no such consent shall be deemed to waive any provisions of this Contract.

7.5 Contractor is directed to familiarize itself with sections 4100 through 4114 of the Public Contract Code of the State of California, as regards subletting and subcontracting, and to comply with all applicable requirements therein. In addition, Contractor is directed to familiarize itself with sections 1720 through 1861 of the Labor Code of the State of California, as regards the payment of prevailing wages and related issues, and to comply with all applicable requirements therein including, without

limitation, section 1775 and the Contractor's and Subcontractors' obligations and liability for violations of prevailing wage law and other applicable laws.

7.6 No Contractor whose Bid is accepted shall, without consent of the awarding authority and in full compliance with section 4100 et seq. of the Public Contract Code, including, without limitation, sections 4107, 4107.5, and 4109 of the Public Contract Code, and section 1771.1 of the Labor Code, either:

7.6.1 Substitute any person as a Subcontractor in place of the Subcontractor designated in the original Bid; or

7.6.2 Permit any Subcontract to be assigned or transferred, or allow any portion of the Work to be performed by anyone other than the original Subcontractor listed in the Bid; or

7.6.3 Sublet or subcontract any portion of the Work in excess of one-half of one percent (0.5%) of the Contractor's total bid as to which his original bid did not designate a Subcontractor.

7.7 The Contractor shall be responsible for the coordination of the trades, Subcontractors, sub-subcontractors, and material or equipment suppliers working on the Project.

7.7.1 If the Contract is valued at $1 million or more and uses, or plans to use, state bond funds, then Contractor is responsible for ensuring that first tier Subcontractors holding C-4, C-7, C-10, C-16, C-20, C-34, C-36, C-38, C-42, C-43, and/or C-46 licenses are prequalified by the OWNER to work on the Project pursuant to Public Contract Code section 20111.6.

7.7.2 Contractor is responsible for ensuring that all Subcontractors are properly registered as public works contractors by the Department of Industrial Relations.

7.8 Contractor is solely responsible for settling any differences between the Contractor and its Subcontractor(s) or between Subcontractors.

7.9 Contractor must include in all of its subcontracts the assignment provisions as indicated in the Termination section of these General Conditions.

8. OTHER CONTRACTS/CONTRACTORS

8.1 OWNER reserves the right to let other contracts, and/or to perform work with its own forces, in connection with the Project. Contractor shall afford other contractors reasonable opportunity for introduction and storage of their materials and execution of their work and shall properly coordinate and connect Contractor's Work with the work of other contractors.

8.2 In addition to Contractor's obligation to protect its own Work, Contractor shall protect the work of any other contractor that Contractor encounters while working on the Project.

8.3 If any part of Contractor's Work depends for proper execution or results upon work of OWNER or any other contractor, the Contractor shall inspect and, before

proceeding with its Work, promptly report to the OWNER in writing any defects in OWNER's or any other contractor's work that render Contractor's Work unsuitable for proper execution and results. Contractor shall be held accountable for damages to OWNER for OWNER's or any other contractor's work that Contractor failed to inspect or should have inspected. Contractor's failure to inspect and report shall constitute Contractor's acceptance of all OWNER's or any other contractor's work as fit and proper for reception of Contractor's Work, except as to defects that may develop in OWNER's or any other contractor's work after execution of Contractor's Work and not caused by execution of Contractor's Work.

8.4 To ensure proper execution of its subsequent work, Contractor shall measure and inspect work already in place and shall at once report to the OWNER in writing any discrepancy between that executed work and the Contract Documents.

8.5 Contractor shall ascertain to its own satisfaction the scope of the Project and nature of OWNER's or any other contracts that have been or may be awarded by OWNER in prosecution of the Project to the end that Contractor may perform this Contract in light of the other contracts, if any.

8.6 Nothing herein contained shall be interpreted as granting to Contractor exclusive occupancy of the Site, the Premises, or of the Project. Contractor shall not cause any unnecessary hindrance or delay to the use and/or school operation(s) of the Premises and/or to OWNER or any other contractor working on the Project. If simultaneous execution of any contract or school operation is likely to cause interference with performance of Contractor's Contract, Contractor shall coordinate with those contractor(s), person(s), and/or entity(s) and shall notify the OWNER of the resolution.

9. DRAWINGS AND SPECIFICATIONS

9.1 A complete list of all Drawings that form a part of the Contract is to be found as an index on the Drawings themselves, and/or may be provided to the Contractor and/or in the Table of Contents.

9.2 Materials or Work described in words that so applied have a well-known technical or trade meaning shall be deemed to refer to recognized standards, unless noted otherwise.

9.3 Trade Name or Trade Term. It is not the intention of this Contract to go into detailed descriptions of any materials and/or methods commonly known to the trade under "trade name" or "trade term." The mere mention or notation of "trade name" or "trade term" shall be considered a sufficient notice to Contractor that it will be required to complete the work so named, complete, finished, and operable, with all its appurtenances, according to the best practices of the trade.

9.4 The naming of any material and/or equipment shall mean furnishing and installing of same, including all incidental and accessory items thereto and/or labor therefor, as per best practices of the trade(s) involved, unless specifically noted otherwise.

9.5 Contract Documents are complementary, and what is called for by one shall be binding as if called for by all. As such, Drawings and Specifications are intended to be fully cooperative and to agree. However, if Contractor observes that Drawings and

Specifications are in conflict with the Contract Documents, Contractor shall promptly notify OWNER and Architect in writing, and any necessary changes shall be made as provided in the Contract Documents.

9.6 In the case of discrepancy or ambiguity in the Contract Documents, the order of precedence in the Agreement shall prevail. However, in the case of discrepancy or ambiguity solely between and among the Drawings and Specifications, the discrepancy or ambiguity shall be resolved in favor of the interpretation that will provide OWNER with the functionally complete and operable Project described in the Drawings and Specifications. In case of ambiguity, conflict, or lack of information, OWNER will furnish clarifications with reasonable promptness.

9.7 Drawings and Specifications are intended to comply with all laws, ordinances, rules, and regulations of constituted authorities having jurisdiction, and where referred to in the Contract Documents, the laws, ordinances, rules, and regulations shall be considered as a part of the Contract within the limits specified. Contractor shall bear all expense of correcting work done contrary to said laws, ordinances, rules, and regulations.

9.8 As required by Section 4-317(c), Part 1, Title 24, CCR: "Should any existing conditions such as deterioration or non-complying construction be discovered which is not covered by the DSA-approved documents wherein the finished work will not comply with Title 24, California Code of Regulations, a construction change document, or a separate set of plans and specifications, detailing and specifying the required repair work shall be submitted to and approved by DSA before proceeding with the repair work."

9.9 Ownership of Drawings

All copies of Plans, Drawings, Designs, Specifications, and copies of other incidental architectural and engineering work, or copies of other Contract Documents furnished by OWNER, are the property of OWNER. They are not to be used by Contractor in other work and, with the exception of signed sets of Contract Documents, are to be returned to OWNER on request at completion of Work, or may be used by OWNER as it may require without any additional costs to OWNER. Neither the Contractor nor any Subcontractor, or material or equipment supplier shall own or claim a copyright in the Drawings, Specifications, and other documents prepared by the Architect. OWNER hereby grants the Contractor, Subcontractors, sub-subcontractors, and material or equipment suppliers a limited license to use applicable portions of the Drawings prepared for the Project in the execution of their Work under the Contract Documents.

10. CONTRACTOR'S SUBMITTALS AND SCHEDULES

Contractor's submittals shall comply with the provisions and requirements of the Specifications including, without limitation Submittals.

10.1 Schedule of Work, Schedule of Submittals, and Schedule of Values

10.1.1 Within **TEN (10)** calendar days after the date of the Notice to Proceed (unless otherwise specified in the Specifications), the Contractor shall prepare and submit to the OWNER for review, in a form supported by sufficient data to substantiate its accuracy as the OWNER may require:

10.1.1.1 Preliminary Schedule. A preliminary schedule of construction indicating the starting and completion dates of the various stages of the Work, including any information and following any form as may be specified in the Specifications. Once approved by OWNER, this shall become the Construction Schedule. This schedule shall include and identify all tasks that are on the Project's critical path with a specific determination of the start and completion of each critical path task as well as all Contract milestones and each milestone's completion date(s) as may be required by the OWNER.

10.1.1.2 Preliminary Schedule of Values. A preliminary schedule of values for all of the Work, which must include quantities and prices of items aggregating the Contract Price and must subdivide the Work into component parts in sufficient detail to serve as the basis for progress payments during construction. Unless the Special Conditions contain different limits, this preliminary schedule of values shall include, at a minimum, the following information and the following structure:

10.1.1.2.1 Divided into at least the following categories:

10.1.1.2.1.1 Overhead and profit;
10.1.1.2.1.2 Supervision;
10.1.1.2.1.3 General conditions;
10.1.1.2.1.4 Layout;
10.1.1.2.1.5 Mobilization;
10.1.1.2.1.6 Submittals;
10.1.1.2.1.7 Bonds and insurance;
10.1.1.2.1.8 Close-out/Certification documentation;
10.1.1.2.1.9 Demolition;
10.1.1.2.1.10 Installation;
10.1.1.2.1.11 Rough-in;
10.1.1.2.1.12 Finishes;
10.1.1.2.1.13 Testing;
10.1.1.2.1.14 Punchlist and acceptance.

10.1.1.2.2 And also divided by each of the following areas:

10.1.1.2.2.1 Site work;
10.1.1.2.2.2 By each building;
10.1.1.2.2.3 By each floor.

10.1.1.2.3 The preliminary schedule of values shall not provide for values any greater than the following percentages of the Contract value:

10.1.1.2.3.1 Mobilization and layout combined to equal not more than 1%;
10.1.1.2.3.2 Submittals, samples and shop drawings combined to equal not more than 3%;
10.1.1.2.3.3 Bonds and insurance combined to equal not more than 2%.

10.1.1.2.4 Closeout documentation shall have a value in the preliminary schedule of not less than 5%.

10.1.1.2.5 Notwithstanding any provision of the Contract Documents to the contrary, payment of the Contractor's overhead, supervision, general conditions costs, and profit, as reflected in the Cost Breakdown, shall be paid based on percentage complete, with the disbursement of Progress Payments and the Final Payment.

10.1.1.2.6 Contractor shall certify that the preliminary schedule of values as submitted to the OWNER is accurate and reflects the costs as developed in preparing Contractor's bid. The preliminary schedule of values shall be subject to the OWNER's review and approval of the form and content thereof. In the event that the OWNER objects to any portion of the preliminary schedule of values, the OWNER shall notify the Contractor, in writing, of the OWNER's objection(s) to the preliminary schedule of values. Within five (5) calendar days of the date of the OWNER's written objection(s), Contractor shall submit a revised preliminary schedule of values to the OWNER for review and approval. The foregoing procedure for the preparation, review and approval of the preliminary schedule of values shall continue until the OWNER has approved the entirety of the preliminary schedule of values.

10.1.1.2.7 Once the preliminary schedule of values is approved by the OWNER, this shall become the Schedule of Values. The Schedule of Values shall not be thereafter modified or amended by the Contractor without the prior consent and approval of the OWNER, which may be granted or withheld in the sole discretion of the OWNER.

10.1.1.3 Preliminary Schedule of Submittals. A preliminary schedule of submittals, including Shop Drawings, Product Data, and Samples submittals. Once approved by OWNER, this shall become the Submittal Schedule. All submittals shall be forwarded to the OWNER by the date indicated on the approved Submittal Schedule, unless an earlier date is necessary to maintain the Construction Schedule, in which case those submittals shall be forwarded to the OWNER so as not to delay the Construction Schedule. Upon request by the OWNER, Contractor shall provide an electronic copy of all submittals to the OWNER. All submittals shall be submitted no later than 90 days after the Notice to Proceed.

10.1.1.4 Safety Plan. Contractor's Safety Plan specifically adapted for the Project. Contractor's Safety Plan shall comply with the following requirements:

10.1.1.4.1 All applicable requirements of California Division of Occupational Safety and Health ("CalOSHA") and/or of the United States Occupational Safety and Health Administration ("OSHA").

10.1.1.4.2 All provisions regarding Project safety, including all applicable provisions in these General Conditions.

10.1.1.4.3 Contractor's Safety Plan shall be in English and in the language(s) of the Contractor's and its Subcontractors' employees.

10.1.1.5 Complete Registered Subcontractors List. The name, address, telephone number, facsimile number, California State Contractors License number, classification, DIR registration number and monetary value of all

Subcontracts of any tier for parties furnishing labor, material, or equipment for completion of the Project.

10.1.2 Contractor must provide all schedules both in hard copy and electronically, in a format (e.g., Microsoft Project or Primavera) approved in advance by the OWNER.

10.1.3 The OWNER will review the schedules submitted and the Contractor shall make changes and corrections in the schedules as requested by the OWNER and resubmit the schedules until approved by the OWNER.

10.1.4 The OWNER shall have the right at any time to revise the schedule of values if, in the OWNER's sole opinion, the schedule of values does not accurately reflect the value of the Work performed.

10.1.5 All submittals and schedules must be approved by the OWNER before Contractor can rely on them as a basis for payment.

10.2 Monthly Progress Schedule(s)

10.2.1 Contractor shall provide Monthly Progress Schedule(s) to the OWNER. A Monthly Progress Schedule shall update the approved Construction Schedule or the last Monthly Progress Schedule, showing all work completed and to be completed as well as updating the Registered Subcontractors List. The monthly Progress Schedule shall be sent within the timeframe requested by the OWNER and shall be in a format acceptable to the OWNER and contain a written narrative of the progress of work that month and any changes, delays, or events that may affect the work. The process for OWNER approval of the Monthly Progress Schedule shall be the same as the process for approval of the Construction Schedule.

10.2.2 Contractor shall submit Monthly Progress Schedule(s) with all payment applications.

10.2.3 Contractor must provide all schedules both in hard copy and electronically, in a format (e.g., Microsoft Project or Primavera) approved in advance by the OWNER.

10.2.4 The OWNER will review the schedules submitted and the Contractor shall make changes and corrections in the schedules as requested by the OWNER and resubmit the schedules until approved by the OWNER.

10.2.5 The OWNER shall have the right at any time to revise the schedule of values if, in the OWNER’s sole opinion, the schedule of values does not accurately reflect the value of the Work performed.

10.2.6 All submittals and schedules must be approved by the OWNER before Contractor can rely on them as a basis for payment.

10.3 Material Safety Data Sheets (MSDS)

Contractor is required to ensure Material Safety Data Sheets are available in a readily accessible place at the Work Site for any material requiring a Material Safety Data Sheet

per the federal "Hazard Communication" standard, or employees' "right to know" law. The Contractor is also required to ensure proper labeling on substances brought onto the job site and that any person working with the material or within the general area of the material is informed of the hazards of the substance and follows proper handling and protection procedures. Two additional copies of the Material Safety Data Sheets shall also be submitted directly to the OWNER.

11. SITE ACCESS, CONDITIONS, AND REQUIREMENTS

11.1 Site Investigation

Before bidding on this Work, Contractor shall make a careful investigation of the Site and thoroughly familiarize itself with the requirements of the Contract. By the act of submitting a bid for the Work included in this Contract, Contractor shall be deemed to have made a complete study and investigation, and to be familiar with and accepted the existing conditions of the Site.

Prior to commencing the Work, Contractor and the OWNER's representative shall survey the Site to document the condition of the Site. Contractor will record the survey in digital videotape format and provide an electronic copy to the OWNER within fourteen (14) days of the survey. This electronic record shall serve as a basis for determining any damages caused by the Contractor during the Project. The Contractor may also document any pre-existing conditions in writing, provided that both the Contractor and the OWNER's representative agree on said conditions and sign a memorandum documenting the same.

11.2 Soils Investigation Report

11.2.1 When a soils investigation report obtained from test holes at Site or for the Project is available, that report may be available to the Contractor but shall not be a part of this Contract and shall not alleviate or excuse the Contractor's obligation to perform its own investigation. Any information obtained from that report or any information given on Drawings as to subsurface soil condition or to elevations of existing grades or elevations of underlying rock is approximate only, is not guaranteed, does not form a part of this Contract, and Contractor may not rely thereon. By submitting its bid, Contractor acknowledges that it has made visual examination of Site and has made whatever tests Contractor deems appropriate to determine underground condition of soil.

11.2.2 Contractor agrees that no claim against OWNER will be made by Contractor for damages and hereby waives any rights to damages if, during progress of Work, Contractor encounters subsurface or latent conditions at Site materially differing from those shown on Drawings or indicated in Specifications, or for unknown conditions of an unusual nature that differ materially from those ordinarily encountered in the work of the character provided for in Plans and Specifications, except as indicated in the provisions of these General Conditions regarding trenches, trenching, and/or existing utility lines.

11.3 Access to Work

OWNER and its representatives shall at all times have access to Work wherever it is in preparation or progress, including storage and fabrication. Contractor shall provide safe

and proper facilities for such access so that OWNER's representatives may perform their functions.

11.4 Layout and Field Engineering

11.4.1 All field engineering required for layout of this Work and establishing grades for earthwork operations shall be furnished by Contractor at its expense. This Work shall be done by a qualified, California-registered civil engineer approved in writing by OWNER and Architect. Any required Record and/or As-Built Drawings of Site development shall be prepared by the approved civil engineer.

11.4.2 The Contractor shall be responsible for having ascertained pertinent local conditions such as location, accessibility, and general character of the Site and for having satisfied itself as to the conditions under which the Work is to be performed. Contractor shall follow best practices, including but not limited to potholing to avoid utilities. OWNER shall not be liable for any claim for allowances because of Contractor's error, failure to follow best practices, or negligence in acquainting itself with the conditions at the Site.

11.4.3 Contractor shall protect and preserve established benchmarks and monuments and shall make no changes in locations without the prior written approval of OWNER. Contractor shall replace any benchmarks or monuments that are lost or destroyed subsequent to proper notification of OWNER and with OWNER's approval.

11.5 Utilities

Utilities shall be provided as indicated in the Specifications.

11.6 Sanitary Facilities

Sanitary facilities shall be provided as indicated in the Specifications.

11.7 Surveys

Contractor shall provide surveys done by a California-licensed civil engineer surveyor to determine locations of construction, grading, and site work as required to perform the Work.

11.8 Regional Notification Center

The Contractor, except in an emergency, shall contact the appropriate regional notification center at least two (2) days prior to commencing any excavation if the excavation will be conducted in an area or in a private easement that is known, or reasonably should be known, to contain subsurface installations other than the underground facilities owned or operated by the OWNER, and obtain an inquiry identification number from that notification center. No excavation shall be commenced and/or carried out by the Contractor unless an inquiry identification number has been assigned to the Contractor or any Subcontractor and the Contractor has given the OWNER the identification number. Any damages arising from Contractor's failure to make appropriate notification shall be at the sole risk and expense of the Contractor.

Any delays caused by failure to make appropriate notification shall be at the sole risk of the Contractor and shall not be considered for an extension of the Contract Time.

11.9 Existing Utility Lines

11.9.1 Pursuant to Government Code section 4215, OWNER assumes the responsibility for removal, relocation, and protection of main or trunk utility lines and facilities located on the construction Site at the time of commencement of construction under this Contract with respect to any such utility facilities that are not identified in the Plans and Specifications. Contractor shall not be assessed for liquidated damages for delay in completion of the Project caused by failure of OWNER or the owner of a utility to provide for removal or relocation of such utility facilities.

11.9.2 Locations of existing utilities provided by OWNER shall not be considered exact, but approximate within a reasonable margin and shall not relieve Contractor of responsibilities to exercise reasonable care or costs of repair due to Contractor's failure to do so. OWNER shall compensate Contractor for the costs of locating, repairing damage not due to the failure of Contractor to exercise reasonable care, and removing or relocating such utility facilities not indicated in the Plans and Specifications with reasonable accuracy, and for equipment necessarily idle during such work.

11.9.3 No provision herein shall be construed to preclude assessment against Contractor for any other delays in completion of the Work. Nothing in this Article shall be deemed to require OWNER to indicate the presence of existing service laterals, appurtenances, or other utility lines, within the exception of main or trunk utility lines or whenever the presence of these utilities on the Site of the construction Project can be inferred from the presence of other visible facilities, such as buildings, meter junction boxes, on or adjacent to the Site of the construction.

11.9.4 If Contractor, while performing Work under this Contract, discovers utility facilities not identified by OWNER in Contract Plans and Specifications, Contractor shall immediately notify the OWNER and the utility in writing. The cost of repair for damage to above-mentioned visible facilities without prior written notification to the OWNER shall be borne by the Contractor.

11.10 Notification

Contractor understands, acknowledges and agrees that the purpose for prompt notification to the OWNER pursuant to these provisions is to allow the OWNER to investigate the condition(s) so that the OWNER shall have the opportunity to decide how the OWNER desires to proceed as a result of the condition(s). Accordingly, failure of Contractor to promptly notify the OWNER in writing, pursuant to these provisions, shall constitute Contractor's waiver of any claim for damages or delay incurred as a result of the condition(s).

11.11 Hazardous Materials

Contractor shall comply with all provisions and requirements of the Contract Documents related to hazardous materials including, without limitation, Hazardous Materials Procedures and Requirements.

11.12 No Signs

Neither the Contractor nor any other person or entity shall display any signs not required by law or the Contract Documents at the Site, fences trailers, offices, or elsewhere on the Site without specific prior written approval of the OWNER.

12. TRENCHES

12.1 Trenches Greater Than Five Feet

Pursuant to Labor Code section 6705, if the Contract Price exceeds $25,000 and involves the excavation of any trench or trenches five (5) feet or more in depth, the Contractor shall, in advance of excavation, promptly submit to the OWNER and/or a registered civil or structural engineer employed by the OWNER or Architect, a detailed plan, stamped by a licensed engineer retained by the Contractor, showing the design of shoring for protection from the hazard of caving ground during the excavation of such trench or trenches.

12.2 Excavation Safety

If such plan varies from the Shoring System Standards established by the Construction Safety Orders, the plan shall be prepared by a registered civil or structural engineer, but in no case shall such plan be less effective than that required by the Construction Safety Orders. No excavation of such trench or trenches shall be commenced until said plan has been accepted by the OWNER or by the person to whom authority to accept has been delegated by the OWNER.

12.3 No Tort Liability of OWNER

Pursuant to Labor Code section 6705, nothing in this Article shall impose tort liability upon the OWNER or any of its employees.

12.4 No Excavation without Permits

The Contractor shall not commence any excavation Work until it has secured all necessary permits including the required CalOSHA excavation/shoring permit. Any permits shall be prominently displayed on the Site prior to the commencement of any excavation.

12.5 Discovery of Hazardous Waste and/or Unusual Conditions

12.5.1 Pursuant to Public Contract Code section 7104, if the Work involves digging trenches or other excavations that extend deeper than four feet below the Surface, the Contractor shall promptly, and before the following conditions are disturbed, notify the OWNER, in writing, of any:

12.5.1.1 Material that the Contractor believes may be material that is hazardous waste, as defined in section 25117 of the Health and Safety Code, is required to be removed to a Class I, Class II, or Class III disposal site in accordance with provisions of existing law.

12.5.1.2 Subsurface or latent physical conditions at the Site differing from those indicated.

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

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

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

13. INSURANCE AND BONDS

13.1 Insurance

Unless different provisions and/or limits are indicated in the Special Conditions, all insurance required of Contractor and/or its Subcontractor(s) shall be in the amounts and include the provisions set forth herein.

13.1.1 Commercial General Liability and Automobile Liability Insurance

13.1.1.1 Contractor shall procure and maintain, during the life of this Contract, Commercial General Liability Insurance and Automobile Liability Insurance that shall protect Contractor, OWNER, State, Construction Manager(s), Project Inspector(s), and Architect(s) from all claims for bodily injury, property damage, personal injury, death, advertising injury, and medical payments arising from operations under this Contract. This coverage shall be provided in a form at least as broad as Insurance Services (ISO) Form CG 0001 11188. Contractor shall ensure that Products Liability and Completed Operations coverage, Fire Damage Liability, and Any Auto including owned, non-owned, and hired, are included within the above policies and at the required limits, or Contractor shall procure and maintain these coverages separately.

13.1.1.2 Contractor's self-insured retention for its Commercial General Liability Insurance policy shall not exceed $25,000 unless approved in writing by OWNER.

13.1.1.3 All such policies shall be written on an occurrence form.

13.1.2 Excess Liability Insurance

13.1.2.1 Contractor may procure and maintain, during the life of this Contract, an Excess Liability Insurance Policy to meet the policy limit requirements of the required policies if Contractor's underlying policy limits are less than required.

13.1.2.2 There shall be no gap between the per occurrence amount of any underlying policy and the start of the coverage under the Excess Liability Insurance Policy. Any Excess Liability Insurance Policy shall be written on a following form and shall protect Contractor, OWNER, State, Construction Manager(s), Project Manager(s), and Architect(s) in amounts and including the provisions as set forth in the Supplementary Conditions (if any) and/or Special Conditions, and that complies with all requirements for Commercial General Liability and Automobile Liability and Employers' Liability Insurance.

13.1.2.3 The OWNER, in its sole discretion, may accept the Excess Liability Insurance Policy that bring Contractor's primary limits to the minimum requirements herein.

13.1.3 Subcontractor(s): Contractor shall require its Subcontractor(s), if any, to procure and maintain Commercial General Liability Insurance, Automobile Liability Insurance, and Excess Liability Insurance (if Subcontractor elects to satisfy, in part the insurance required herein by procuring and maintaining an Excess Liability Insurance Policy) with forms of coverage and limits equal to the amounts required of the Contractor.

13.1.4 Workers' Compensation and Employers' Liability Insurance

13.1.4.1 In accordance with provisions of section 3700 of the California Labor Code, the Contractor and every Subcontractor shall be required to secure the payment of compensation to its employees.

13.1.4.2 Contractor shall procure and maintain, during the life of this Contract, Workers' Compensation Insurance and Employers' Liability Insurance for all of its employees engaged in work under this Contract, on/or at the Site of the Project. This coverage shall cover, at a minimum, medical and surgical treatment, disability benefits, rehabilitation therapy, and survivors' death benefits. Contractor shall require its Subcontractor(s), if any, to procure and maintain Workers' Compensation Insurance and Employers' Liability Insurance for all employees of Subcontractor(s). Any class of employee or employees not covered by a Subcontractor's insurance shall be covered by Contractor's insurance. If any class of employee or employee engaged in Work under this Contract, on or at the Site of the Project, is not protected under the Workers' Compensation Insurance, Contractor shall provide, or shall cause a Subcontractor to provide, adequate insurance coverage for the protection of any employee(s) not otherwise protected before any of those employee(s) commence work.

13.1.5 Builder's Risk Insurance: Builder's Risk "All Risk" Insurance

The OWNER's Property Coverage Memorandum is extended by Addendum A to includes Builder's Risk, to cover direct physical loss or damage to the enrolled project as described to the extent of the OWNER's and Contractor's interest in such project and caused by a Covered Cause of Loss as defined in OWNER's Property Coverage Memorandum. This includes materials, supplies, scaffolding, and

temporary structures to be used for the construction, reconstruction, alteration, renovation, or repair.

The limit of this coverage extension is the value of the project, not to exceed Twenty-five Million Dollars ($25,000,000.00). The described project will be valued at the lesser of the cost to repair or replace without deduction for depreciation, provided that the damaged property covered by the coverage extension is actually repaired or replaced within a reasonable period of time following the date of loss.

The Property Coverage Memorandum is extended to cover direct physical loss or damage to materials and supplies while in transit and at temporary storage sites within the United States of America and Canada. Tools and Equipment owned or used by the Contractor are not covered. Contractor shall be responsible for deductible portion only in the amount of $5,000.

13.1.6 Pollution Liability Insurance (Not used)

13.1.6.1 Contractor shall procure and maintain Pollution Liability Insurance that shall protect Contractor, OWNER, State, Construction Manager(s), Project Inspector(s), and Architect(s) from all claims for bodily injury, property damage, including natural resource damage, cleanup costs, removal, storage, disposal, and/or use of the pollutant arising from operations under this Contract, and defense, including costs and expenses incurred in the investigation, defense, or settlement of claims. Coverage shall apply to sudden and/or gradual pollution conditions resulting from the escape or release of smoke, vapors, fumes, acids, alkalis, toxic chemicals, liquids, or gases, natural gas, waste materials, or other irritants, contaminants, or pollutants, including asbestos and lead.

13.1.6.2 Contractor shall warrant that any retroactive date applicable to coverage under the policy predates the effective date of the Contract and that continuous coverage will be maintained or an extended reporting or discovery period will be exercised for a period of three (3) years, beginning from the time that the Work under the Contract is completed.

13.1.7 Proof of Insurance and Other Requirements: Endorsements and Certificates

13.1.7.1 Contractor shall not commence Work nor shall it allow any Subcontractor to commence Work under this Contract, until Contractor and its Subcontractor(s) have procured all required insurance and Contractor has delivered in duplicate to the OWNER complete endorsements (or entire insurance policies) and certificates indicating the required coverages have been obtained, and the OWNER has approved these documents.

13.1.7.2 Endorsements, certificates, and insurance policies shall include the following:

13.1.7.2.1 A clause stating:

"This policy shall not be canceled and the coverage amounts shall not be reduced until written notice to OWNER, Architect, and Construction Manager

stating date of the cancellation by the insurance carrier. Date of cancellation may not be less than thirty (30) days after date of mailing notice."

13.1.7.2.2 Language stating in particular those insured, extent of insurance, location and operation to which insurance applies, expiration date, to whom cancellation and reduction notice will be sent, and length of notice period.

13.1.7.2.3 All endorsements, certificates and insurance policies shall state that OWNER, its trustees, employees and agents, Construction Manager(s), Project Manager(s), Inspector(s) and Architect(s) are named additional insureds under all policies except Workers' Compensation Insurance and Employers' Liability Insurance.

13.1.7.3 No policy shall be amended, canceled or modified, and the coverage amounts shall not be reduced, until Contractor or Contractor's broker has provided written notice to OWNER, Architect, and Construction Manager stating date of the amendment, modification, cancellation or reduction, and a description of the change. Date of amendment, modification, cancellation or reduction may not be less than thirty (30) days after date of mailing notice.

13.1.7.4 Insurance written on a "claims made" basis shall be retroactive to a date that coincides with or precedes Contractor's commencement of Work, including subsequent policies purchased as renewals or replacements. Said policy is to be renewed by the Contractor and all Subcontractors for a period of five (5) years following completion of the Work or termination of this Agreement. Such insurance must have the same coverage and limits as the policy that was in effect during the term of this Agreement, and will cover the Contractor and all Subcontractors for all claims made.

13.1.7.5 Contractor's and Subcontractors' insurance policy(s) shall be primary and non-contributory to any insurance or self-insurance maintained by OWNER, its trustees, employees and/or agents, the State of California, Construction Manager(s), Project Manager(s), Inspector(s), and/or Architect(s).

13.1.7.6 All endorsements shall waive any right to subrogation against any of the named additional insureds.

13.1.7.7 Unless otherwise stated in the Special Conditions, all of Contractor's insurance shall be with insurance companies with an A.M. Best rating of no less than **A: VII**.

13.1.7.8 The insurance requirements set forth herein shall in no way limit the Contractor's liability arising out of or relating to the performance of the Work or related activities.

13.1.7.9 Failure of Contractor and/or its Subcontractor(s) to comply with the insurance requirements herein shall be deemed a material breach of the Agreement.

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13.1.8 Insurance Policy Limits

Unless different limits are indicated in the Special Conditions, the limits of insurance shall not be less than the following amounts:

Commercial General Liability	Product Liability and Completed Operations, Fire Damage Liability – Split Limit	**$2,000,000 per occurrence; $4,000,000 aggregate**
Automobile Liability – Any Auto	Combined Single Limit	$1,000,000
Workers' Compensation		Statutory limits pursuant to State law
Employers' Liability		$1,000,000
Builder's Risk (Course of Construction)	OWNER shall provide Builder's Risk insurance. Contractor shall be responsible for deductible portion.	Issued for the value and scope of Work indicated herein.
Pollution Liability		**$1,000,000 per occurrence; $2,000,000 aggregate**

13.2 Contract Security - Bonds

13.2.1 Contractor shall furnish two surety bonds issued by a California admitted surety insurer as follows:

13.2.1.1 Performance Bond: A bond in an amount at least equal to one hundred percent (100%) of Contract Price as security for faithful performance of this Contract.

13.2.1.2 Payment Bond: A bond in an amount at least equal to one hundred percent (100%) of the Contract Price as security for payment of persons performing labor and/or furnishing materials in connection with this Contract.

13.2.2 Cost of bonds shall be included in the Bid and Contract Price.

13.2.3 All bonds related to this Project shall be in the forms set forth in these Contract Documents and shall comply with all requirements of the Contract Documents, including, without limitation, the bond forms.

14. WARRANTY/GUARANTEE/INDEMNITY

14.1 Warranty/Guarantee

14.1.1 The Contractor shall obtain and preserve for the benefit of the OWNER, manufacturer's warranties on materials, fixtures, and equipment incorporated into the Work.

14.1.2 In addition to guarantees required elsewhere, Contractor shall, and hereby does guarantee and warrant all Work furnished on the job against all defects for a period of **ONE (1)** year after the later of the following dates, unless a longer period is provided for in the Contract Documents:

14.1.2.1 The acceptance by the OWNER, or its agent, of the Work, subject to these General Conditions, or

14.1.2.2 The date that commissioning for the Project, if any, was completed.

At the OWNER's sole option, Contractor shall repair or replace any and all of that Work, together with any other Work that may be displaced in so doing, that may prove defective in workmanship and/or materials within a **ONE (1)** year period from date of completion as defined above, unless a longer period is provided for in the Contract Documents, without expense whatsoever to OWNER. In the event of failure of Contractor and/or Surety to commence and pursue with diligence said replacements or repairs within ten (10) days after being notified in writing, Contractor and Surety hereby acknowledge and agree that OWNER is authorized to proceed to have defects repaired and made good at expense of Contractor and/or Surety who hereby agree to pay costs and charges therefore immediately on demand.

14.1.3 If, in the opinion of OWNER, defective work creates a dangerous condition or requires immediate correction or attention to prevent further loss to OWNER or to prevent interruption of operations of OWNER, OWNER will attempt to give the notice required above. If Contractor or Surety cannot be contacted or neither complies with OWNER's request for correction within a reasonable time as determined by OWNER, OWNER may, notwithstanding the above provision, proceed to make any and all corrections and/or provide attentions the OWNER believes are necessary. The costs of correction or attention shall be charged against Contractor and Surety of the guarantees provided in this Article or elsewhere in this Contract.

14.1.4 The above provisions do not in any way limit the guarantees on any items for which a longer guarantee is specified or on any items for which a manufacturer gives a guarantee for a longer period. Contractor shall furnish to OWNER all appropriate guarantee or warranty certificates as indicated in the Specifications or upon request by OWNER.

14.1.5 Nothing herein shall limit any other rights or remedies available to OWNER.

14.2 Indemnity and Defense

14.2.1 To the furthest extent permitted by California law, the Contractor shall indemnify, keep and hold harmless the OWNER, the Architect, and the Construction Manager, their consultants and separate contractors, and their respective board members, officers, representatives, contractors, agents, and employees, in both individual and official capacities ("Indemnitees"), against all suits, claims, damages, losses, and expenses, including but not limited to attorney's fees, caused by, arising out of, resulting from, or incidental to, the performance of the Work under this Contract by the Contractor, its Subcontractors, vendors, or suppliers, except to the extent caused by the sole negligence, active negligence, or willful misconduct of the Indemnitees, and/or defects in design furnished by the Architect, as found by a court or arbitrator of competent jurisdiction, in which case the Contractor's indemnification and hold harmless obligation shall be reduced by the proportion of the Indemnitees' and/or Architect's liability, and/or to any extent that would render these provisions void or unenforceable. This agreement and obligation of the Contractor shall not be construed to negate, abridge, or otherwise reduce any right or obligation of indemnity that would otherwise exist as to any party or person described herein. This indemnification, and hold harmless obligation includes, but is not limited to, any failure or alleged failure by Contractor to comply with any provision of law, any failure or alleged failure to timely and properly fulfill all of its obligations under the Contract Documents in strict accordance with their terms, and without limitation, any failure or alleged failure of Contractor's obligations regarding any stop payment notice actions or liens, including Civil Wage and Penalty Assessments and/or Orders by the California Department of Industrial Relations.

14.2.2 Contractor shall also defend, at its own expense, Indemnitees against all suits, claims, allegations, damages, losses, and expenses, including but not limited to attorneys' fees, caused by, arising out of, resulting from, or incidental to, the performance of the Work under this Contract by the Contractor, its Subcontractors, vendors, or suppliers, except to the extent caused by the sole negligence, active negligence, or willful misconduct of the Indemnitees, and/or defects in design furnished by the Architect, as found by a court or arbitrator of competent jurisdiction, in which case the Contractor's defense obligation shall be reduced by the proportion of the Indemnitees' and/or Architect's liability, and/or to any extent that would render these provisions void or unenforceable. The OWNER shall have the right to accept or reject any legal representation that Contractor proposes to defend the Indemnitees. This obligation of defense is inclusive of fees and costs. If the Indemnitees provide their own defense due to failure to timely respond to tender of defense, rejection of tender of defense, or conflict of interest of proposed counsel, Contractor shall reimburse Indemnitees for any expenditures, including reasonable attorney's fees and costs. This agreement and obligation of the Contractor shall not be construed to negate, abridge, or otherwise reduce any right or obligation of defense that would otherwise exist as to any party or person described herein. This defense obligation includes, but is not limited to, any failure or alleged failure by Contractor to comply with any provision of law, any failure or alleged failure to timely and properly fulfill all of its obligations under the Contract Documents in strict accordance with their terms, and without limitation, any failure or alleged failure of Contractor's obligations regarding any stop payment notice actions or liens, including Civil Wage and Penalty Assessments and/or Orders by the California Department of Industrial Relations. The Contractor shall give prompt notice to the OWNER in the event of any injury (including death), loss, or damage included herein.

14.2.3 Without limitation of the provisions herein, if the Contractor's agreement to indemnify and hold harmless the Indemnitees or its agreement to defend Indemnitees as provided herein shall be determined to be void or unenforceable, in whole or in part, it is the intention of the parties that these circumstances shall not otherwise affect the validity or enforceability of the Contractor's agreement to indemnify, defend, and hold harmless the rest of the Indemnitees, as provided herein. Further, the Contractor shall be and remain fully liable on its agreements and obligations herein to the fullest extent permitted by law.

14.2.4 Pursuant to Public Contract Code section 9201, the OWNER shall provide timely notification to Contractor of the receipt of any third-party claim relating to this Contract. The OWNER shall be entitled to recover its reasonable costs incurred in providing said notification.

14.2.5 In any and all claims against any of the Indemnitees by any employee of the Contractor, any Subcontractor, anyone directly or indirectly employed by any of them or anyone for whose acts any of them may be liable, the Contractor's indemnification obligation herein shall not be limited in any way by any limitation on the amount or type of damages, compensation, or benefits payable by or for the Contractor or any Subcontractor under workers' compensation acts, disability benefit acts, or other employee benefit acts.

14.2.6 The OWNER may retain so much of the moneys due the Contractor as shall be considered necessary, until disposition of any such suit, claims or actions for damages or until the OWNER, Architect and Construction Manager have received written agreement from the Contractor that they will unconditionally defend the OWNER, Architect and Construction Manager, their officers, agents and employees, and pay any damages due by reason of settlement or judgment.

14.2.7 The defense and indemnification obligations hereunder shall survive the completion of Work, including the warranty/guarantee period, and/or the termination of the Agreement.

15. TIME

15.1 Notice to Proceed

15.1.1 OWNER may issue a Notice to Proceed within ninety (90) days from the date of the Notice of Award. Once Contractor has received the Notice to Proceed, Contractor shall complete the Work within the period of time indicated in the Contract Documents.

15.1.2 In the event that the OWNER desires to postpone issuing the Notice to Proceed beyond ninety (90) days from the date of the Notice of Award, it is expressly understood that with reasonable notice to the Contractor, the OWNER may postpone issuing the Notice to Proceed. It is further expressly understood by Contractor that Contractor shall not be entitled to any claim of additional compensation as a result of the postponement of the issuance of the Notice to Proceed.

15.1.3 If the Contractor believes that a postponement of issuance of the Notice to Proceed will cause a hardship to Contractor, Contractor may terminate the Contract. Contractor's termination due to a postponement shall be by written notice to OWNER

within ten (10) days after receipt by Contractor of OWNER's notice of postponement. It is further understood by Contractor that in the event that Contractor terminates the Contract as a result of postponement by the OWNER, the OWNER shall only be obligated to pay Contractor for the Work that Contractor had performed at the time of notification of postponement. Should Contractor terminate the Contract as a result of a notice of postponement, OWNER shall have the authority to award the Contract to the next lowest responsive responsible bidder.

15.2 Computation of Time / Adverse Weather

15.2.1 The Contractor will only be allowed a time extension for Adverse Weather conditions if requested by Contractor in compliance with the time extension request procedures and only if all of the following conditions are met:

15.2.1.1 The weather conditions constitute Adverse Weather, as defined herein and further specified in the Special Conditions;

15.2.1.2 Contractor can verify that the Adverse Weather caused delays in excess of five (5) hours of the indicated labor required to complete the scheduled tasks of Work on the day affected by the Adverse Weather;

15.2.1.3 The Contractor's crew is dismissed as a result of the Adverse Weather;

15.2.1.4 Said delay adversely affects the critical path in the Construction Schedule; and

15.2.1.5 Exceeds twelve (12) days of delay per year.

15.2.2 If the aforementioned conditions are met, a non-compensable day-for-day extension will only be allowed for those days in excess of those indicated in the Special Conditions.

15.2.3 The Contractor shall work seven (7) days per week, if necessary, irrespective of inclement weather, to maintain access and the Construction Schedule, and to protect the Work under construction from the effects of Adverse Weather, all at no further cost to the OWNER.

15.2.4 The Contract Time has been determined with consideration given to the average climate weather conditions prevailing in the County in which the Project is located.

15.3 Hours of Work

15.3.1 Sufficient Forces

Contractor and Subcontractors shall continuously furnish sufficient and competent work forces with the required levels of familiarity with the Project and skill, training and experience to ensure the prosecution of the Work in accordance with the Construction Schedule.

15.3.2 Performance During Working Hours

Work shall be performed during regular working hours as permitted by the appropriate governmental agency except that in the event of an emergency, or when required to complete the Work in accordance with job progress, Work may be performed outside of regular working hours with the advance written consent of the OWNER and approval of any required governmental agencies.

15.3.3 No Work during State Testing

Contractor shall, at no additional cost to the OWNER and at the OWNER's request, coordinate its Work to not disturb OWNER students including, without limitation, not performing any Work when students at the Site are taking State or Federally-required tests. The OWNER or OWNER's Representative will provide Contractor with a schedule of test dates concurrent with the OWNER's issuance of the Notice to Proceed, or as soon as test dates are made available to the OWNER.

15.4 Progress and Completion

15.4.1 Time of the Essence

Time limits stated in the Contract Documents are of the essence to the Contract. By executing the Agreement, the Contractor confirms that the Contract Time is a reasonable period for performing the Work.

15.4.2 No Commencement Without Insurance or Bonds

The Contractor shall not commence operations on the Project or elsewhere prior to the effective date of insurance and bonds. The date of commencement of the Work shall not be changed by the effective date of such insurance or bonds. If Contractor commences Work without insurance and bonds, all Work is performed at Contractor's peril and shall not be compensable until and unless Contractor secures bonds and insurance pursuant to the terms of the Contract Documents and subject to OWNER claim for damages.

15.5 Schedule

Contractor shall provide to OWNER, Construction Manager, and Architect a schedule in conformance with the Contract Documents and as required in the Notice to Proceed and the Contractor's Submittals and Schedules section of these General Conditions.

15.6 Expeditious Completion

The Contractor shall proceed expeditiously with adequate forces and shall achieve Completion within the Contract Time.

16. EXTENSIONS OF TIME – LIQUIDATED DAMAGES

16.1 Liquidated Damages

Contractor and OWNER hereby agree that the exact amount of damages for failure to complete the Work within the time specified is extremely difficult or impossible to determine. If the Work is not completed within the time specified in the Contract Documents, it is understood that the OWNER will suffer damage. It being impractical

and unfeasible to determine the amount of actual damage, it is agreed the Contractor shall pay to OWNER as fixed and liquidated damages, and not as a penalty, the amount set forth in the Agreement for each calendar day of delay in completion. Contractor and its Surety shall be liable for the amount thereof pursuant to Government Code section 53069.85.

16.2 Excusable Delay

16.2.1 Contractor shall not be charged for liquidated damages because of any delays in completion of Work which are not the fault of Contractor or its Subcontractors, including acts of God as defined in Public Contract Code section 7105, acts of enemy, epidemics, and quarantine restrictions. Contractor shall, within five (5) calendar days of beginning of any delay, notify OWNER in writing of causes of delay including documentation and facts explaining the delay and the direct correlation between the cause and effect. OWNER shall review the facts and extent of any delay and shall grant extension(s) of time for completing Work when, in its judgment, the findings of fact justify an extension. Extension(s) of time shall apply only to that portion of Work affected by delay, and shall not apply to other portions of Work not so affected. An extension of time may only be granted if Contractor has timely submitted the Construction Schedule as required herein.

16.2.2 Contractor shall notify the OWNER pursuant to the claims provisions in these General Conditions of any anticipated delay and its cause. Following submission of a claim, the OWNER may determine whether the delay is to be considered avoidable or unavoidable, how long it continues, and to what extent the prosecution and completion of the Work might be delayed thereby.

16.2.3 In the event the Contractor requests an extension of Contract Time for unavoidable delay, such request shall be submitted in accordance with the provisions in the Contract Documents governing changes in Work. When requesting time, requests must be submitted with full justification and documentation. If the Contractor fails to submit justification, it waives its right to a time extension at a later date. Such justification must be based on the official Construction Schedule as updated at the time of occurrence of the delay or execution of Work related to any changes to the Scope of Work. Any claim for delay must include the following information as support, without limitation:

16.2.3.1 The duration of the activity relating to the changes in the Work and the resources (manpower, equipment, material, etc.) required to perform the activities within the stated duration.

16.2.3.2 Specific logical ties to the Contract Schedule for the proposed changes and/or delay showing the activity/activities in the Construction Schedule that are affected by the change and/or delay. In particular, Contractor must show an actual impact to the schedule, after making a good faith effort to mitigate the delay by rescheduling the work, by providing an analysis of the schedule ("Schedule Analysis"). Such Schedule Analysis shall describe in detail the cause and effect of the delay and the impact on the critical dates in the Project schedule. (A portion of any delay of seven (7) days or more must be provided.)

16.2.3.3 A recovery schedule must be submitted within twenty (20) calendar days of written notification to the OWNER of causes of delay.

16.3 No Additional Compensation for Delays Within Contractor's Control

16.3.1 Contractor is aware that governmental agencies, including, without limitation, the Division of the State Architect, the Department of General Services, gas companies, electrical utility companies, water OWNERs, and other agencies may have to approve Contractor-prepared drawings or approve a proposed installation. Accordingly, Contractor shall include in its bid, time for possible review of its drawings and for reasonable delays and damages that may be caused by such agencies. Thus, Contractor is not entitled to make a claim for damages or delays arising from the review of Contractor's drawings.

16.3.2 Contractor shall only be entitled to compensation for delay when all of the following conditions are met:

16.3.2.1 The OWNER is responsible for the delay;

16.3.2.2 The delay is unreasonable under the circumstances involved;

16.3.2.3 The delay was not within the contemplation of the OWNER and Contractor; and

16.3.2.4 Contractor timely complies with the claims procedure of the Contract Documents.

16.4 Float or Slack in the Schedule

Float or slack is the amount of time between the early start date and the late start date, or the early finish date and the late finish date, of any of the activities in the schedule. Float or slack is not for the exclusive use of or benefit of either the OWNER or the Contractor, but its use shall be determined solely by the OWNER.

17. CHANGES IN THE WORK

17.1 No Changes Without Authorization

17.1.1 There shall be no change whatsoever in the Drawings, Specifications, or in the Work without an executed Change Order or a written Construction Change Directive authorized by the OWNER as herein provided. OWNER shall not be liable for the cost of any extra work or any substitutions, changes, additions, omissions, or deviations from the Drawings and Specifications unless the OWNER's governing board has authorized the same and the cost thereof has been approved in writing by Change Order or Construction Change Directive in advance of the changed Work being performed. No extension of time for performance of the Work shall be allowed hereunder unless claim for such extension is made at the time changes in the Work are ordered, and such time duly adjusted and approved in writing in the Change Order or Construction Change Directive. Contractor shall be responsible for any costs incurred by the OWNER for professional services and DSA fees and/or delay to the Project Schedule, if any, for DSA to review any request for changes to the DSA approved plans and specifications for the convenience of the Contractor and/or to accommodate the Contractor's means and methods. The provisions of the Contract Documents shall apply to all such changes, additions, and omissions with the same effect as if originally embodied in the Drawings and Specifications.

17.1.2 Contractor shall perform immediately all work that has been authorized by a fully executed Change Order or Construction Change Directive. Contractor shall be fully responsible for any and all delays and/or expenses caused by Contractor's failure to expeditiously perform this Work.

17.1.3 Should any Change Order result in an increase in the Contract Price or extend the Contract Time, the cost of or length of extension in that Change Order shall be agreed to, in writing, by the OWNER in advance of the Work by Contractor, and shall be subject to the monetary limitations set forth in Public Contract Code section 20118.4. In the event that Contractor proceeds with any change in Work without a Change Order executed by the OWNER or Construction Change Directive, Contractor waives any claim of additional compensation or time for that additional work. Under no circumstances shall Contractor be entitled to any claim of additional compensation or time not expressly requested by Contractor in a Proposed Change Order or approved by OWNER in an executed Change Order.

17.1.4 Contractor understands, acknowledges, and agrees that the reason for OWNER authorization is so that OWNER may have an opportunity to analyze the Work and decide whether the OWNER shall proceed with the Change Order or alter the Project so that a change in Work becomes unnecessary.

17.2 Architect Authority

The Architect will have authority to order minor changes in the Work not involving any adjustment in the Contract Price, or an extension of the Contract Time, or a change that is inconsistent with the intent of the Contract Documents. These changes shall be effected by written Change Order, Construction Change Directive, by Architect's response(s) to RFI(s), or by Architect's Supplemental Instructions ("ASI").

17.3 Change Orders

17.3.1 A Change Order is a written instrument prepared and issued by the OWNER and/or the Architect and signed by the OWNER (as authorized by the OWNER's Governing Board), the Contractor, the Architect, and approved by the Project Inspector (if necessary) and DSA (if necessary), stating their agreement regarding all of the following:

17.3.1.1 A description of a change in the Work;

17.3.1.2 The amount of the adjustment in the Contract Price, if any; and

17.3.1.3 The extent of the adjustment in the Contract Time, if any.

17.4 Construction Change Directives

17.4.1 A Construction Change Directive is a written order prepared and issued by the OWNER, the Construction Manager, and/or the Architect and signed by the OWNER and the Architect, directing a change in the Work. The OWNER may, as provided by law, by Construction Change Directive and without invalidating the Contract, order changes in the Work consisting of additions, deletions, or other revisions. The adjustment to the Contract Price or Time, if any, is subject to the provisions of this section regarding Changes in the Work. If all or a portion of the

Project is being funded by funds requiring approval by the State Allocation Board ("SAB"), these revisions may be subject to compensation once approval of same is received and funded by the SAB, and funds are released by the Office of Public School Construction ("OPSC"). Any dispute as to the adjustment in the Contract Price, if any, of the Construction Change Directive or timing of payment shall be resolved pursuant to the Payment and Claims and Disputes provisions herein.

17.4.2 The OWNER may issue a Construction Change Directive in the absence of agreement on the terms of a Change Order.

17.5 Force Account Directives

17.5.1 When work, for which a definite price has not been agreed upon in advance, is to be paid for on a force account basis, all direct costs necessarily incurred and paid by the Contractor for labor, material, and equipment used in the performance of that Work, shall be subject to the approval of the OWNER and compensation will be determined as set forth herein.

17.5.2 The OWNER will issue a Force Account Directive to proceed with the Work on a force account basis, and a not-to-exceed budget will be established by the OWNER.

17.5.3 All requirements regarding direct cost for labor, labor burden, material, equipment, and markups on direct costs for overhead and profit described in this section shall apply to Force Account Directives. However, the OWNER will only pay for actual costs verified in the field by the OWNER or its authorized representative(s) on a daily basis.

17.5.4 The Contractor shall be responsible for all cost related to the administration of Force Account Directive. The markup for overhead and profit for Contractor modifications shall be full compensation to the Contractor to administer Force Account Directive, and Contractor shall not be entitled to separately recover additional amounts for overhead and/or profit.

17.5.5 The Contractor shall notify the OWNER or its authorized representative(s) at least twenty-four (24) hours prior to proceeding with any of the force account work. Furthermore, the Contractor shall notify the OWNER when it has consumed eighty percent (80%) of the budget, and shall not exceed the budget unless specifically authorized in writing by the OWNER. The Contractor will not be compensated for force account work in the event that the Contractor fails to timely notify the OWNER regarding the commencement of force account work, or exceeding the force account budget.

17.5.6 The Contractor shall diligently proceed with the work, and on a daily basis, submit a daily force account report on a form supplied by the OWNER no later than 5:00 p.m. each day. The report shall contain a detailed itemization of the daily labor, material, and equipment used on the force account work only. The names of the individuals performing the force account work shall be included on the daily force account reports. The type and model of equipment shall be identified and listed. The OWNER will review the information contained in the reports, and sign the reports no later than the next work day, and return a copy of the report to the Contractor for their records. The OWNER will not sign, nor will the Contractor receive compensation

for work the OWNER cannot verify. The Contractor will provide a weekly force account summary indicating the status of each Force Account Directive in terms of percent complete of the not-to-exceed budget and the estimated percent complete of the work.

17.5.7 In the event the Contractor and the OWNER reach a written agreement on a set cost for the work while the work is proceeding based on a Force Account Directive, the Contractor's signed daily force account reports shall be discontinued and all previously signed reports shall be invalid.

17.6 Price Request

17.6.1 Definition of Price Request

A Price Request ("PR") is a written request prepared by the Architect requesting the Contractor to submit to the OWNER and the Architect an estimate of the effect of a proposed change in the Work on the Contract Price and the Contract Time.

17.6.2 Scope of Price Request

A Price Request shall contain adequate information, including any necessary Drawings and Specifications, to enable Contractor to provide the cost breakdowns required herein. The Contractor shall not be entitled to any additional compensation for preparing a response to a Price Request, whether ultimately accepted or not.

17.7 Proposed Change Order

17.7.1 Definition of Proposed Change Order

A Proposed Change Order ("PCO") is a written request prepared by the Contractor requesting that the OWNER and the Architect issue a Change Order based upon a proposed change to the Work.

17.7.2 Changes in Contract Price

A PCO shall include breakdowns and backup documentation pursuant to the revisions herein and sufficient, in the OWNER's judgment, to validate any change in Contract Price. In no case shall Contractor or any of its Subcontractors be permitted to reserve rights for additional compensation for Change Order Work.

17.7.3 Changes in Time

A PCO shall also include any changes in time required to complete the Project. Any additional time requested shall not be the number of days to make the proposed change, but must be based upon the impact to the Construction Schedule as defined in the Contract Documents. If Contractor fails to request a time extension in a PCO, then the Contractor is thereafter precluded from requesting, and waives any right to request, additional time and/or claim a delay. In no case shall Contractor or any of its Subcontractors be permitted to reserve rights for additional time for Change Order Work. A PCO that leaves the amount of time requested blank, or states that such time requested is "to be determined", is not permitted and shall also constitute a waiver of any right to request additional time and/or claim a delay.

17.7.4 Unknown and/or Unforeseen Conditions

If there is an Allowance, then Contractor must submit a Request for Allowance Expenditure Directive, including supporting documentation as described below, to receive authorization for the release of funds from the Allowance. If cost of the unforeseen condition(s) exceed the Allowance, Contractor must submit a PCO requesting an increase in Contract Price and/or Contract Time that is based at least partially on Contractor's assertion that Contractor has encountered unknown and/or unforeseen condition(s) on the Project, then Contractor shall base the PCO on provable information that, beyond a reasonable doubt and to the OWNER's satisfaction, demonstrates that the unknown and/or unforeseen condition(s) were actually unknown and/or unforeseen and that the condition(s) were reasonably unknown and/or unforeseen. If not, the OWNER shall deny the PCO as unsubstantiated, and the Contractor shall complete the Project without any increase in Contract Price and/or Contract Time based on that PCO.

17.7.5 Proposed Change Order Certification

In submitting a PCO, Contractor certifies and affirms that the cost and/or time request is submitted in good faith, that the cost and/or time request is accurate and in accordance with the provisions of the Contract Documents, and the Contractor submits the cost and/or request for extension of time recognizing the significant civil penalties and treble damages which follow from making a false claim or presenting a false claim under Government Code section 12650 et seq.

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17.8 Format for Proposed Change Order

17.8.1 The following format shall be used as applicable by the OWNER and the Contractor (e.g. Change Orders, PCO's) to communicate proposed additions and deductions to the Contract, supported by attached documentation. Any spaces left blank will be deemed no change to cost or time.

	WORK PERFORMED OTHER THAN BY CONTRACTOR	**ADD**	**DEDUCT**
(a)	**Material** (attach suppliers' invoice or itemized quantity and unit cost plus sales tax)		
(b)	**Add Labor** (attach itemized hours and rates, fully encumbered)		
(c)	**Add Equipment** (attach suppliers' invoice)		
(d)	**Subtotal**		
(e)	**Add overhead and profit for any and all tiers of Subcontractor**, the total not to exceed ten percent (10%) of Item (d)		
(f)	**Subtotal**		
(g)	**Add Overhead and Profit for Contractor**, not to exceed five percent (5%) of Item (f)		
(h)	**Subtotal**		
(i)	**Add Bond and Insurance**, not to exceed one and a half percent (1.5%) of Item (h)		
(j)	**TOTAL**		
(k)	**Time** (zero unless indicated; "TBD" not permitted)	**_____ Calendar Days**	

	WORK PERFORMED BY CONTRACTOR	**ADD**	**DEDUCT**
(a)	**Material** (attach itemized quantity and unit cost plus sales tax)		
(b)	**Add Labor** (attach itemized hours and rates, fully encumbered)		
(c)	**Add Equipment** (attach suppliers' invoice)		
(d)	**Subtotal**		
(e)	**Add Overhead and Profit for Contractor**, not to exceed fifteen percent (15%) of Item (d)		
(f)	**Subtotal**		
(g)	**Add Bond and Insurance**, not to exceed one and a half percent (1.5%) of Item (f)		
(h)	**TOTAL**		
(i)	**Time** (zero unless indicated; "TBD" not permitted)	**_____ Calendar Days**	

17.8.2 Labor. Contractor shall be compensated for the costs of labor actually and directly utilized in the performance of the Work. Such labor costs shall be limited to field labor for which there is a prevailing wage rate classification. Wage rates for labor shall not exceed the prevailing wage rates in the locality of the Site and shall be in the labor classification(s) necessary for the performance of the Work.

Labor costs shall exclude costs incurred by the Contractor in preparing estimate(s) of the costs of the change in the Work, in the maintenance of records relating to the costs of the change in the Work, coordination and assembly of materials and information relating to the change in the Work or performance thereof, or the supervision and other overhead and general conditions costs associated with the change in the Work or performance thereof, including but not limited to the cost for the job superintendent.

17.8.3 Materials. Contractor shall be compensated for the costs of materials necessarily and actually used or consumed in connection with the performance of the change in the Work. Costs of materials may include reasonable costs of transportation from a source closest to the Site of the Work and delivery to the Site. If discounts by material suppliers are available for materials necessarily used in the performance of the change in the Work, they shall be credited to the OWNER. If materials necessarily used in the performance of the change in the Work are obtained from a supplier or source owned in whole or in part by the Contractor, compensation therefor shall not exceed the current wholesale price for such materials. If, in the reasonable opinion of the OWNER, the costs asserted by the Contractor for materials in connection with any change in the Work are excessive, or if the Contractor fails to provide satisfactory evidence of the actual costs of such materials from its supplier or vendor of the same, the costs of such materials and the OWNER's obligation to pay for the same shall be limited to the then lowest wholesale price at which similar materials are available in the quantities required to perform the change in the Work. The OWNER may elect to furnish materials for the change in the Work, in which event the Contractor shall not be compensated for the costs of furnishing such materials or any mark-up thereon.

17.8.4 Equipment. As a precondition to the OWNER's duty to pay for Equipment rental or loading and transportation, Contractor shall provide satisfactory evidence of the actual costs of Equipment from the supplier, vendor or rental agency of same. Contractor shall be compensated for the actual cost of the necessary and direct use of Equipment in the performance of the change in the Work. Use of such Equipment in the performance of the change in the Work shall be compensated in increments of fifteen (15) minutes. Rental time for Equipment moved by its own power shall include time required to move such Equipment to the site of the Work from the nearest available rental source of the same. If Equipment is not moved to the Site by its own power, Contractor will be compensated for the loading and transportation costs in lieu of rental time. The foregoing notwithstanding, neither moving time or loading and transportation time shall be allowed if the Equipment is used for performance of any portion of the Work other than the change in the Work. Unless prior approval in writing is obtained by the Contractor from the Architect, the Project Inspector and the OWNER, no costs or compensation shall be allowed for time while Construction Equipment is inoperative, idle or on standby, for any reason. Contractor shall not be entitled to an allowance or any other compensation for Equipment or tools used in the performance of change in the Work where such Equipment or tools have a replacement value of $500.00 or less. Equipment costs claimed by the Contractor in connection with the performance of any Work shall not exceed rental rates established by distributors or construction equipment rental agencies in the locality of the Site; any costs asserted which exceed such rental rates shall not be allowed or paid. Unless otherwise specifically approved in writing by the Architect, the Project Inspector and the OWNER, the allowable rate for the use of Equipment in connection with the Work shall constitute full compensation to the

Contractor for the cost of rental, fuel, power, oil, lubrication, supplies, necessary attachments, repairs or maintenance of any kind, depreciation, storage, insurance, labor (exclusive of labor costs of the Equipment operator), and any and all other costs incurred by the Contractor incidental to the use of such Equipment.

17.8.5 Overhead and Profit. The phrase "Overhead and Profit" shall include field and office supervisors and assistants, watchperson, use of small tools, consumable, insurance other than construction bonds and insurance required herein, and general field and home office expenses.

17.9 Change Order Certification

17.9.1 All Change Orders and PCOs must include the following certification by the Contractor:

17.9.1.1 The undersigned Contractor approves the foregoing as to the changes, if any, to the Contract Price specified for each item, and as to the extension of time allowed, if any, for completion of the entire Work as stated herein, and agrees to furnish all labor, materials, and service, and perform all work necessary to complete any additional work specified for the consideration stated herein. Submission of sums which have no basis in fact or which Contractor knows are false are at the sole risk of Contractor and may be a violation of the False Claims Act set forth under Government Code section 12650 et seq. It is understood that the changes herein to the Contract shall only be effective when approved by the governing board of the OWNER.

17.9.1.2 It is expressly understood that the value of the extra Work or changes expressly includes any and all of the Contractor's costs and expenses, direct and indirect, resulting from additional time required on the Project or resulting from delay to the Project. Contractor is not entitled to separately recover amounts for overhead or other indirect costs. Any costs, expenses, damages, or time extensions not included are deemed waived.

17.10 Determination of Change Order Cost

17.10.1 The amount of the increase or decrease in the Contract Price from a Change Order, if any, shall be determined in one or more of the following ways as applicable to a specific situation and at the OWNER's discretion:

17.10.1.1 OWNER acceptance of a PCO;

17.10.1.2 By unit prices contained in Contractor's original bid;

17.10.1.3 By agreement between OWNER and Contractor.

17.11 Deductive Change Orders

All deductive Change Order(s) must be prepared pursuant to the provisions herein. Where a portion of the Work is deleted from the Contract, the reasonable value of the deducted work less the value of work performed shall be considered the appropriate deduction. The value submitted on the Schedule of Values shall be used to calculate the credit amount unless the bid documentation is being held in escrow as part of the

Contract Documents. Unit Prices, if any, may be used in OWNER's discretion in calculating reasonable value. If Contractor offers a proposed amount for a deductive Change Order(s), Contractor shall include a minimum of five percent (5%) total profit and overhead to be deducted with the amount of the work of the Change Order(s). If Subcontractor work is involved, Subcontractors shall also include a minimum of five percent (5%) profit and overhead to be deducted with the amount of its deducted work. Any deviation from this provision shall not be allowed.

17.12 Addition or Deletion of Alternate Bid Item(s)

If the Bid Form and Proposal includes proposal(s) for Alternate Bid Item(s), during Contractor's performance of the Work, the OWNER may elect to add or delete any such Alternate Bid Item(s) if not included in the Contract at the time of award. If the OWNER elects to add or delete Alternate Bid Item(s) after Contract award, the cost or credit for such Alternate Bid Item(s) shall be as set forth in the Bid Form and Proposal unless the parties agree to a different price and the Contract Time shall be adjusted by the number of days allocated in the Contract Documents. If days are not allocated in the Contract Documents, the Contract Time shall be equitably adjusted.

17.13 Discounts, Rebates, and Refunds

For purposes of determining the cost, if any, of any change, addition, or omission to the Work hereunder, all trade discounts, rebates, refunds, and all returns from the sale of surplus materials and equipment shall accrue and be credited to the Contractor, and the Contractor shall make provisions so that such discounts, rebates, refunds, and returns may be secured, and the amount thereof shall be allowed as a reduction of the Contractor's cost in determining the actual cost of construction for purposes of any change, addition, or omission in the Work as provided herein.

17.14 Accounting Records

With respect to portions of the Work performed by Change Orders and Construction Change Directives, the Contractor shall keep and maintain cost-accounting records satisfactory to the OWNER, including, without limitation, Job Cost Reports as provided in these General Conditions, which shall be available to the OWNER on the same terms as any other books and records the Contractor is required to maintain under the Contract Documents. Such records shall include without limitation hourly records for Labor and Equipment and itemized records of materials and Equipment used that day in connection with the performance of any Work. All records maintained hereunder shall be subject to inspection, review and/or reproduction by the OWNER, the Architect or the Project Inspector upon request. In the event that the Contractor fails or refuses, for any reason, to maintain or make available for inspection, review and/or reproduction such records, the OWNER's reasonable good faith determination of the extent of adjustment to the Contract Price shall be final, conclusive, dispositive and binding upon Contractor.

17.15 Notice Required

If the Contractor desires to make a claim for an increase in the Contract Price, or any extension in the Contract Time for completion, it shall notify the OWNER pursuant to the provisions herein, including the Article on Claims and Disputes. No claim shall be considered unless made in accordance with this subparagraph. Contractor shall proceed to execute the Work even though the adjustment may not have been agreed upon. Any

change in the Contract Price or extension of the Contract Time resulting from such claim shall be authorized by a Change Order.

17.16 Applicability to Subcontractors

Any requirements under this Article shall be equally applicable to Change Orders or Construction Change Directives issued to Subcontractors by the Contractor to the extent as required by the Contract Documents.

17.17 Alteration to Change Order Language

Contractor shall not alter Change Orders or reserve time in Change Orders. Change Orders altered in violation of this provision, if in conflict with the terms set forth herein, shall be construed in accordance with the terms set forth herein. Contractor shall execute finalized Change Orders and proceed under the provisions herein with proper notice.

17.18 Failure of Contractor to Execute Change Order

Contractor shall be in default of the Contract if Contractor fails to execute a Change Order when the Contractor agrees with the addition and/or deletion of the Work in that Change Order.

18. REQUEST FOR INFORMATION

18.1 Any Request for Information shall reference all applicable Contract Document(s), including Specification section(s), detail(s), page number(s), drawing number(s), and sheet number(s), etc. The Contractor shall make suggestions and interpretations of the issue raised by each Request for Information. A Request for Information cannot modify the Contract Price, Contract Time, or the Contract Documents. Upon request by the OWNER, Contractor shall provide an electronic copy of the Request for Information in addition to the hard copy.

18.2 The Contractor shall be responsible for any costs incurred for professional services that OWNER may deduct from any amounts owing to the Contractor, if a Request for Information requests an interpretation or decision of a matter where the information sought is equally available to the party making the request. OWNER, at its sole discretion, shall deduct from and/or invoice Contractor for all the professional services arising herein.

19. PAYMENTS

19.1 Contract Price

The Contract Price is stated in the Agreement and, including authorized adjustments, is the total amount payable by the OWNER to the Contractor for performance of the Work under the Contract Documents.

19.2 Applications for Progress Payments

19.2.1 Procedure for Applications for Progress Payments

19.2.1.1 Application for Progress Payment

19.2.1.1.1 Not before the fifth (5th) day of each calendar month during the progress of the Work, Contractor shall submit to the OWNER and the Architect an itemized Application for Payment for operations completed in accordance with the Schedule of Values. Such application shall be notarized, if required, and supported by the following or each portion thereof unless waived by the OWNER in writing:

19.2.1.1.1.1 The amount paid to the date of the Application to the Contractor, to all its Subcontractors, and all others furnishing labor, material, or equipment for its Contract;

19.2.1.1.1.2 The amount being requested under the Application for Payment by the Contractor on its own behalf and separately stating the amount requested on behalf of each of the Subcontractors and all others furnishing labor, material, and equipment under the Contract;

19.2.1.1.1.3 The balance that will be due to each of such entities after said payment is made;

19.2.1.1.1.4 A certification that the As-Built Drawings and annotated Specifications are current;

19.2.1.1.1.5 Itemized breakdown of work done for the purpose of requesting partial payment;

19.2.1.1.1.6 An updated and acceptable construction schedule in conformance with the provisions herein;

19.2.1.1.1.7 The additions to and subtractions from the Contract Price and Contract Time;

19.2.1.1.1.8 A total of the retentions held;

19.2.1.1.1.9 Material invoices, evidence of equipment purchases, rentals, and other support and details of cost as the OWNER may require from time to time;

19.2.1.1.1.10 The percentage of completion of the Contractor's Work by line item;

19.2.1.1.1.11 Schedule of Values updated from the preceding Application for Payment;

19.2.1.1.1.12 A duly completed and executed conditional waiver and release upon progress payment compliant with Civil Code section 8132 from the Contractor and each subcontractor of any tier and supplier to be paid from the current progress payment;

19.2.1.1.1.13 A duly completed and executed unconditional waiver and release upon progress payment compliant with Civil Code section 8134

from the Contractor and each subcontractor of any tier and supplier that was paid from the previous progress payment(s); and

19.2.1.1.1.14 A certification by the Contractor of the following:

The Contractor warrants title to all Work performed as of the date of this payment application has been completed in accordance with the Contract Documents for the Project. The Contractor further warrants that all amounts have been paid for work which previous Certificates for Payment were issued and payments received and all Work performed as of the date of this payment application is free and clear of liens, claims, security interests, or encumbrances in favor of the Contractor, Subcontractors, material and equipment suppliers, workers, or other persons or entities making a claim by reason of having provided labor, materials, and equipment relating to the Work, except those of which the OWNER has been informed. Submission of sums which have no basis in fact or which Contractor knows are false are at the sole risk of Contractor and may be a violation of the False Claims Act set forth under Government Code section 12650 et seq.

19.2.1.1.1.15 The Contractor shall be subject to the False Claims Act set forth in Government Code section 12650 et seq. for information provided with any Application for Progress Payment.

19.2.1.1.1.16 All remaining certified payroll records ("CPR(s)") for each journeyman, apprentice, worker, or other employee employed by the Contractor and/or each Subcontractor in connection with the Work for the period of the Application for Payment. As indicated herein, the OWNER shall not make any payment to Contractor until:

19.2.1.1.1.16.1 Contractor and/or its Subcontractor(s) provide electronic CPRs weekly for all weeks any journeyman, apprentice, worker or other employee was employed in connection with the Work directly to the DIR, or within ten (10) days of any request by the OWNER or the DIR, and

19.2.1.1.1.16.2 Any delay in Contractor and/or its Subcontractor(s) providing CPRs in a timely manner may directly delay the Contractor's payment.

19.2.1.1.2 Applications received after June 20th will not be paid until the second week of July and applications received after December 12th will not be paid until the first week of January.

19.2.2 Prerequisites for Progress Payments

19.2.2.1 First Payment Request: The following items, if applicable, must be completed before the OWNER will accept and/or process the Contractor's first payment request:

19.2.2.1.1 Installation of the Project sign;

19.2.2.1.2 Installation of field office;

19.2.2.1.3 Installation of temporary facilities and fencing;

19.2.2.1.4 Schedule of Values;

19.2.2.1.5 Contractor's Construction Schedule;

19.2.2.1.6 Schedule of unit prices, if applicable;

19.2.2.1.7 Submittal Schedule;

19.2.2.1.8 Receipt by Architect of all submittals due as of the date of the payment application;

19.2.2.1.9 Copies of necessary permits;

19.2.2.1.10 Copies of authorizations and licenses from governing authorities;

19.2.2.1.11 Initial progress report;

19.2.2.1.12 Surveyor qualifications;

19.2.2.1.13 Written acceptance of OWNER's survey of rough grading, if applicable;

19.2.2.1.14 List of all Subcontractors, with names, license numbers, telephone numbers, and Scope of Work;

19.2.2.1.15 All bonds and insurance endorsements; and

19.2.2.1.16 Resumes of Contractor's project manager, and if applicable, job site secretary, record documents recorder, and job site superintendent.

19.2.2.2 Second Payment Request: The OWNER will not process the second payment request until and unless all submittals and Shop Drawings have been accepted for review by the Architect.

19.2.2.3 No Waiver of Criteria: Any payments made to Contractor where criteria set forth herein have not been met shall not constitute a waiver of said criteria by OWNER. Instead, such payment shall be construed as a good faith effort by OWNER to resolve differences so Contractor may pay its Subcontractors and suppliers. Contractor agrees that failure to submit such items may constitute a breach of contract by Contractor and may subject Contractor to termination.

19.3 Progress Payments

19.3.1 OWNER's Approval of Application for Payment

19.3.1.1 Upon receipt of an Application for Payment, The OWNER shall act in accordance with both of the following:

19.3.1.1.1 Each Application for Payment shall be reviewed by the OWNER as soon as practicable after receipt for the purpose of determining that the Application for Payment is a proper Application for Payment.

19.3.1.1.2 Any Application for Payment determined not to be a proper Application for Payment suitable for payment shall be returned to the Contractor as soon as practicable, but not later than seven (7) days, after receipt. An Application for Payment returned pursuant to this paragraph shall be accompanied by a document setting forth in writing the reasons why the Application for Payment is not proper. The number of days available to the OWNER to make a payment without incurring interest pursuant to this section shall be reduced by the number of days by which the OWNER exceeds this seven-day return requirement.

19.3.1.1.3 An Application for Payment shall be considered properly executed if funds are available for payment of the Application for Payment, and payment is not delayed due to an audit inquiry by the financial officer of the OWNER.

19.3.1.2 The OWNER's review of the Contractor's Application for Payment will be based on the OWNER's and the Architect's observations at the Site and the data comprising the Application for Payment that the Work has progressed to the point indicated and that, to the best of the OWNER's and the Architect's knowledge, information, and belief, the quality of the Work is in accordance with the Contract Documents. The foregoing representations are subject to:

19.3.1.2.1 Observation of the Work for general conformance with the Contract Documents,

19.3.1.2.2 Results of subsequent tests and inspections,

19.3.1.2.3 Minor deviations from the Contract Documents correctable prior to completion, and

19.3.1.2.4 Specific qualifications expressed by the Architect.

19.3.1.3 OWNER's approval of the certified Application for Payment shall be based on Contractor complying with all requirements for a fully complete and valid certified Application for Payment.

19.3.2 Payments to Contractor

19.3.2.1 Within thirty (30) days after approval of the Application for Payment, Contractor shall be paid a sum equal to ninety-five percent (95%) of the value of the Work performed (as verified by Architect and Inspector and certified by Contractor) up to the last day of the previous month, less the aggregate of previous payments and amount to be withheld. The value of the Work completed shall be Contractor's best estimate. No inaccuracy or error in said estimate shall operate to release the Contractor, or any Surety upon any bond, from damages arising from such Work, or from the OWNER's right to enforce each and every provision of this Contract, and the OWNER shall have the right subsequently to correct any error made in any estimate for payment.

19.3.2.2 The Contractor shall not be entitled to have any payment requests processed, or be entitled to have any payment made for Work performed, so long as any lawful or proper direction given by the OWNER concerning the Work, or any portion thereof, remains incomplete.

19.3.2.3 If the OWNER fails to make any progress payment within thirty (30) days after receipt of an undisputed and properly submitted Application for Payment from the Contractor, the OWNER 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.

19.3.3 No Waiver

No payment by OWNER hereunder shall be interpreted so as to imply that OWNER has inspected, approved, or accepted any part of the Work. Notwithstanding any payment, the OWNER may enforce each and every provision of this Contract. The OWNER may correct or require correction of any error subsequent to any payment.

19.4 Decisions to Withhold Payment

19.4.1 Reasons to Withhold Payment

The OWNER may withhold payment in whole, or in part, to the extent reasonably necessary to protect the OWNER if, in the OWNER's opinion, the representations to the OWNER required herein cannot be made. The OWNER may withhold payment, in whole, or in part, to such extent as may be necessary to protect the OWNER from loss because of, but not limited to any of the following:

19.4.1.1 Defective Work not remedied within **FORTY-EIGHT (48)** hours of written notice to Contractor.

19.4.1.2 Stop Payment Notices or other liens served upon the OWNER as a result of the Contract. Contractor agrees that the OWNER may withhold up to 125% of the amount claimed in the Stop Payment Notice to answer the claim and to provide for the OWNER’s reasonable cost of any litigation pursuant to the stop payment notice.

19.4.1.3 Liquidated damages assessed against the Contractor.

19.4.1.4 The cost of completion of the Contract if there exists a reasonable doubt that the Work can be completed for the unpaid balance of the Contract Price or by the completion date.

19.4.1.5 Damage to the OWNER or other contractor(s).

19.4.1.6 Unsatisfactory prosecution of the Work by the Contractor.

19.4.1.7 Failure to store and properly secure materials.

19.4.1.8 Failure of the Contractor to submit, on a timely basis, proper, sufficient, and acceptable documentation required by the Contract Documents, including, without limitation, a Construction Schedule, Schedule of Submittals,

Schedule of Values, Monthly Progress Schedules, Shop Drawings, Product Data and samples, Proposed product lists, executed Change Orders, and/or verified reports.

19.4.1.9 Failure of the Contractor to maintain As-Built Drawings.

19.4.1.10 Erroneous estimates by the Contractor of the value of the Work performed, or other false statements in an Application for Payment.

19.4.1.11 Unauthorized deviations from the Contract Documents.

19.4.1.12 Failure of the Contractor to prosecute the Work in a timely manner in compliance with the Construction Schedule, established progress schedules, and/or completion dates.

19.4.1.13 Failure to provide acceptable electronic certified payroll records, as required by the Labor Code, by these Contract Documents, or by written request; for each journeyman, apprentice, worker, or other employee employed by the Contractor and/or by each Subcontractor in connection with the Work for the period of the Application for Payment or if payroll records are delinquent or inadequate.

19.4.1.14 Failure to properly pay prevailing wages as required in Labor Code section 1720 et seq., failure to comply with any other Labor Code requirements, and/or failure to comply with labor compliance monitoring and enforcement by the DIR.

19.4.1.15 Allowing an unregistered subcontractor, as described in Labor Code section 1725.5, to engage in the performance of any work under this Contract.

19.4.1.16 Failure to comply with any applicable federal statutes and regulations regarding minimum wages, withholding, payrolls and basic records, apprentice and trainee employment requirements, equal employment opportunity requirements, Copeland Act requirements, Davis-Bacon Act and related requirements, Contract Work Hours and Safety Standards Act requirements, if applicable.

19.4.1.17 Failure to properly maintain or clean up the Site.

19.4.1.18 Failure to timely indemnify, defend, or hold harmless the OWNER.

19.4.1.19 Any payments due to the OWNER, including but not limited to payments for failed tests, utilities changes, or permits.

19.4.1.20 Failure to pay Subcontractor(s) or supplier(s) as required by law and by the Contract Documents.

19.4.1.21 Failure to pay any royalty, license or similar fees.

19.4.1.22 Contractor is otherwise in breach, default, or in substantial violation of any provision of this Contract.

19.4.1.23 Failure to perform any implementation and/or monitoring required by any SWPPP for the Project and/or the imposition of any penalties or fines therefore whether imposed on the OWNER or Contractor.

19.4.2 Reallocation of Withheld Amounts

19.4.2.1 OWNER may, in its discretion, apply any withheld amount to pay outstanding claims or obligations as defined herein. In so doing, OWNER shall make such payments on behalf of Contractor. If any payment is so made by OWNER, then that amount shall be considered a payment made under Contract by OWNER to Contractor and OWNER shall not be liable to Contractor for any payment made in good faith. These payments may be made without prior judicial determination of claim or obligation. OWNER will render Contractor an accounting of funds disbursed on behalf of Contractor.

19.4.2.2 If Contractor defaults or neglects to carry out the Work in accordance with the Contract Documents or fails to perform any provision thereof, OWNER may, after **FORTY-EIGHT (48)** hours' written notice to the Contractor and, without prejudice to any other remedy, make good such deficiencies. The OWNER shall adjust the total Contract Price by reducing the amount thereof by the cost of making good such deficiencies. If OWNER deems it inexpedient to correct Work that is damaged, defective, or not done in accordance with Contract provisions, an equitable reduction in the Contract Price (of at least one hundred fifty percent (150%) of the estimated reasonable value of the nonconforming Work) shall be made therefor.

19.4.3 Payment After Cure

When Contractor removes the grounds for declining approval, payment shall be made for amounts withheld because of them. No interest shall be paid on any retainage or amounts withheld due to the failure of the Contractor to perform in accordance with the terms and conditions of the Contract Documents.

19.5 Subcontractor Payments

19.5.1 Payments to Subcontractors

No later than seven (7) days after receipt, or pursuant to Business and Professions Code section 7108.5 and Public Contract Code section 7107, the Contractor shall pay to each Subcontractor, out of the amount paid to the Contractor on account of such Subcontractor's portion of the Work, the amount to which said Subcontractor is entitled. The Contractor shall, by appropriate agreement with each Subcontractor, require each Subcontractor to make payments to its Sub-subcontractors in a similar manner.

19.5.2 No Obligation of OWNER for Subcontractor Payment

The OWNER shall have no obligation to pay, or to see to the payment of, money to a Subcontractor except as may otherwise be required by law.

19.5.3 Joint Checks

OWNER shall have the right in its sole discretion, if necessary for the protection of the OWNER, to issue joint checks made payable to the Contractor and Subcontractors and/or material or equipment suppliers. The joint check payees shall be responsible for the allocation and disbursement of funds included as part of any such joint payment. In no event shall any joint check payment be construed to create any contract between the OWNER and a Subcontractor of any tier, or a material or equipment supplier, any obligation from the OWNER to such Subcontractor or a material or equipment supplier, or rights in such Subcontractor or a material or equipment supplier against the OWNER.

20. COMPLETION OF THE WORK

20.1 Completion

20.1.1 OWNER will accept completion of Contract and have the Notice of Completion recorded when the entire Work shall have been completed to the satisfaction of OWNER.

20.1.2 The Work may only be accepted as complete by action of the governing board of the OWNER.

20.1.3 OWNER, at its sole option, may accept completion of Contract and have the Notice of Completion recorded when the entire Work shall have been completed to the satisfaction of OWNER, except for minor corrective items, as distinguished from incomplete items. If Contractor fails to complete all minor corrective items within fifteen (15) days after the date of the OWNER's acceptance of completion, OWNER shall withhold from the final payment one hundred fifty percent (150%) of an estimate of the amount sufficient to complete the corrective items, as determined by OWNER, until the item(s) are completed.

20.1.4 At the end of the 15-day period, if there are any items remaining to be corrected, OWNER may elect to proceed as provided herein related to adjustments to Contract Price, and/or OWNER's right to perform the Work of the Contractor.

20.2 Close-Out/Certification Procedures

20.2.1 Punch List

The Contractor shall notify the Architect when Contractor considers the Work complete. Upon notification, Architect will prepare a list of minor items to be completed or corrected ("Punch List"). The Contractor and/or its Subcontractors shall proceed promptly to complete and correct items on the Punch List. Failure to include an item on Punch List does not alter the responsibility of the Contractor to complete all Work in accordance with the Contract Documents.

20.2.2 Close-Out/Certification Requirements

20.2.2.1 Utility Connections

Buildings shall be connected to water, gas, sewer, and electric services, complete and ready for use. Service connections shall be made and existing services reconnected.

20.2.2.2 Record Drawings and Record Specifications

20.2.2.2.1 Contractor shall provide exact Record Drawings of the Work ("As-Builts") and Record Specifications upon completion of the Project and as a condition precedent to approval of final payment.

20.2.2.2.2 Contractor shall obtain the Inspector's approval of the corrected prints and employ a competent draftsman to transfer the Record Drawings information to the most current version of AutoCAD that is, at that time, currently utilized for plan check submission by either the OWNER, the Architect, OPSC, and/or DSA, and print a complete set of transparent sepias. When completed, Contractor shall deliver corrected sepias and diskette/CD/other data storage device acceptable to OWNER with AutoCAD file to the OWNER.

20.2.2.2.3 Contractor is liable and responsible for any and all inaccuracies in the Record Drawings and Record Specifications, even if inaccuracies become evident at a future date.

20.2.2.3 Maintenance Manuals: Contractor shall prepare all operation and maintenance manuals and date as indicated in the Specifications.

20.2.2.4 Source Programming: Contractor shall provide all source programming for all items in the Project.

20.2.2.5 Verified Reports: Contractor shall completely and accurately fill out and file forms DSA 6-C or DSA 152 (or current form), as appropriate. Refer to section 4-336 and section 4-343 of Part 1, Title 24 of the California Code of Regulations.

20.3 Final Inspection

20.3.1 Contractor shall comply with Punch List procedures as provided herein, and maintain the presence of a Project Superintendent and Project Manager until the Punch List is complete to ensure proper and timely completion of the Punch List. Under no circumstances shall Contractor demobilize its forces prior to completion of the Punch List without OWNER's prior written approval. Upon receipt of Contractor's written notice that all of the Punch List items have been fully completed and the Work is ready for final inspection and acceptance, Architect and Project Inspector will inspect the Work and shall submit to Contractor and OWNER a final inspection report noting the Work, if any, required in order to complete in accordance with the Contract Documents. Absent unusual circumstances, this report shall consist of the Punch List items not yet satisfactorily completed.

20.3.2 Upon Contractor's completion of all items on the Punch List and any other uncompleted portions of the Work, the Contractor shall notify the OWNER and Architect, who shall again inspect such Work. If the Architect finds the Work complete and acceptable under the Contract Documents, the Architect will notify Contractor, who shall then jointly submit to the Architect and the OWNER its final Application for Payment.

20.3.3 Final Inspection Requirements

20.3.3.1 Before calling for final inspection, Contractor shall determine that the following have been performed:

20.3.3.1.1 The Work has been completed.

20.3.3.1.2 All life safety items are completed and in working order.

20.3.3.1.3 Mechanical and electrical Work are complete and tested, fixtures are in place, connected, and ready for tryout.

20.3.3.1.4 Electrical circuits scheduled in panels and disconnect switches labeled.

20.3.3.1.5 Painting and special finishes complete.

20.3.3.1.6 Doors complete with hardware, cleaned of protective film, relieved of sticking or binding, and in working order.

20.3.3.1.7 Tops and bottoms of doors sealed.

20.3.3.1.8 Floors waxed and polished as specified.

20.3.3.1.9 Broken glass replaced and glass cleaned.

20.3.3.1.10 Grounds cleared of Contractor's equipment, raked clean of debris, and trash removed from Site.

20.3.3.1.11 Work cleaned, free of stains, scratches, and other foreign matter, and damaged and broken material replaced.

20.3.3.1.12 Finished and decorative work shall have marks, dirt, and superfluous labels removed.

20.3.3.1.13 Final cleanup, as provided herein.

20.4 Costs of Multiple Inspections

More than two (2) requests of the OWNER to make a final inspection shall be considered an additional service of OWNER, Architect, Construction Manager, and/or Project Inspector, and all subsequent costs will be invoiced to Contractor and if funds are available, withheld from remaining payments.

20.5 Partial Occupancy or Use Prior to Completion

20.5.1 OWNER's Rights to Occupancy

The OWNER may occupy or use any completed or partially completed portion of the Work at any stage, and such occupancy shall not constitute the OWNER's Final Acceptance of any part of the Work. Neither the OWNER's Final Acceptance, the making of Final Payment, any provision in Contract Documents, nor the use or occupancy of the Work, in whole or in part, by OWNER shall constitute acceptance of Work not in accordance with the Contract Documents nor relieve the Contractor or

the Contractor's Performance Bond Surety from liability with respect to any warranties or responsibility for faulty or defective Work or materials, equipment and workmanship incorporated therein. In the event that the OWNER occupies or uses any completed or partially completed portion of the Work, the Contractor shall remain responsible for payments, security, maintenance, heat, utilities, damage to the Work, insurance, the period for correction of the Work, and the commencement of warranties required by the Contract Documents unless the Contractor requests in writing, and the OWNER agrees, to otherwise divide those responsibilities. Any dispute as to responsibilities shall be resolved pursuant to the Claims and Disputes provisions herein, with the added provision that during the dispute process, the OWNER shall have the right to occupy or use any portion of the Work that it needs or desires to use.

20.5.2 Inspection Prior to Occupancy or Use

Immediately prior to partial occupancy or use, the OWNER, the Contractor, and the Architect shall jointly inspect the area to be occupied or portion of the Work to be used in order to determine and record the condition of the Work.

20.5.3 No Waiver

Unless otherwise agreed upon, partial or entire occupancy or use of a portion or portions of the Work shall not constitute beneficial occupancy or acceptance of the Work not complying with the requirements of the Contract Documents.

21. FINAL PAYMENT AND RETENTION

21.1 Final Payment

Upon receipt and approval of a valid and final Application for Payment, the Architect will issue a final Certificate of Payment. The OWNER shall thereupon jointly inspect the Work and either accept the Work as complete or notify the Architect and the Contractor in writing of reasons why the Work is not complete. Upon acceptance of the Work of the Contractor as fully complete by the Governing Board of the OWNER (that, absent unusual circumstances, will occur when the Punch List items have been satisfactorily completed), the OWNER shall record a Notice of Completion with the County Recorder, and the Contractor shall, upon receipt of final payment from the OWNER, pay the amount due Subcontractors.

21.2 Prerequisites for Final Payment

The following conditions must be fulfilled prior to Final Payment:

21.2.1 A full release of all Stop Payment Notices served in connection with the Work shall be submitted by Contractor.

21.2.2 A duly completed and executed conditional waiver and release upon final payment compliant with Civil Code section 8136, from the Contractor and each subcontractor of any tier and supplier to be paid from the final payment.

21.2.3 A duly completed and executed unconditional waiver and release upon progress payment compliant with Civil Code section 8134, from the Contractor and

each subcontractor of any tier and supplier that was paid from the previous progress payments.

21.2.4 A duly completed and executed Document 00 65 19.26, "AGREEMENT AND RELEASE OF ANY AND ALL CLAIMS" from the Contractor.

21.2.5 The Contractor shall have made all corrections to the Work that are required to remedy any defects therein, to obtain compliance with the Contract Documents or any requirements of applicable codes and ordinances, or to fulfill any of the orders or directions of OWNER required under the Contract Documents.

21.2.6 Each Subcontractor shall have delivered to the Contractor all written guarantees, warranties, applications, and bonds required by the Contract Documents for its portion of the Work.

21.2.7 Contractor must have completed all requirements set forth under "Close-Out/Certification Procedures," including, without limitation, submission of an approved set of complete Record Drawings.

21.2.8 Architect shall have issued its written approval that final payment can be made.

21.2.9 The Contractor shall have delivered to the OWNER all manuals and materials required by the Contract Documents, which must be approved by the OWNER.

21.2.10 The Contractor shall have completed final clean-up as provided herein.

21.3 Retention

21.3.1 The retention, less any amounts disputed by the OWNER or that the OWNER has the right to withhold pursuant to provisions herein, shall be paid:

21.3.1.1 After approval by the Architect of the Application and Certificate of Payment,

21.3.1.2 After the satisfaction of the conditions set forth herein, and

21.3.1.3 After forty-five (45) days after the recording of the Notice of Completion by OWNER.

21.3.2 No interest shall be paid on any retention, or on any amounts withheld due to a failure of the Contractor to perform, in accordance with the terms and conditions of the Contract Documents, except as provided to the contrary in any Escrow Agreement between the OWNER and the Contractor pursuant to Public Contract Code section 22300.

21.4 Substitution of Securities

The OWNER will permit the substitution of securities in accordance with the provisions of Public Contract Code section 22300.

22. UNCOVERING OF WORK

If a portion of the Work is covered without Inspector or Architect approval or not in compliance with the Contract Documents, it must, if required in writing by the OWNER, the Project Inspector, or the Architect, be uncovered for the Project Inspector's or the Architect's observation and be corrected, replaced, and/or recovered at the Contractor's expense without change in the Contract Price or Contract Time.

23. NONCONFORMING WORK AND CORRECTION OF WORK

23.1 Nonconforming Work

23.1.1 Contractor shall promptly remove from Premises all Work identified by OWNER as failing to conform to the Contract Documents whether incorporated or not. Contractor shall promptly replace and re-execute its own Work to comply with the Contract Documents without additional expense to the OWNER and shall bear the expense of making good all work of other contractors destroyed or damaged by any removal or replacement pursuant hereto and/or any delays to the OWNER or other Contractors caused thereby.

23.1.2 If Contractor does not remove Work that OWNER has identified as failing to conform to the Contract Documents within a reasonable time, not to exceed **FORTY-EIGHT (48)** hours, OWNER may remove it and may store any material at Contractor's expense. If Contractor does not pay expense(s) of that removal within ten (10) days' time thereafter, OWNER may, upon ten (10) days' written notice, sell any material at auction or at private sale and shall deduct all costs and expenses incurred by the OWNER and/or OWNER may withhold those amounts from payment(s) to Contractor.

23.2 Correction of Work

23.2.1 Correction of Rejected Work

Pursuant to the notice provisions herein, the Contractor shall immediately correct the Work rejected by the OWNER, the Architect, or the Project Inspector as failing to conform to the requirements of the Contract Documents, whether observed before or after Completion and whether or not fabricated, installed, or completed. The Contractor shall bear costs of correcting the rejected Work, including additional testing, inspections, and compensation for the Inspector's or the Architect's services and expenses made necessary thereby.

23.2.2 One-Year Warranty Corrections

If, within one (1) year after the date of Completion of the Work or a designated portion thereof, or after the date for commencement of warranties established hereunder, or by the terms of an applicable special warranty required by the Contract Documents, any of the Work is found to be not in accordance with the requirements of the Contract Documents, the Contractor shall correct it promptly after receipt of written notice from the OWNER to do so. This period of one (1) year shall be extended with respect to portions of the Work first performed after Completion by the period of time between Completion and the actual performance of the Work. This obligation hereunder shall survive acceptance of the Work under the

Contract and termination of the Contract. The OWNER shall give such notice promptly after discovery of the condition.

23.3 OWNER's Right to Perform Work

23.3.1 If the Contractor should neglect to prosecute the Work properly or fail to perform any provisions of this contract, the OWNER, after **FORTY-EIGHT (48)** hours written notice to the Contractor, may, without prejudice to any other remedy it may have, make good such deficiencies and may deduct the cost thereof from the payment then or thereafter due the Contractor.

23.3.2 If it is found at any time, before or after completion of the Work, that Contractor has varied from the Drawings and/or Specifications, including, but not limited to, variation in material, quality, form, or finish, or in the amount or value of the materials and labor used, OWNER may require at its option:

23.3.2.1 That all such improper Work be removed, remade or replaced, and all work disturbed by these changes be made good by Contractor at no additional cost to the OWNER;

23.3.2.2 That the OWNER deduct from any amount due Contractor the sum of money equivalent to the difference in value between the work performed and that called for by the Drawings and Specifications; or

23.3.2.3 That the OWNER exercise any other remedy it may have at law or under the Contract Documents, including but not limited to the OWNER hiring its own forces or another contractor to replace the Contractor's nonconforming Work, in which case the OWNER shall either issue a deductive Change Order, a Construction Change Directive, or invoice the Contractor for the cost of that work. Contractor shall pay any invoices within thirty (30) days of receipt of same or OWNER may withhold those amounts from payment(s) to Contractor.

24. TERMINATION AND SUSPENSION

24.1 OWNER's Right to Terminate Contractor for Cause

24.1.1 Grounds for Termination: The OWNER, in its sole discretion, may terminate the Contract and/or terminate the Contractor's right to perform the work of the Contract based upon any of the following:

24.1.1.1 Contractor refuses or fails to execute the Work or any separable part thereof with sufficient diligence as will ensure its completion within the time specified or any extension thereof, or

24.1.1.2 Contractor fails to complete said Work within the time specified or any extension thereof, or

24.1.1.3 Contractor persistently fails or refused to perform Work or provide material of sufficient quality as to be in compliance with Contract Documents; or

24.1.1.4 Contractor persistently or repeatedly refuses fails, except in cases for which extension of time is provided, to supply enough properly skilled workers or proper materials to complete the Work in the time specified; or

24.1.1.5 Contractor fails to make prompt payment to Subcontractors, or for material, or for labor; or

24.1.1.6 Contractor persistently disregards laws, or ordinances, or instructions of OWNER; or

24.1.1.7 Contractor fails to supply labor, including that of Subcontractors, that is sufficient to prosecute the Work or that can work in harmony with all other elements of labor employed or to be employed on the Work; or

24.1.1.8 Contractor or its Subcontractor(s) is/are otherwise in breach, default, or in substantial violation of any provision of this Contract, including but not limited to a lapse in licensing or registration.

24.1.2 Notification of Termination

24.1.2.1 Upon the occurrence at OWNER's sole determination of any of the above conditions, OWNER may, without prejudice to any other right or remedy, serve written notice upon Contractor and its Surety of OWNER's termination of this Contract and/or the Contractor's right to perform the work of the Contract. This notice will contain the reasons for termination. Unless, within three (3) days after the service of the notice, any and all condition(s) shall cease, and any and all violation(s) shall cease, or arrangement satisfactory to OWNER for the correction of the condition(s) and/or violation(s) be made, this Contract shall cease and terminate. Upon Termination, Contractor shall not be entitled to receive any further payment until the entire Work is finished.

24.1.2.2 Upon Termination, OWNER may immediately serve written notice of tender upon Surety whereby Surety shall have the right to take over and perform this Contract only if Surety:

24.1.2.2.1 Within three (3) days after service upon it of the notice of tender, gives OWNER written notice of Surety's intention to take over and perform this Contract; and

24.1.2.2.2 Commences performance of this Contract within three (3) days from date of serving of its notice to OWNER.

24.1.2.3 Surety shall not utilize Contractor in completing the Project if the OWNER notifies Surety of the OWNER's objection to Contractor's further participation in the completion of the Project. Surety expressly agrees that any contractor which Surety proposes to fulfill Surety's obligations is subject to OWNER's approval. OWNER's approval shall not be unreasonably withheld, conditioned or delayed.

24.1.2.4 If Surety fails to notify OWNER or begin performance as indicated herein, OWNER may take over the Work and execute the Work to completion by any method it may deem advisable at the expense of Contractor and/or its

Surety. Contractor and/or its Surety shall be liable to OWNER for any excess cost or other damages the OWNER incurs thereby. Time is of the essence in this Contract. If the OWNER takes over the Work as herein provided, OWNER may, without liability for so doing, take possession of and utilize in completing the Work such materials, appliances, plan, and other property belonging to Contractor as may be on the Site of the Work, in bonded storage, or previously paid for.

24.1.3 Effect of Termination

24.1.3.1 Contractor shall, only if ordered to do so by the OWNER, immediately remove from the Site all or any materials and personal property belonging to Contractor that have not been incorporated in the construction of the Work, or which are not in place in the Work. The OWNER retains the right, but not the obligation, to keep and use any materials and personal property belonging to Contractor that have not been incorporated in the construction of the Work, or which are not in place in the Work. The Contractor and its Surety shall be liable upon the performance bond for all damages caused to the OWNER by reason of the Contractor's failure to complete the Contract.

24.1.3.2 In the event that the OWNER shall perform any portion of, or the whole of the Work, pursuant to the provisions of the General Conditions, the OWNER shall not be liable nor account to the Contractor in any way for the time within which, or the manner in which, the Work is performed by the OWNER or for any changes the OWNER may make in the Work or for the money expended by the OWNER in satisfying claims and/or suits and/or other obligations in connection with the Work.

24.1.3.3 In the event that the Contract is terminated for any reason, no allowances or compensation will be granted for the loss of any anticipated profit by the Contractor or any impact or impairment of Contractor's bonding capacity.

24.1.3.4 If the expense to the OWNER to finish the Work exceeds the unpaid Contract Price, Contractor and Surety shall pay difference to OWNER within twenty-one (21) days of OWNER's request.

24.1.3.5 The OWNER shall have the right (but shall have no obligation) to assume and/or assign to a general contractor or construction manager or other third party who is qualified and has sufficient resources to complete the Work, the rights of the Contractor under its subcontracts with any or all Subcontractors. In the event of an assumption or assignment by the OWNER, no Subcontractor shall have any claim against the OWNER or third party for Work performed by Subcontractor or other matters arising prior to termination of the Contract. The OWNER or any third party, as the case may be, shall be liable only for obligations to the Subcontractor arising after assumption or assignment. Should the OWNER so elect, the Contractor shall execute and deliver all documents and take all steps, including the legal assignment of its contractual rights, as the OWNER may require, for the purpose of fully vesting in the OWNER the rights and benefits of

its Subcontractor under Subcontracts or other obligations or commitments. All payments due the Contractor hereunder shall be subject to a right of offset by the OWNER for expenses and damages suffered by the OWNER as a result of any default, acts, or omissions of the Contractor. Contractor must include this assignment provision in all of its contracts with its Subcontractors.

24.1.3.6 The foregoing provisions are in addition to and not in limitation of any other rights or remedies available to OWNER.

24.1.4 Emergency Termination of Public Contracts Act of 1949

24.1.4.1 This Contract is subject to termination as provided by sections 4410 and 4411 of the Government Code of the State of California, being a portion of the Emergency Termination of Public Contracts Act of 1949.

24.1.4.1.1 Section 4410 of the Government Code states:

In the event a national emergency occurs, and public work, being performed by contract, is stopped, directly or indirectly, because of the freezing or diversion of materials, equipment or labor, as the result of an order or a proclamation of the President of the United States, or of an order of any federal authority, and the circumstances or conditions are such that it is impracticable within a reasonable time to proceed with a substantial portion of the work, then the public agency and the contractor may, by written agreement, terminate said contract.

24.1.4.1.2 Section 4411 of the Government Code states:

Such an agreement shall include the terms and conditions of the termination of the contract and provision for the payment of compensation or money, if any, which either party shall pay to the other or any other person, under the facts and circumstances in the case.

24.1.4.2 Compensation to the Contractor shall be determined at the sole discretion of OWNER on the basis of the reasonable value of the Work done, including preparatory work. As an exception to the foregoing and at the OWNER's discretion, in the case of any fully completed separate item or portion of the Work for which there is a separate previously submitted unit price or item on the accepted schedule of values, that price shall control. The OWNER, at its sole discretion, may adopt the Contract Price as the reasonable value of the work done or any portion thereof.

24.2 Termination of Contractor for Convenience

24.2.1 OWNER in its sole discretion may terminate the Contract upon three (3) days' written notice to the Contractor. Under a termination for convenience, the OWNER retains the right to all the options available to the OWNER if there is a termination for cause. In case of a termination for convenience, the Contractor shall have no claims against the OWNER except:

24.2.1.1 The actual cost for labor, materials, and services performed that is unpaid and adequately documented through timesheets, invoices, receipts, or otherwise, and

24.2.1.2 Five percent (5%) of the total cost of work performed as of the date of termination, or five percent (5%) of the value of the Work yet to be performed, whichever is less. This five percent (5%) amount shall be full compensation for all Contractor's and Subcontractor(s)' mobilization and/or demobilization costs and any anticipated loss profits resulting from termination of the Contractor for convenience.

24.3 Suspension of Work

24.3.1 OWNER in its sole discretion may suspend, delay or interrupt the Work in whole or in part for such period of time as the OWNER may determine upon three (3) days written notice to the Contractor.

24.3.1.1 An adjustment may be made for changes in the cost of performance of the Work caused by any such suspension, delay or interruption. No adjustment shall be made to the extent:

24.3.1.1.1 That performance is, was or would have been so suspended, delayed or interrupted by another cause for which Contractor is responsible; or

24.3.1.1.2 That an equitable adjustment is made or denied under another provision of the Contract; or

24.3.1.1.3 That the suspension of Work was the direct or indirect result of Contractor's failure to perform any of its obligations hereunder.

24.3.1.2 Any adjustments in cost of performance may have a fixed or percentage fee as provided in the section on Format for Proposed Change Order herein. This amount shall be full compensation for all Contractor's and its Subcontractor(s)' changes in the cost of performance of the Contract caused by any such suspension, delay or interruption.

25. CLAIMS PROCESS

25.1 Performance during Claim Process

Contractor and its subcontractors shall continue to perform its Work under the Contract and shall not cause a delay of the Work during any dispute, claim, negotiation, mediation, or arbitration proceeding, except by written agreement by the OWNER.

25.2 Definition of Claim

25.2.1 Pursuant to Public Contract Code section 9204, the term "Claim" means a separate demand by the Contractor sent by registered mail or certified mail with return receipt requested, for one or more of the following:

25.2.1.1 A time extension, including without limitation, for relief of damages or penalties for delay assessed by the OWNER under the Contract;

25.2.1.2 Payment by the OWNER of money or damages arising from work done by, or on behalf of, the Contractor pursuant to the Contract and payment of which is not otherwise expressly provided for or to which Contractor is not otherwise entitled to; or

25.2.1.3 An amount of payment disputed by the OWNER.

25.3 Claims Presentation

25.3.1 If Contractor intends to apply for an increase in the Contract Price or Contract Time for any reason including, without limitation, the acts of OWNER or its agents, Contractor shall, within thirty (30) days after the event giving rise to the Claim, give notice of the Claim in writing, including an itemized statement of the details and amounts of its Claim for any increase in the Contract Price of Contract Time, including a Schedule Analysis and any and all other documentation substantiating Contractor's claimed damages. Otherwise, Contractor shall have waived and relinquished its dispute against the OWNER and Contractor's claims for compensation or an extension of time shall be forfeited and invalidated. Likewise, failure to timely submit a claim and the requisite supporting documentation shall constitute a waiver of such claim.

25.3.2 The Claim shall identify:

25.3.2.1 The issues, events, conditions, circumstances and/or causes giving rise to the dispute, and shall show, in detail, the cause and effect of same;

25.3.2.2 The pertinent dates and/or durations and actual and/or anticipated effects on the Contract Price, Contract Schedule milestones and/or Contract Time adjustments;

25.3.2.3 The line-item costs for labor, material, and/or equipment, if applicable; or

25.3.2.4 A request by Contractor, if any, to waive the claims procedure under Public Contract Code section 9204 and proceed directly to the commencement of a civil action or binding arbitration.

25.3.3 The Claim shall include the following certification by the Contractor:

25.3.3.1 The undersigned Contractor certifies under penalty of perjury that the attached dispute is made in good faith; that the supporting data is accurate and complete to the best of my knowledge and belief; that the amount requested accurately reflects the adjustment for which Contractor believes the OWNER is liable; and that I am duly authorized to certify the dispute on behalf of the Contractor.

25.3.3.2 Furthermore, Contractor understands that the value of the attached dispute expressly includes any and all of the Contractor's costs and expenses, direct and indirect, resulting from the Work performed on the Project, additional

time required on the Project and/or resulting from delay to the Project. Contractor may not separately recover for overhead or other indirect costs. Any costs, expenses, damages, or time extensions not included are deemed waived.

25.4 Claim Resolution pursuant to Public Contract Code section 9204

25.4.1 STEP 1:

25.4.1.1 Upon receipt of a Claim by registered or certified mail, return receipt requested, including the documents necessary to substantiate it, the OWNER shall conduct a reasonable review of the Claim and, within a period **not to exceed 45 days**, shall provide the Contractor a written statement identifying what portion of the Claim is disputed and what portion is undisputed. Upon receipt of a Claim, the OWNER and Contractor may, **by mutual agreement, extend the time period** to provide a written statement. If the OWNER needs approval from its governing body to provide the Contractor a written statement identifying the disputed portion and the undisputed portion of the Claim, and the governing body does not meet within the 45 days or within the mutually agreed to extension of time following receipt of Claim sent by registered mail or certified mail, return receipt requested, the OWNER shall have **up to three (3) days following the next duly publicly noticed meeting of the governing body after the 45-day period, or extension**, expires to provide Contractor a written statement identifying the disputed portion and the undisputed portion.

25.4.1.1.1 Any payment due on an undisputed portion of the Claim shall be processed and made within 60 days after the OWNER issues its written statement. Amounts not paid in a timely manner as required by this section, section 25.4, shall bear interest at seven percent (7%) per annum.

25.4.1.2 Upon receipt of a Claim, the parties may mutually agree to waive, in writing, mediation and proceed directly to the commencement of a civil action or binding arbitration, as applicable. In this instance, OWNER and Contractor must comply with the sections below regarding Public Contract Code section 20104 et seq. and Government Code Claim Act Claims.

25.4.1.3 If the OWNER fails to issue a written statement, or to otherwise meet the time requirements of this section, this shall result in the Claim being deemed rejected in its entirety. A Claim that is denied by reason of the OWNER's failure to have responded to a Claim, or its failure to otherwise meet the time requirements of this section, shall not constitute an adverse finding with regard to the merits of the Claim or the responsibility or qualifications of Contractor.

25.4.2 STEP 2:

25.4.2.1 If Contractor disputes the OWNER's written response, or if the OWNER fails to respond to a Claim within the time prescribed, Contractor may demand in writing an informal conference to meet and confer for settlement of the issues in dispute. Upon receipt of a demand in writing sent by registered mail or certified mail, return receipt requested, the OWNER shall schedule a meet and confer conference within 30 days for settlement of the dispute. Within 10 business days following the conclusion of the meet and confer conference, if the Claim or any portion of the Claim remains in dispute, the OWNER shall provide the Contractor

a written statement identifying the portion of the Claim that remains in dispute and the portion that is undisputed.

25.4.2.1.1.1 Any payment due on an undisputed portion of the Claim shall be processed and made within 60 days after the OWNER issues its written statement. Amounts not paid in a timely manner as required by this section, section 25.4, shall bear interest at seven percent (7%) per annum.

25.4.3 STEP 3:

25.4.3.1 Any disputed portion of the Claim, as identified by Contractor in writing, shall be submitted to nonbinding mediation, with the OWNER and Contractor sharing the associated costs equally. The OWNER and Contractor shall mutually agree to a mediator within 10 business days after the disputed portion of the Claim has been identified in writing. If the parties cannot agree upon a mediator, each party shall select a mediator and those mediators shall select a qualified neutral third party to mediate with regard to the disputed portion of the Claim. Each party shall bear the fees and costs charged by its respective mediator in connection with the selection of the neutral mediator. If mediation is unsuccessful, the parts of the Claim remaining in dispute shall be subject to applicable procedures outside this section.

25.4.3.1.1 For purposes of this section, mediation includes any nonbinding process, including, but not limited to, neutral evaluation or a dispute review board, in which an independent third party or board assists the parties in dispute resolution through negotiation or by issuance of an evaluation. Any mediation utilized shall conform to the timeframes in this section.

25.4.3.2 Unless otherwise agreed to by the OWNER and Contractor in writing, the mediation conducted pursuant to this section shall excuse any further obligation under Public Contract Code section 20104.4 to mediate after litigation has been commenced.

25.4.4 STEP 4:

25.4.4.1 If mediation under this section does not resolve the parties' dispute, the OWNER may, but does not require arbitration of disputes under private arbitration or the Public Works Contract Arbitration Program.

25.5 <u>Subcontractor Pass-Through Claims</u>

25.5.1 If a subcontractor or a lower tier subcontractor lacks legal standing to assert a claim against a OWNER because privity of contract does not exist, the contractor may present to the OWNER a Claim on behalf of a subcontractor or lower tier subcontractor. A subcontractor may request in writing, either on his or her own behalf or on behalf of a lower tier subcontractor, that Contractor present a Claim for work which was performed by the subcontractor or by a lower tier subcontractor on behalf of the subcontractor. The subcontractor requesting that the Claim be presented to the OWNER shall furnish reasonable documentation to support the Claim.

25.5.2 Within 45 days of receipt of this written request from a subcontractor, Contractor shall notify the subcontractor in writing as to whether the Contractor presented the Claim to the OWNER and, if Contractor did not present the Claim, provide the subcontractor with a statement of the reasons for not having done so.

25.5.3 The Contractor shall bind all its Subcontractors to the provisions of this section and will hold the OWNER harmless against Claims by Subcontractors.

25.6 Government Code Claim Act Claim

25.6.1 If a claim, or any portion thereof, remains in dispute upon satisfaction of all applicable Claim Resolution requirements, including those pursuant to Public Contract Code section 9204, the Contractor shall comply with all claims presentation requirements as provided in Chapter 1 (commencing with section 900) and Chapter 2 (commencing with section 910) of Part 3 of Division 3.6 of Title 1 of Government Code as a condition precedent to the Contractor's right to bring a civil action against the OWNER. For purposes of those provisions, the running of the time within which a claim must be presented to the OWNER shall be tolled from the time Contractor submits its written Claim until the time the Claim is denied, including any time utilized by any applicable meet and confer process.

25.7 Claim Resolution pursuant to Public Contract Code section 20104 et seq.

25.7.1 In the event of a disagreement between the parties as to performance of the Work, the interpretation of this Contract, or payment or nonpayment for Work performed or not performed, the parties shall attempt to resolve all claims of three hundred seventy-five thousand dollars ($375,000) or less which arise between Contractor and OWNER by those procedures set forth in Public Contract Code section 20104, et seq., to the extent applicable.

25.7.1.1 Contractor shall file with the OWNER any written Claim, including the documents necessary to substantiate it, upon the application for final payment.

25.7.1.2 For claims of less than fifty thousand dollars ($50,000), the OWNER shall respond in writing within forty-five (45) days of receipt of the Claim or may request in writing within thirty (30) days of receipt of the Claim any additional documentation supporting the Claim or relating to defenses or claims the OWNER may have against the Contractor.

25.7.1.2.1 If additional information is required, it shall be requested and provided by mutual agreement of the parties.

25.7.1.2.2 OWNER's written response to the documented Claim shall be submitted to the Contractor within fifteen (15) days after receipt of the further documentation or within a period of time no greater than that taken by the Contractor to produce the additional information, whichever is greater.

25.7.1.3 For claims of over fifty thousand dollars ($50,000) and less than or equal to three hundred seventy-five thousand dollars ($375,000), the OWNER shall respond in writing to all written Claims within sixty (60) days of receipt of the claim, or may request, in writing, within thirty (30) days of receipt of the

Claim any additional documentation supporting the Claim or relating to defenses or claims the OWNER may have against the Contractor.

25.7.1.3.1 If additional information is required, it shall be requested and provided upon mutual agreement of the OWNER and the Contractor.

25.7.1.3.2 The OWNER's written response to the Claim, as further documented, shall be submitted to the Contractor within thirty (30) days after receipt of the further documentation, or within a period of time no greater than that taken by the Contractor to produce the additional information or requested documentation, whichever is greater.

25.7.1.4 If Contractor disputes the OWNER's written response, or the OWNER fails to respond within the time prescribed, Contractor may so notify the OWNER, in writing, either within fifteen (15) days of receipt of the OWNER's response or within fifteen (15) days of the OWNER's failure to respond within the time prescribed, respectively, and demand an informal conference to meet and confer for settlement of the issues in dispute. Upon a demand, the OWNER shall schedule a meet and confer conference within thirty (30) days for settlement of the dispute.

25.7.1.5 Following the meet and confer conference, if the Claim or any portion of it remains in dispute, the Contractor may file a claim as provided in Chapter 1 (commencing with Section 900) and Chapter 2 (commencing with Section 910) of Part 3 of Division 3.6 of Title 1 of the Government Code. For purposes of those provisions the running of the time within which a claim must be filed shall be tolled from the time the Contractor submits its written Claim until the time the Claim is denied, including any period of time utilized by the meet and confer process.

25.7.1.6 For any civil action filed to resolve claims filed pursuant to this section, within sixty (60) days, but no earlier than thirty (30) days, following the filing of responsive pleadings, the court shall submit the matter to nonbinding mediation unless waived by mutual stipulation of both parties. The mediation process shall provide for the selection within fifteen (15) days by both parties of a disinterested third person as mediator, shall be commenced within thirty (30) days of the submittal, and shall be concluded within fifteen (15) days from the commencement of the mediation unless a time requirement is extended upon a good cause showing to the court or by stipulation of both parties. If the parties fail to select a mediator within the 15-day period, any party may petition the court to appoint the mediator.

25.7.1.7 If the matter remains in dispute, the case shall be submitted to judicial arbitration pursuant to Chapter 2.5 (commencing with Section 1141.10) of the Title 3 of Part 3 of the Code of Civil Procedure, notwithstanding Section 1141.11 of that code. The Civil Discovery Act of 1986, (Article 3 (commencing with Section 2016) of Chapter 3 of Title 3 of part 4 of the Code of Civil Procedure) shall apply to any proceeding brought under this subdivision consistent with the rules pertaining to judicial arbitration.

25.7.1.8 The OWNER shall not fail to pay money as to any portion of a Claim which is undisputed except as otherwise provided in the Contract Documents. In

any suit filed pursuant to this section, the OWNER shall pay interest due at the legal rate on any arbitration award or judgment. Interest shall begin to accrue on the date the suit is filed in a court of law.

25.7.2 Contractor shall bind its Subcontractors to the provisions of this Section and will hold the OWNER harmless against disputes by Subcontractors.

25.8 Claim Resolution Non-Applicability

25.8.1 The procedures for dispute and claim resolutions set forth in this Article shall not apply to the following:

25.8.1.1 Personal injury, wrongful death or property damage claims;

25.8.1.2 Latent defect or breach of warranty or guarantee to repair;

25.8.1.3 Stop payment notices;

25.8.1.4 OWNER's rights set forth in the Article on Suspension and Termination;

25.8.1.5 Disputes arising out of labor compliance enforcement by the Department of Industrial Relations; or

25.8.1.6 OWNER rights and obligations as a public entity set forth in applicable statutes; provided, however, that penalties imposed against a public entity by statutes, including, but not limited to, Public Contract Code sections 20104.50 and 7107, shall be subject to the Claim Resolution requirements provided in this Article.

25.9 Attorney's Fees

25.9.1 Should litigation be necessary to enforce any terms or provisions of this Agreement, then each party shall bear its own litigation and collection expenses, witness fees, court costs and attorney's fees.

26. STATE LABOR, WAGE & HOUR, APPRENTICE, AND RELATED PROVISIONS

26.1 Labor Compliance and Enforcement

Since this Project is subject to labor compliance and enforcement by the Department of Industrial Relations ("DIR"), Contractor specifically acknowledges and understands that it shall perform the Work of this Agreement while complying with all the applicable provisions of Division 2, Part 7, Chapter 1, of the Labor Code and Title 8 of the California Code of Regulations, including, without limitation, the requirement that the Contractor and all Subcontractors shall timely furnish complete and accurate electronic certified payroll records directly to the DIR. The OWNER may not issue payment if this requirement is not met.

26.2 Wage Rates, Travel, and Subsistence

26.2.1 Pursuant to the provisions of Article 2 (commencing at section 1770), Chapter 1, Part 7, Division 2, of the Labor Code, the general prevailing rate of per

diem wages and the general prevailing rate for holiday and overtime work in the locality in which this public work is to be performed for each craft, classification, or type of worker needed to execute this Contract are on file at the OWNER's principal office and copies will be made available to any interested party on request. Contractor shall obtain and post a copy of these wage rates at the job site.

26.2.2 Holiday and overtime work, when permitted by law, shall be paid for at the general prevailing rate of per diem wages for holiday and overtime work on file with the Director of the Department of Industrial Relations, unless otherwise specified. The holidays upon which those rates shall be paid need not be specified by the OWNER, but shall be all holidays recognized in the applicable collective bargaining agreement. If the prevailing rate is not based on a collectively bargained rate, the holidays upon which the prevailing rate shall be paid shall be as provided in Section 6700 of the Government Code.

26.2.3 Contractor shall pay and shall cause to be paid each worker engaged in Work on the Project the general prevailing rate of per diem wages determined by the Director of the Department of Industrial Relations, regardless of any contractual relationship which may be alleged to exist between Contractor or any Subcontractor and such workers.

26.2.4 If during the period this bid is required to remain open, the Director of the Department of Industrial Relations determines that there has been a change in any prevailing rate of per diem wages in the locality in which the Work under the Contract is to be performed, such change shall not alter the wage rates in the Notice to Bidders or the Contract subsequently awarded.

26.2.5 Pursuant to Labor Code section 1775, Contractor shall, as a penalty to OWNER, forfeit the statutory amount (believed by the OWNER to be currently up to two hundred dollars ($200) for each calendar day, or portion thereof, for each worker paid less than the prevailing rates, determined by the OWNER and/or the Director, for the work or craft in which that worker is employed for any public work done under Contract by Contractor or by any Subcontractor under it. The difference between such prevailing wage rates and the amount paid to each worker for each calendar day or portion thereof for which each worker was paid less than the prevailing wage rate shall be paid to each worker by Contractor.

26.2.6 Any worker employed to perform Work on the Project, which Work is not covered by any classification listed in the general prevailing wage rate of per diem wages determined by the Director, shall be paid not less than the minimum rate of wages specified therein for the classification which most nearly corresponds to Work to be performed by him, and such minimum wage rate shall be retroactive to time of initial employment of such person in such classification.

26.2.7 Pursuant to Labor Code section 1773.1, per diem wages are deemed to include employer payments for health and welfare, pension, vacation, travel time, subsistence pay, and apprenticeship or other training programs authorized by Labor Code section 3093, and similar purposes.

26.2.8 Contractor shall post at appropriate conspicuous points on the Site of Project, a schedule showing all determined minimum wage rates and all authorized deductions, if any, from unpaid wages actually earned. In addition, Contractor shall

post a sign-in log for all workers and visitors to the Site, a list of all subcontractors of any tier on the Site, and the required Equal Employment Opportunity poster(s).

26.3 Hours of Work

26.3.1 As provided in article 3 (commencing at section 1810), chapter 1, part 7, division 2, of the Labor Code, eight (8) hours of labor shall constitute a legal day's work. The time of service of any worker employed at any time by Contractor or by any Subcontractor on any subcontract under this Contract upon the Work or upon any part of the Work contemplated by this Contract shall be limited and restricted by Contractor to eight (8) hours per day, and forty (40) hours during any one week, except as hereinafter provided. Notwithstanding the provisions hereinabove set forth, Work performed by employees of Contractor in excess of eight (8) hours per day and forty (40) hours during any one week, shall be permitted upon this public work upon compensation for all hours worked in excess of eight (8) hours per day at not less than one and one-half times the basic rate of pay.

26.3.2 Contractor shall keep and shall cause each Subcontractor to keep an accurate record showing the name of and actual hours worked each calendar day and each calendar week by each worker employed by Contractor in connection with the Work or any part of the Work contemplated by this Contract. The record shall be kept open at all reasonable hours to the inspection of OWNER and to the Division of Labor Standards Enforcement of the DIR.

26.3.3 Pursuant to Labor Code section 1813, Contractor shall as a penalty to the OWNER forfeit the statutory amount (believed by the OWNER to be currently twenty-five dollars ($25)) for each worker employed in the execution of this Contract by Contractor or by any Subcontractor for each calendar day during which such worker is required or permitted to work more than eight (8) hours in any one calendar day and forty (40) hours in any one calendar week in violation of the provisions of article 3 (commencing at section 1810), chapter 1, part 7, division 2, of the Labor Code.

26.3.4 Any Work necessary to be performed after regular working hours, or on Sundays or other holidays shall be performed without additional expense to the OWNER.

26.4 Payroll Records

26.4.1 Contractor shall upload, and shall cause each Subcontractor performing any portion of the Work under this Contract to upload, an accurate and complete certified payroll record ("CPR") electronically using DIR's eCPR System by uploading the CPRs by electronic XML file or entering each record manually using the DIR's iform (or current form) online on a weekly basis and within ten (10 days of any request by the OWNER or Labor Commissioner at http://www.dir.ca.gov/Public-Works/Certified-Payroll-Reporting.html or current application and URL, showing the name, address, social security number, work classification, straight-time, and overtime hours worked each day and week, and the actual per diem wages paid to each journeyman, apprentice, worker, or other employee employed by the Contractor and/or each Subcontractor in connection with the Work.

26.4.1.1 The CPRs enumerated hereunder shall be filed directly with the DIR on a weekly basis or to the requesting party, whether the OWNER or DIR, within ten

(10) days after receipt of each written request. The CPRs from the Contractor and each Subcontractor for each week shall be provided on or before Wednesday of the week following the week covered by the CPRs. OWNER may not make any payment to Contractor until:

26.4.1.1.1 Contractor and/or its Subcontractor(s) provide CPRs acceptable to the DIR; and

26.4.1.1.2 Any delay in Contractor and/or its Subcontractor(s) providing CPRs to the DIR in a timely manner may directly delay Contractor's payment.

26.4.2 All CPRs shall be available for inspection at all reasonable hours at the principal office of Contractor on the following basis:

26.4.2.1 A certified copy of an employee's CPR shall be made available for inspection or furnished to the employee or his/her authorized representative on request.

26.4.2.2 CPRs shall be made available for inspection or furnished upon request to a representative of OWNER, Division of Labor Standards Enforcement, Division of Apprenticeship Standards, and/or the DIR.

26.4.2.3 CPRs shall be made available upon request by the public for inspection or copies thereof made; provided, however, that a request by the public shall be made through the OWNER, Division of Apprenticeship Standards, or the Division of Labor Standards Enforcement. If the requested CPRs have not been provided pursuant to the provisions herein, the requesting party shall, prior to being provided the records, reimburse the costs of preparation by Contractor, Subcontractors, and the entity through which the request was made. The public shall not be given access to the records at the principal office of Contractor.

26.4.3 Any copy of records made available for inspection as copies and furnished upon request to the public or any public agency by OWNER, Division of Apprenticeship Standards, or Division of Labor Standards Enforcement shall be marked or obliterated in such a manner as to prevent disclosure of an individual's name, address, and social security number. The name and address of Contractor awarded Contract or performing Contract shall not be marked or obliterated.

26.4.4 Contractor shall inform OWNER of the location of the records enumerated hereunder, including the street address, city, and county, and shall, within five (5) working days, provide a notice of change of location and address.

26.4.5 In the event of noncompliance with the requirements of this section, Contractor shall have ten (10) days in which to comply subsequent to receipt of written notice specifying in what respects Contractor must comply with this section. Should noncompliance still be evident after the ten (10) day period, Contractor shall, as a penalty to OWNER, forfeit up to one hundred dollars ($100) for each calendar day, or portion thereof, for each worker, until strict compliance is effectuated. Upon the request of the Labor Commissioner, these penalties shall be withheld from progress payments then due.

26.4.6 [RESERVED]

26.5 [RESERVED]

26.6 Apprentices

26.6.1 Contractor acknowledges and agrees that, if this Contract involves a dollar amount greater than or a number of working days greater than that specified in Labor Code section 1777.5, then this Contract is governed by the provisions of Labor Code Section 1777.5. It shall be the responsibility of Contractor to ensure compliance with this Article and with Labor Code section 1777.5 for all apprenticeship occupations.

26.6.2 Apprentices of any crafts or trades may be employed and, when required by Labor Code section 1777.5, shall be employed provided they are properly registered in full compliance with the provisions of the Labor Code.

26.6.3 Every such apprentice shall be paid the standard wage paid to apprentices under the regulations of the craft or trade at which he/she is employed, and shall be employed only at the work of the craft or trade to which she/he is registered.

26.6.4 Only apprentices, as defined in section 3077 of the Labor Code, who are in training under apprenticeship standards and written apprentice agreements under chapter 4 (commencing at section 3070), division 3, of the Labor Code, are eligible to be employed. The employment and training of each apprentice shall be in accordance with the provisions of the apprenticeship standards and apprentice agreements under which he/she is training.

26.6.5 Pursuant to Labor Code section 1777.5, if that section applies to this Contract as indicated above, Contractor and any Subcontractors employing workers in any apprenticeable craft or trade in performing any Work under this Contract shall apply to the applicable joint apprenticeship committee for a certificate approving the Contractor or Subcontractor under the applicable apprenticeship standards and fixing the ratio of apprentices to journeymen employed in performing the Work.

26.6.6 Pursuant to Labor Code section 1777.5, if that section applies to this Contract as indicated above, Contractor and any Subcontractor may be required to make contributions to the apprenticeship program.

26.6.7 If Contractor or Subcontractor willfully fails to comply with Labor Code section 1777.5, then, upon a determination of noncompliance by the Administrator of Apprenticeship, it shall:

26.6.7.1 Be denied the right to bid on any subsequent project for one (1) year from the date of such determination;

26.6.7.2 Forfeit as a penalty to OWNER the full amount as stated in Labor Code section 1777.7. Interpretation and enforcement of these provisions shall be in accordance with the rules and procedures of the California Apprenticeship Council and under the authority of the Chief of the Division of Apprenticeship Standards.

26.6.8 Contractor and all Subcontractors shall comply with Labor Code section 1777.6, which section forbids certain discriminatory practices in the employment of apprentices.

26.6.9 Contractor shall become fully acquainted with the law regarding apprentices prior to commencement of the Work. Special attention is directed to sections 1777.5, 1777.6, and 1777.7 of the Labor Code, and title 8, California Code of Regulations, section 200 et seq. Questions may be directed to the State Division of Apprenticeship Standards, 455 Golden Gate Avenue, 9th floor, San Francisco, California 94102.

26.7 Non-Discrimination

26.7.1 Contractor herein agrees not to discriminate in its recruiting, hiring, promotion, demotion, or termination practices on the basis of race, religious creed, national origin, ancestry, sex, age, or physical handicap in the performance of this Contract and to comply with the provisions of the California Fair Employment and Housing Act as set forth in part 2.8 of division 3 of the California Government Code, commencing at section 12900; the Federal Civil Rights Act of 1964, as set forth in Public Law 88-352, and all amendments thereto; Executive Order 11246; and all administrative rules and regulations found to be applicable to Contractor and Subcontractor.

26.7.2 Special requirements for Federally Assisted Construction Contracts: During the performance of this Contract, Contractor agrees to incorporate in all subcontracts the provisions set forth in Chapter 60-1.4(b) of Title 41 published in Volume 33 No. 104 of the Federal Register dated May 28, 1968.

26.8 Labor First Aid

Contractor shall maintain emergency first aid treatment for Contractor's workers on the Project which complies with the Federal Occupational Safety and Health Act of 1970 (29 U.S.C. § 651 et seq.) and the California Occupational Safety and Health Act of 1973 (Lab. Code, § 6300 et seq.; 8 Cal. Code of Regs., § 330 et seq.).

27. [RESERVED]

28. MISCELLANEOUS

28.1 Assignment of Antitrust Actions

28.1.1 Section 7103.5(b) of the Public Contract Code states:

In entering into a public works contract or subcontract to supply goods, services, or materials pursuant to a public works contract, the Contractor or subcontractor offers and agrees to assign to the awarding body all rights, title, and interest in and to all causes of action it may have under Section 4 of the Clayton Act (15 U.S.C. Sec. 15) or under the Cartwright Act (Chapter 2 (commending with Section 16700) of Part 2 of Division 7 of the Business and Professions Code), arising from purchases of goods, which assignment shall be made and become effective at the time the awarding body tenders final payment to the Contractor, without further acknowledgment by the parties.

28.1.2 Section 4552 of the Government Code states:

In submitting a bid to a public purchasing body, the bidder offers and agrees that if the bid is accepted, it will assign to the purchasing body all rights, title, and interest in and to all causes of action it may have under Section 4 of the Clayton Act (15 U.S.C. Sec. 15) or under the Cartwright Act (Chapter 2 (commencing with Section 16700) of Part 2 of Division 7 of the Business and Professions Code), arising from purchases of goods, materials, or services by the bidder for sale to the purchasing body pursuant to the bid. Such assignment shall be made and become effective at the time the purchasing body tenders final payment to the bidder.

28.1.3 Section 4553 of the Government Code states:

If an awarding body or public purchasing body receives, either through judgment or settlement, a monetary recovery for a cause of action assigned under this chapter, the assignor shall be entitled to receive reimbursement for actual legal costs incurred and may, upon demand, recover from the public body any portion of the recovery, including treble damages, attributable to overcharges that were paid by the assignor but were not paid by the public body as part of the bid price, less the expenses incurred in obtaining that portion of the recovery.

28.1.4 Section 4554 of the Government Code states:

Upon demand in writing by the assignor, the assignee shall, within one year from such demand, reassign the cause of action assigned under this part if the assignor has been or may have been injured by the violation of law for which the cause of action arose and (a) the assignee has not been injured thereby, or (b) the assignee declines to file a court action for the cause of action.

28.1.5 Under this Article, "public purchasing body" is OWNER and "bidder" is Contractor.

28.2 Excise Taxes

If, under Federal Excise Tax Law, any transaction hereunder constitutes a sale on which a Federal Excise Tax is imposed and the sale is exempt from such Federal Excise Tax because it is a sale to a State or Local Government for its exclusive use, OWNER, upon request, will execute documents necessary to show (1) that OWNER is a political subdivision of the State for the purposes of such exemption, and (2) that the sale is for the exclusive use of OWNER. No Federal Excise Tax for such materials shall be included in any Contract Price.

28.3 Taxes

Contract Price is to include any and all applicable sales taxes or other taxes that may be due in accordance with section 7051 et seq. of the Revenue and Taxation Code, Regulation 1521 of the State Board of Equalization or any other tax code that may be applicable.

28.4 Shipments

All shipments must be F.O.B. destination to Site or sites, as indicated in the Contract Documents. There must be no charge for containers, packing, unpacking, drayage, or

insurance. The total Contract Price shall be all inclusive (including sales tax) and no additional costs of any type will be considered.

28.5 Compliance with Government Reporting Requirements

If this Contract is subject to federal or other governmental reporting requirements because of federal or other governmental financing in whole or in part for the Project of which it is part, or for any other reason, Contactor shall comply with those reporting requirements at the request of the OWNER at no additional cost.

END OF DOCUMENT

DOCUMENT 00 73 13

SPECIAL CONDITIONS

1. Contract Time

The work for construction of this project shall commence on the date stated in the VCOE's Notice to Proceed and shall be completed (final completion of construction including all punch list corrections) **within Six hundred and nine (609)** consecutive calendar days from and after the date stated in such notice.

2. Modernization Projects

2.1 Access. Access to the buildings and entry to buildings, classrooms, restrooms, mechanical rooms, electrical rooms, or other rooms, for construction purposes, must be coordinated with VCOE and onsite VCOE personnel before Work is to start. Unless agreed to otherwise in writing, only a custodian will be allowed to unlock and lock doors in existing building(s). The custodian will be available only while school is in session. If a custodian is required to arrive before 7:00 a.m. or leave after 3:30 p.m. to accommodate Contractor's Work, the overtime wages for the custodian will be paid by the Contractor, unless at the discretion of the VCOE, other arrangements are made in advance.

2.2 Keys. If applicable, upon request, the VCOE may at its own discretion, provide keys to the school site for the convenience of the Contractor. The Contractor agrees to pay all expenses to re-key the entire school site and all other affected VCOE buildings if the keys are lost or stolen, or if any unauthorized party obtains a copy of the key or access to the school.

2.3 Maintaining Services. The Contractor is advised that Work is to be performed in spaces regularly scheduled for instruction. Interruption and/or periods of shutdown of public access, electrical service, water service, lighting, or other utilities shall be only as arranged in advance with the VCOE. Contractor shall provide temporary services to all facilities interrupted by Contractor's Work.

2.4 Maintaining Utilities. The Contractor shall maintain in operation during duration of Contract, drainage lines, storm drains, sewers, water, gas, electrical, steam, and other utility service lines within working area.

2.5 Confidentiality. Contractor shall maintain the confidentiality of all information, documents, programs, procedures and all other items that Contractor encounters while performing the Work. This requirement shall be ongoing and shall survive the expiration or termination of this Contract and specifically includes, without limitation, all student, parent, and employee disciplinary information and health information.

2.6 Work during Instructional Time. By submitting its bid, Contractor affirms that Work may be performed during ongoing instruction in existing facilities. If so, Contractor agrees to cooperate to the best of its ability to minimize any disruption to

school operations and any use of school facilities by the public up to, and including, rescheduling specific work activities, at no additional cost to VCOE.

3. Badge Policy for Contractors

All Contractors doing work for the VCOE will provide their workers with identification badges. These badges will be worn by all members of the Contractor's staff who are working in a VCOE facility. Badges must be filled out in full and contain the following information: Name of Contractor, Name of Employee, Contractor's address and phone number. Badges are to be worn when the Contractor or his/her employees are on site and must be visible at all times. Contractors must inform their employees that they are required to allow VCOE employees, the Architect, the Construction Manager, the Program Manager, or the Project Inspector to review the information on the badges upon request. Continued failure to display identification badges as required by this policy may result in the individual being removed from the Project or assessment of fines against the Contractor

4. Substitution for Specified Items

4.1 Whenever in the Specifications any materials, process, or article is indicated or specified by grade, patent, or proprietary name, or by name of manufacturer, that Specification shall be deemed to be followed by the words "or equal." Contractor may, unless otherwise stated, offer any material, process, or article that shall be substantially equal or better in every respect to that so indicated or specified.

4.1.1 If the material, process, or article offered by Contractor is not, in the opinion of the VCOE, substantially equal or better in every respect to that specified, then Contractor shall furnish the material, process, or article specified in the Specifications without any additional compensation or change order.

4.1.2 This provision shall not be applicable with respect to any material, product, thing or service for which VCOE made findings and gave notice in accordance with Public Contract Code section 3400(c); therefore, Contractor shall not be entitled to request a substitution with respect to those materials, products or services.

4.2 A request for a substitution shall be submitted as follows:

4.2.1 Contractor shall notify the VCOE in writing of any request for a substitution at least ten (10) days prior to bid opening as indicated in the Instructions to Bidders.

4.2.2 Requests for Substitutions after award of the Contract shall be submitted within thirty-five (35) days of the date of the Notice of Award.

4.3 Within 35 days after the date of the Notice of Award, Contractor shall provide data substantiating a request for substitution of "an equal" item, including but not limited to the following:

4.3.1 All variations of the proposed substitute from the material specified including, but not limited to, principles of operation, materials, or construction finish, thickness or gauge of materials, dimensions, weight, and tolerances;

4.3.2 Available maintenance, repair or replacement services;

4.3.3 Increases or decreases in operating, maintenance, repair, replacement, and spare parts costs;

4.3.4 Whether or not acceptance of the substitute will require other changes in the Work (or in work performed by the VCOE or others under Contract with the VCOE); and

4.3.5 The time impact on any part of the Work resulting directly or indirectly from acceptance of the proposed substitute.

4.4 No substitutions shall be made until approved, in writing, by the VCOE. The burden of proof as to equality of any material, process, or article shall rest with Contractor. The Contractor warrants that if substitutes are approved:

4.4.1 The proposed substitute is equal or superior in all respects to that specified, and that such proposed substitute is suitable and fit for the intended purpose and will perform adequately the function and achieve the results called for by the general design and the Contract Documents;

4.4.2 The Contractor provides the same warranties and guarantees for the substitute that would be provided for that specified;

4.4.3 The Contractor shall be fully responsible for the installation of the substitute and any changes in the Work required, either directly or indirectly, because of the acceptance of such substitute, with no increase in Contract Price or Contract Time. Incidental changes or extra component parts required to accommodate the substitute will be made by the Contractor without a change in the Contract Price or Contract Time;

4.4.4 The Contractor shall be responsible for any re-design costs occasioned by VCOE's acceptance and/or approval of any substitute; and

4.4.5 The Contractor shall, in the event that a substitute is less costly than that specified, credit the VCOE with one hundred percent (100%) of the net difference between the substitute and the originally specified material. In this event, the Contractor agrees to execute a deductive Change Order to reflect that credit.

4.5 In the event Contractor furnishes a material, process, or article more expensive than that specified, the difference in the cost of that material, process, or article so furnished shall be borne by Contractor.

4.6 In no event shall the VCOE be liable for any increase in Contract Price or Contract Time due to any claimed delay in the evaluation of any proposed substitute or in the acceptance or rejection of any proposed substitute.

4.7 Contractor shall be responsible for any costs the VCOE incurs for professional services, DSA fees, or delay to the Project Schedule, if applicable, while DSA reviews changes for the convenience of Contractor and/or to accommodate Contractor's means and methods. VCOE may deduct those costs from any amounts owing to the Contractor for the review of the request for substitution, even if the request for substitution is not

approved. VCOE, at its sole discretion, shall deduct from the payments due to and/or invoice Contractor for all the professional services and/or DSA fees or delay to the Project Schedule, if applicable, while DSA reviews changes for the convenience of Contractor and/or to accommodate Contractor's means and methods arising herein.

5. Weather Days

Delays due to Adverse Weather conditions will only be permitted in compliance with the provisions in the General Conditions and only if the number of days of Adverse Weather exceeds the following parameters and Contractor can verify that the excess days of Adverse Weather caused delays:

January	**5 days**	July	**0 days**
February	**7 days**	August	**0 days**
March	**3 days**	September	**0 days**
April	**2 days**	October	
May	**2 days**	November	
June	**0 days**	December	

6. Insurance Policy Limits

All of Contractor's insurance shall be with insurance companies with an A.M. Best rating of no less than A: VII. For types of coverage and limits of insurance see General Conditions 00 72 13:

7. Permits, Certificates, Licenses, Fees, Approvals

7.1 Payment for Permits, Certificates, Licenses, Fees, and Approvals. As required in the General Conditions, the Contractor shall secure and pay for all permits, licenses, approvals, and certificates necessary for the prosecution of the Work with the exception of the following:

7.2 General Permit For Storm Water Discharges Associated With Construction and Land Disturbance Activities

7.2.1 Contractor acknowledges that all California school VCOEs are obligated to develop and implement the following requirements for the discharge of storm water to surface waters from its construction and land disturbance activities (storm water requirements):

7.2.1.1 Projects that disturb less than one acre of land and are not part of a larger common plan of development or sale, in accordance with Title 24, Chapter 5.106.1, shall prevent the pollution of stormwater runoff from the construction activities through one or more of the following measures:

7.2.1.1.1 Comply with lawfully enacted stormwater management and/or erosion control ordinance.

7.2.1.1.2 Prevent loss of soil through wind or water erosion by adhering to a Storm Water Pollution Prevention Plan ("SWPPP") implementing an effective combination of erosion and sediment control and good housekeeping best management practices ("BMPs").

7.2.1.1.2.1 Soil loss BMP's that must be considered for implementation as appropriate for each project include, but are not limited to, the following:

7.2.1.1.2.1.1 Scheduling construction activity during dry weather, when possible.

7.2.1.1.2.1.2 Preservation of natural features, vegetation, soil, and buffers around surface waters.

7.2.1.1.2.1.3 Drainage swales or lined ditches to control stormwater flow.

7.2.1.1.2.1.4 Mulching or hydroseeding to stabilize disturbed soils.

7.2.1.1.2.1.5 Erosion control to protect slopes.

7.2.1.1.2.1.6 Protection of storm drain inlets (gravel bags or catch basin inserts).

7.2.1.1.2.1.7 Perimeter sediment control (perimeter silt fence, fiber rolls).

7.2.1.1.2.1.8 Sediment trap or sediment basin to retain sediment on site.

7.2.1.1.2.1.9 Stabilized construction exits.

7.2.1.1.2.1.10 Wind erosion control.

7.2.1.1.2.1.11 Other soil loss BMP's acceptable to the enforcing agency.

7.2.1.1.2.2 Good housekeeping BMP's to manage construction equipment, materials, non-stormwater discharges, and wastes that must be considered for implementation as appropriate for each project include, but are not limited to, the following:

7.2.1.1.2.2.1 Dewatering activities.

7.2.1.1.2.2.2 Material handling and waste management.

7.2.1.1.2.2.3 Building materials stockpile management.

7.2.1.1.2.2.4 Management of washout areas (concrete, paints, stucco, etc.).

7.2.1.1.2.2.5 Control of vehicle/equipment fueling to contractor's staging area.

7.2.1.1.2.2.6 Vehicle and equipment cleaning performed off site.

7.2.1.1.2.2.7 Spill prevention and control.

7.2.1.1.2.2.8 Other housekeeping BMP's acceptable to the enforcing agency.

7.2.1.2 Projects that disturb one acre or more of land, or disturb less than one acre of land but are part of a larger common plan of development or sale shall comply with all lawfully enacted stormwater discharge regulations in accordance with Title 24, Chapter 5.106.2.

7.2.2 Contractor shall comply with any VCOE storm water requirements that are approved by the VCOE and applicable to the Project, at no additional cost to the VCOE.

7.2.3 At no additional cost to the VCOE, Contractor shall provide a Qualified Storm Water Practitioner who shall be onsite and implement and monitor any and all SWPPP requirements applicable to the Project, including but not limited to:

7.2.3.1 At least forty eight (48) hours prior to a forecasted rain event, implementing the Rain Event Action Plan (REAP) for any rain event requiring implementation of the REAP, including any erosion and sediment control measures needed to protect all exposed portions of the site; and

7.2.3.2 Monitoring any Numeric Action Levels (NALs), if applicable.

8. As-Builts and Record Drawings

8.1 Contractor shall submit As-Built Drawings pursuant to the Contract Documents consisting of one set of .pdf formatted files in color.

8.2 Contractor shall submit Record Drawings pursuant to the Contract Documents consisting of one set of.pdf formatted files in color.

9. Fingerprinting

Contractor shall comply with the provisions of Education Code section 45125.2 regarding the submission of employee fingerprints to the California Department of Justice and the completion of criminal background investigations of its employees, its subcontractor(s), and its subcontractors' employees. Contractor shall not permit any employee to have any contact with VCOE pupils until such time as Contractor has verified in writing to the governing board of the VCOE, that such employee has not been convicted of a violent or serious felony, as defined in Education Code section 45122.1. Contractor shall fully complete and perform all tasks required pursuant to the Criminal Background Investigation/ Fingerprinting Certification.

10.Federal Funds

As this Project is funded in whole or in part by federal funds, Contractor and all Subcontractors are subject to civil or criminal prosecution for any violation of the federal False Claims Act set forth under section 1001 of title 18 and section 231 of title 31 of the United States Code.

11.Preliminary Schedule of Values

The preliminary schedule of values shall include, at a minimum, the following information and the following structure:

Replace provision in the General Conditions with the following provisions:

16.1.1.2.3. The preliminary schedule of values shall not provide for values any greater than the following percentages of the Contract value:

16.1.2.3.1 Mobilization and layout combined to equal not more than **[1]**%;

16.1.1.2.3.2 Submittals, samples and shop drawings combined to equal not more than **[3]**%;

16.1.1.2.3.3 Bonds and insurance combined to equal not more than **[2]**%.

12.Contractor Staging Area and Worker Parking: To be determined

13.Special Instructions for Gateway Annex School Project

Disregard all references to the Deduct Alternate for Building C. There shall be no deduct alternate for this project. Include the full scope of work in your bid, including all requirements for the construction of Building C.

END OF DOCUMENT

DOCUMENT 00 73 56

HAZARDOUS MATERIALS PROCEDURES & REQUIREMENTS

1. Summary

This document includes information applicable to hazardous materials and hazardous waste abatement.

2. Notice of Hazardous Waste or Materials

a. Contractor shall give notice in writing to the VCOE, the Construction Manager, and the Architect promptly, before any of the following materials are disturbed, and in no event later than twenty-four (24) hours after first observance, of any:

(1) Material that Contractor believes may be a material that is hazardous waste or hazardous material, as defined in section 25117 of the Health and Safety Code, that is required to be removed to a Class I, Class II, or Class III disposal site in accordance with provisions of existing law;

(2) Other material that may present a substantial danger to persons or property exposed thereto in connection with Work at the site.

b. Contractor's written notice shall indicate whether the hazardous waste or material was shown or indicated in the Contract Documents to be within the scope of Work, and whether the materials were brought to the site by Contractor, its Subcontractors, suppliers, or anyone else for whom Contractor is responsible. As used in this section the term "hazardous materials" shall include, without limitation, asbestos, lead, Polychlorinated biphenyl (PCB), petroleum and related hydrocarbons, and radioactive material.

c. In response to Contractor's written notice, the VCOE shall investigate the identified conditions.

d. If the VCOE determines that conditions do not involve hazardous materials or that no change in terms of Contract is justified, the VCOE shall so notify Contractor in writing, stating reasons. If the VCOE and Contractor cannot agree on whether conditions justify an adjustment in Contract Price or Contract Time, or on the extent of any adjustment, Contractor shall proceed with the Work as directed by the VCOE.

e. If after receipt of notice from the VCOE, Contractor does not agree to resume Work based on a reasonable belief it is unsafe, or does not agree to resume Work under special conditions, then VCOE may order such portion of Work that is in connection with such hazardous condition or such affected area to be deleted from the Work, or performed by others, or VCOE may invoke its rights to terminate the Contract in whole or in part. VCOE will determine entitlement to or the amount or extent of an adjustment, if any, in Contract

Price or Contract Time as a result of deleting such portion of Work, or performing the Work by others.

f. If Contractor stops Work in connection with any hazardous condition and in any area affected thereby, Contractor shall immediately redeploy its workers, equipment, and materials, as necessary, to other portions of the Work to minimize delay and disruption.

3. Additional Warranties and Representations

a. Contractor represents and warrants that it, its employees, and its subcontractors and their employees, shall at all times have the required levels of familiarity with the Site and the Work, training, and ability to comply fully with all applicable laws and contractual requirements for safe and expeditious performance of the Work, including whatever training is or may be required regarding the activities to be performed (including, but not limited to, all training required to address adequately the actual or potential dangers of Contract performance).

b. Contractor represents and warrants that it, its employees, and its subcontractors and their employees, shall at all times have and maintain in good standing any and all certifications and licenses required by applicable federal, state, and other governmental and quasi-governmental requirements applicable to the Work.

c. Contractor represents and warrants that it has studied carefully all requirements of the Specifications regarding procedures for demolition, hazardous waste abatement, or safety practices, specified in the Contract, and prior to submitting its bid, has either (a) verified to its satisfaction that the specified procedures are adequate and sufficient to achieve the results intended by the Contract Documents, or (b) by way of approved "or equal" request or request for clarification and written Addenda, secured changes to the specified procedures sufficient to achieve the results intended by the Contract Documents. Contractor accepts the risk that any specified procedure will result in a completed Project in full compliance with the Contract Documents.

4. Monitoring and Testing

a. VCOE reserves the right, in its sole discretion, to conduct air monitoring, earth monitoring, Work monitoring, and any other tests (in addition to testing required under the agreement or applicable law), to monitor Contract requirements of safe and statutorily compliant work methods and (where applicable) safe re-entry level air standards under state and federal law upon completion of the job, and compliance of the work with periodic and final inspection by public and quasi-public entities having jurisdiction.

b. Contractor acknowledges that VCOE has the right to perform, or cause to be performed, various activities and tests including, but not limited to, pre-abatement, during abatement, and post-abatement air monitoring, that VCOE shall have no obligation to perform said activities and tests, and that a portion of said activities and tests may take place prior to the completion of the Work

by Contractor. In the event VCOE elects to perform these activities and tests, Contractor shall afford VCOE ample access to the Site and all areas of the Work as may be necessary for the performance of these activities and tests. Contractor will include the potential impact of these activities or tests by VCOE in the Contract Price and the Scheduled Completion Date.

c. Notwithstanding VCOE's rights granted by this paragraph, Contractor may retain its own industrial hygiene consultant at Contractor's own expense and may collect samples and may perform tests including, but not limited to, pre-abatement, during abatement, and post-abatement personal air monitoring, and VCOE reserves the right to request documentation of all such activities and tests performed by Contractor relating to the Work and Contractor shall immediately provide that documentation upon request.

5. Compliance with Laws

a. Contractor shall perform safe, expeditious, and orderly work in accordance with the best practices and the highest standards in the hazardous waste abatement, removal, and disposal industry, the applicable law, and the Contract Documents, including, but not limited to, all responsibilities relating to the preparation and return of waste shipment records, all requirements of the law, delivering of all requisite notices, and obtaining all necessary governmental and quasi-governmental approvals.

b. Contractor represents that it is familiar with and shall comply with all laws applicable to the Work or completed Work including, but not limited to, all federal, state, and local laws, statutes, standards, rules, regulations, and ordinances applicable to the Work relating to:

(1) The protection of the public health, welfare and environment;

(2) Storage, handling, or use of asbestos, PCB, lead, petroleum based products, radioactive material, or other hazardous materials;

(3) The generation, processing, treatment, storage, transport, disposal, destruction, or other management of asbestos, PCB, lead, petroleum, radioactive material, or hazardous waste materials or other waste materials of any kind; and

(4) The protection of environmentally sensitive areas such as wetlands and coastal areas.

6. Disposal

a. Contractor has the sole responsibility for determining current waste storage, handling, transportation, and disposal regulations for the job Site and for each waste disposal facility. Contractor must comply fully at its sole cost and expense with these regulations and any applicable law. VCOE may, but is not obligated to, require submittals with this information for it to review consistent with the Contract Documents.

b. Contractor shall develop and implement a system acceptable to VCOE to track hazardous waste from the Site to disposal, including appropriate "Hazardous Waste Manifests" on the EPA form, so that VCOE may track the volume of waste it put in each landfill and receive from each landfill a certificate of receipt.

c. Contractor shall provide VCOE with the name and address of each waste disposal facility prior to any disposal, and VCOE shall have the express right to reject any proposed disposal facility. Contractor shall not use any disposal facility to which VCOE has objected. Contractor shall document actual disposal or destruction of waste at a designated facility by completing a disposal certificate or certificate of destruction forwarding the original to the VCOE.

7. Permits

a. Before performing any of the Work, and at such other times as may be required by applicable law, Contractor shall deliver all requisite notices and obtain the approval of all governmental and quasi-governmental authorities having jurisdiction over the Work. Contractor shall submit evidence satisfactory to VCOE that it and any disposal facility:

(1) have obtained all required permits, approvals, and the like in a timely manner both prior to commencement of the Work and thereafter as and when required by applicable law; and

(2) are in compliance with all such permits, approvals and the regulations.

For example, before commencing any work in connection with the Work involving asbestos-containing materials, or PCBs, or other hazardous materials subject to regulation, Contractor agrees to provide the required notice of intent to renovate or demolish to the appropriate state or federal agency having jurisdiction, by certified mail, return receipt requested, or by some other method of transmittal for which a return receipt is obtained, and to send a copy of that notice to VCOE. Contractor shall not conduct any Work involving asbestos-containing materials or PCBs unless Contractor has first confirmed that the appropriate agency having jurisdiction is in receipt of the required notification. All permits, licenses, and bonds that are required by governmental or quasi-governmental authorities, and all fees, deposits, tap fees, offsite easements, and asbestos and PCB disposal facilities expenses necessary for the prosecution of the Work, shall be procured and paid for by Contractor. Contractor shall give all notices and comply with the all applicable laws bearing on the conduct of the Work as drawn and specified. If Contractor observes or reasonably should have observed that Plans and Specifications and other Contract Documents are at variance therewith, it shall be responsible for promptly notifying VCOE in writing of such fact. If Contractor performs any Work contrary to applicable laws, it shall bear all costs arising therefrom.

b. In the case of any permits or notices held in VCOE's name or of necessity to be made in VCOE's name, VCOE shall cooperate with Contractor in securing the permit or giving the notice, but the Contractor shall prepare for VCOE review and execution upon approval, all necessary applications, notices, and other materials.

8. Indemnification

To the fullest extent permitted by law, the indemnities and limitations of liability expressed throughout the Contract Documents apply with equal force and effect to any claims or liabilities imposed or existing by virtue of the removal, abatement, and disposal of hazardous waste. This includes, but is not limited to, liabilities connected to the selection and use of a waste disposal facility, a waste transporter, personal injury, property damage, loss of use of property, damage to the environment or natural resources, or "disposal" and "release" of materials associated with the Work (as defined in 42 U.S.C. § 960l *et seq*.).

9. Termination

VCOE shall have an absolute right to terminate for default immediately without notice and without an opportunity to cure should Contractor knowingly or recklessly commit a material breach of the terms of the Contract Documents, or any applicable law, on any matter involving the exposure of persons or property to hazardous waste. However, if the breach of contract exposing persons or property to hazardous waste is due solely to an ordinary, unintentional, and non-reckless failure to exercise reasonable care, then the procedures for termination for cause shall apply without modification.

END OF DOCUMENT

GATEWAY ANNEX SCHOOL
VENTURA COUNTY OFFICE OF EDUCATION
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SECTION 01 1000
SUMMARY

PART 1 GENERAL

1.1 PROJECT

A. Project Name: Gateway Annex School

B. Owner's Name: Ventura County Office of Education

C. Architect's Name: Perkins Eastman.

D. The Project consists of the construction of a new public school building including site demolition and site improvements.

1.2 CONTRACT DESCRIPTION

A. Contract Type: Single general construction contract based on a Stipulated Price

1.3 OWNER OCCUPANCY

A. Owner intends to continue to occupy adjacent existing buildings during the entire construction period.

B. Owner intends to occupy the Project upon Substantial Completion.

C. Cooperate with Owner to minimize conflict and to facilitate Owner's operations.

D. Schedule the Work to accommodate Owner occupancy.

1.4 CONTRACTOR USE OF SITE AND PREMISES

A. Construction Operations: Limited to areas shown on the plans and as designated by the Owner.

B. Arrange use of site and premises to allow:

1. Owner occupancy.
2. Work by other prime contractors.
3. Work by Owner.
4. Use of site and premises by the public.

C. Provide access to and from site as required by law and by Owner:

1. Emergency Building Exits During Construction: Keep all exits required by code open during construction period; provide temporary exit signs if exit routes are temporarily altered.
2. Do not obstruct roadways, sidewalks, or other public ways without permit.

D. Existing building spaces may not be used for storage.

E. Time Restrictions:

1. Comply with City Ordinances, noise limited to 55db between 7 AM and 7 PM per City Ordinance.

F. Utility Outages and Shutdown:

1. Limit disruption of utility services to hours the site is unoccupied.

2. Do not disrupt or shut down life safety systems, including but not limited to fire sprinklers and fire alarm system, without 7 days notice to Owner and authorities having jurisdiction.

3. Prevent accidental disruption of utility services to other facilities.

1.5 WORK SEQUENCE

A. Coordinate construction schedule and operations with Owner.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

SECTION 01 2300
ALTERNATES

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Description of Alternates.

B. Procedures for pricing Alternates.

C. Documentation of changes to Contract Sum and Contract Time.

1.2 RELATED REQUIREMENTS

A. Document 00 4323 - Alternates Form: List of Alternates as supplement to Bid Form.

1.3 ACCEPTANCE OF Alternates

A. Alternates quoted on Bid Forms will be reviewed and accepted or rejected at Owner's option. Accepted Alternates will be identified in the Owner-Contractor Agreement.

B. Coordinate related work and modify surrounding work to integrate the Work of each Alternate.

1.4 SCHEDULE OF Alternates

~~A. Deductive Alternate **No. 1 -** Building C:~~

~~1. Deductive Alternate Item: **Delete Building C from project scope. Refer to drawings for more information.**~~

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

SECTION 01 2500
PRODUCT SUBSTITUTION PROCEDURES

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. This Section includes administrative and procedural requirements for handling requests for substitutions submitted 60 days after the date established in the Notice of Award and pursuant to Article 6.14 of the General Conditions.

1.2 RELATED REQUIREMENTS

A. Section 01 3000: Administrative Requirements.

B. Section 01 6000: Product Requirements.

C. Section 01 7800: Closeout Submittals.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.1 SUBMITTALS

A. Transmit submittals as described in related Sections for each request for substitution.

1. Identify the product to be replaced in each request. **Changes to the approved drawings and specifications shall be made by an addendum or a construction changed document (CCD) approved by the Division of the State Architect, as required by Section 4-338, Part 1, Title 24, CCR.** Include related Specification Section and Drawing number.

2. Provide complete documentation denoting compliance with the requirements for substitutions, and the following information, as appropriate.

a. A detailed comparison of significant qualities of the proposed substitution with those specified in the Contract Documents. Significant qualities may include elements, such as performance, weight, size, durability, and visual effect.

b. Product Data, including Drawings, descriptions of products, fabrication, and installation procedures.

c. Samples, where applicable or requested.

d. CONTRACTOR certification the proposed substitution conforms to requirements of the Contract Documents in every respect and is appropriate for the applications indicated.

e. CONTRACTOR waiver of rights to an increase in the Contract Amount, Milestones and/or Contract Time that may subsequently become necessary because of the failure of the substitution to adequately perform.

3. If required, ARCHITECT will request additional information or documentation for evaluation. OWNER will notify CONTRACTOR of acceptance or rejection of the substitution.

4. ARCHITECT will review and consider request for substitution and provide a recommendation to OWNER

5. Where a proposed substitution involves and/or affects more than one Subcontractor, CONTRACTOR shall ensure each Subcontractor cooperates with the other Subcontractor involved to coordinate the Work, provide uniformity and consistency, and assure compatibility of all products.

6. CONTRACTOR submittal and ARCHITECT review of Shop Drawings, Product Data, material lists or Samples do not constitute an acceptable or valid request for substitution.

END OF SECTION

SECTION 01 3000
ADMINISTRATIVE REQUIREMENTS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Preconstruction meeting.

B. Progress meetings.

C. Construction progress schedule.

D. Contractor's daily reports.

E. Coordination drawings.

F. Submittals for review, information, and project closeout.

G. Number of copies of submittals.

H. Requests for Interpretation (RFI) procedures.

I. Submittal procedures.

1.2 RELATED REQUIREMENTS

A. Section 01 3216 - Construction Progress Schedule.

B. Section 01 6000 - Product Requirements.

C. Section 01 7000 - Execution and Closeout Requirements.

D. Section 01 7800 - Closeout Submittals.

1.3 PROJECT COORDINATOR

A. Project Coordinator: Owner's Representative..

B. Cooperate with the Project Coordinator in allocation of mobilization areas of site; for field sheds, for Owner access, traffic, and parking facilities.

C. During construction, coordinate use of site and facilities through the Project Coordinator.

D. Comply with Project Coordinator's procedures for intra-project communications; submittals, reports and records, schedules, coordination drawings, and recommendations; and resolution of ambiguities and conflicts.

E. Comply with instructions of the Project Coordinator for use of temporary utilities and construction facilities

F. Coordinate field engineering and layout work under instructions of the Project Coordinator.

G. Make the following types of submittals to Architect:

1. Requests for information.

2. Requests for substitution.

3. Shop drawings, product data, and samples.

4. Closeout submittals.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.1 PRECONSTRUCTION MEETING

A. Owner will schedule a meeting after Notice of Award.

3.2 PROGRESS MEETINGS

A. Schedule and administer meetings throughout progress of the Work at biweekly intervals.

B. Make arrangements for meetings, prepare agenda with copies for participants, preside at meetings.

C. Attendance Required: Job superintendent, Owner, Architect, Project Inspector, and subcontractors as appropriate to agenda topics for each meeting.

D. Agenda:

1. Review minutes of previous meetings.
2. Review of Work progress and three week look-ahead.
3. Field observations, issues, and decisions.
4. Identification of issues that impede, or will impede, planned progress including open RFIs.
5. Review of submittals schedule and status of submittals.
6. Maintenance of progress schedule.
7. Corrective measures to regain projected schedules.
8. Planned progress during succeeding work period.
9. Maintenance of quality and work standards.
10. Effect of proposed changes on progress schedule and coordination.
11. Other business relating to work.

E. Record minutes and distribute copies within 48 hours after meeting to participants, with copies to Architect, Owner, participants, and those affected by decisions made.

3.3 DAILY CONSTRUCTION REPORTS

A. Prepare a daily construction report recording the following information concerning events at Project site and project progress:

1. Date.
2. High and low temperatures, and general weather conditions.
3. List of subcontractors at Project site.
4. List of separate contractors at Project site.
5. Approximate count of personnel at Project site.
6. Material deliveries.

7. Safety, environmental, or industrial relations incidents.

8. Meetings and significant decisions.

9. Testing and/or inspections performed.

10. Signature of Contractor's authorized representative.

3.4 REQUESTS FOR INTERPRETATION (RFI)

A. Definition: A request seeking one of the following:

1. An interpretation, amplification, or clarification of some requirement of Contract Documents arising from inability to determine from them the exact material, process, or system to be installed; or when the elements of construction are required to occupy the same space (interference); or when an item of work is described differently at more than one place in Contract Documents.

2. A resolution to an issue which has arisen due to field conditions and affects design intent.

B. Preparation: Prepare an RFI immediately upon discovery of a need for interpretation of Contract Documents. Failure to submit a RFI in a timely manner is not a legitimate cause for claiming additional costs or delays in execution of the work.

1. Prepare a separate RFI for each specific item.

3.5 CHANGES TO THE WORK

A. Change Orders

1. No work beyond the contract scope is to proceed without a written change directive.

2. Changes that affect structural, fire life safety or accessibility must be approved by the Division of the State Architect using Form 140A.

B. Changes that do not involve time or cost shall be issued by the Architect as Architect's Supplemental Instructions (ASI).

C. Proposal Requests: The Owner may issue a proposal request for work required and not included in the contract documents or additional work. Contractor to respond to the Owner's request in 10 working days.

D. Change Order Request: The Contractor may issue a change order request for work that must be performed to complete the intent of the project but is not included in the Contract Documents.

3.6 SUBMITTALS FOR REVIEW

A. When the following are specified in individual sections, submit them for review:

1. Product data.

2. Shop drawings.

3. Samples for selection.

B. Submit to Architect for review for the limited purpose of checking for compliance with information given and the design concept expressed in Contract Documents.

C. Samples will be reviewed for aesthetic, color, or finish selection.

D.

3.7 SUBMITTALS FOR INFORMATION

A. When the following are specified in individual sections, submit them for information:

1. Design data.
2. Certificates upon completion of installation.
3. Test reports.
4. Inspection reports.
5. Manufacturer's instructions.
6. Manufacturer's field reports.
7. Other types indicated.

3.8 SUBMITTALS FOR PROJECT CLOSEOUT

A. Submit Final Correction Punch List for Substantial Completion.

B. When the following are specified in individual sections, submit them at project closeout

1. Project record documents with field marked as-built drawings.
2. Operation and maintenance data.
3. Warranties.
4. Bonds.
5. Training Sessions and Training Manuals.
6. Other types as indicated.

C. Submit for Owner's benefit during and after project completion.

3.9 SUBMITTAL PROCEDURES

A. Submit in electronic format and deliver electronically.

B. Shop Drawing Procedures:

1. Prepare accurate, drawn-to-scale, original shop drawing documentation by interpreting the Contract Documents and coordinating related Work.
2. Generic, non-project specific information submitted as shop drawings do not meet the requirements for shop drawings.

C. Transmit each submittal with a copy of approved submittal form.

D. Submit complete list of submittals no later than 10 days after notice to proceed.

E. Submittals must be submitted and review completed and accepted prior to the start of work.

F. Submittals are to be complete for all items in each specification section. Partial submittals may not be reviewed.

G. Sequentially number the transmittalls. Revise submittals with original number and a sequential alphabetic suffix.

H. Identify Project, Contractor, Subcontractor or supplier; pertinent drawing and detail number, and specification section number, as appropriate on each copy.

I. Apply Contractor's stamp, signed or initialed certifying that review, approval, verification of Products required, field dimensions, adjacent construction work, and coordination of information is in accordance with the requirements of the Work and Contract Documents and date of review.

J. Deliver submittals to Architect via email or Contractor's website or other moethod specified by the Owner. Provide email notification when submittals are loaded to a website.

K. Schedule submittals to expedite the Project, and coordinate submission of related items.

L. For each submittal for review, allow 15 business days.

M. Identify variations from Contract Documents and Product or system limitations that may be detrimental to successful performance of the completed work. Describe proposed substitutions or equals on the submittal cover. Accepting a submittal that does not identify deviations from the contract does not constitute acceptance of the deviations.

N. Provide space for Contractor and Architect review stamps.

O. When revised for resubmission, identify lchanges made since previous submission.

P. Distribute reviewed submittals as appropriate. Instruct parties to promptly report any inability to comply with requirements.

Q. Submittals not requested will not be recognized or processed.

END OF SECTION

SECTION 01 3113
PROJECT COORDINATION

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. This Section specifies administrative and procedural requirements necessary for coordinating Work operations including, but not limited to, the following:

1. General coordination procedures.

2. Coordination drawings.

1.2 RELATED SECTIONS

A. Section 01 3216: Construction Progress Schedule.

B. Section 01 4523: Testing and Inspection.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.1 COORDINATION

A. It is the CONTRACTOR'S responsibility to coordinate the Work so as to minimize conflicts and optimize efficiency.

B. The school on the site shall be fully occupied throughout the construction period.

C. The placement of pipes, conduits, other materials, and the locations, size and reinforcement of holes in the building structure shall conform to the Drawing and Specifications. When the requirements of the Mechanical, Electrical or other sections of the Specifications or Drawings are in conflict with the structural requirements, the structural requirements shall take precedence. Where the safety of the building structure is threatened, due to mechanical, electrical, or other construction; holes required for such construction shall be made as directed by the ARCHITECT at no additional cost to the District.

D. Verify that utility, and other building system requirement characteristics of operating equipment are compatible with existing utilities, and other existing building systems. Coordinate work of various Sections having interdependent responsibilities for installing, connecting to, and placing in service, such equipment.

E. CONTRACTOR shall coordinate operations included in various sections of Contract Documents to assure efficient and orderly installation of each part of Work. Coordinate Work operations included under related sections of Contract Documents that depend on each other for proper installation, connection, and operation of Work, including but not limited to:

1. Schedule construction operations in sequence required where installation of one part of Work depends on installation of other components, before or after its own installation.

2. Coordinate installation of different components to assure maximum accessibility for required maintenance, service, and repair.

3. Provide provisions to accommodate items scheduled for later installation.

4. Prepare and administer provisions for coordination drawings.

F. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities to avoid conflicts and assure orderly progress of Work. Such administrative activities include, but are not limited to, the following:

1. Preparation of schedules.
2. Installation, relocation, and removal of temporary facilities.
3. Delivery and processing of submittals.
4. Progress meetings.
5. Project closeout activities.

G. Conservation: Coordinate Work operations to assure operations are carried out with consideration given to conservation of energy, water, materials, and:

3.2 SUBMITTALS

A. Coordination Drawings: CONTRACTOR shall prepare coordination drawings to coordinate the installation of products and materials fabricated, furnished and installed by separate entities, under different parts of the Contract. CONTRACTOR shall notify DISTRICT REPRESENTATIVE and ARCHITECT of all major conflicts in writing in a timely manner so that the design team can respond without construction delays. Coordination drawings shall address the following at a minimum:

1. Limitations in available space for installation or service. CONTRACTOR shall overlay plans of each trade and verify space requirements and conflicts between trades. Minor changes and adjustments that do not affect design intent shall be made by CONTRACTOR and shall be highlighted for ARCHITECT'S review.
2. Incompatibility between items provided under different trades (such as difference in voltage between equipment specified under Divisions 22 and 23 and electrical power provided under Division 26.)
3. Inconsistencies between drawings, specifications and codes (between trades and within each trade).
4. Additional items required for existing facilities construction projects shall be designed and prepared from available as-built drawings that are verified through non-invasive and non-destructive, visual observation only. CONTRACTOR shall field verify actual existing conditions during and upon completion of demolition work and incorporate findings into preparation of coordination drawings. Minor changes and adjustments that do not affect design intent shall be made by Contractor and shall be highlighted for DISTRICT REPRESENTATIVE and ARCHITECT'S reviews.

B. Prepare coordination drawings in BIM modeling software with each trade on a separate layer, in specified color and scale. CONTRACTOR and each Subcontractor shall integrated BIM models.

1. Underground piping systems and underground electrical items shall be modeled and dimensioned as follows:
    a. Identify pipe size, material and quantity.
    b. Identify depth and location within plus or minus 12 inches from a visible landmark.
    c. Identify locations of boxes, cleanouts, valves, covers by name and material.
    d. Identify any items below grade that aren't covered by the above.
2. CONTRACTOR will be responsible for the overall coordination review.
3. Submit BIM model in Navisworks format.

END OF SECTION

SECTION 01 3114
ADDITIONAL REQUIREMENTS FOR DSA REVIEWED PROJECTS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Additional requirements for projects reviewed by the Division of the State Architect (DSA).

B. DSA Deferred Approvals.

C. DSA Incremental Submittals.

D. DSA Forms:

1. DSA-6 – Verified Report.

2. DSA-103 – Statement of Structural Tests and Inspections.

1.2 RELATED SECTIONS

A. Section 01 4000 – Quality Requirements: Testing and Inspection.

B. Section 01 7000 – Execution and Closeout Requirements: Project closeout requirements.

1.3 REFERENCES

A. The publications listed below form a part of this Section to the extent referenced. The publications are referred to in the text by the basic designation only. Refer to Section 01 42 00 for definitions, acronyms, and abbreviations.

B. Unless otherwise noted, standards, manuals, and codes refer to the latest edition of such standards, manuals, and codes as of the date of issue of this Project Manual.

C. California Code of Regulations (CCR).

1. Title 8, Division 1, Chapter 3.2 – California Occupational Safety and Health Regulations (Cal/OSHA).

2. Title 8, Division 1, Chapter 4, Sub-Chapter 4 – Construction Safety Orders.

3. Title 8, Division 1, Chapter 4, Sub-Chapter 7 – General Industrial Safety Orders.

4. Title 19, Division 1 –State Fire Marshal (SFM).

5. California Administrative Code, California Code of Regulations, Title 24, Part 1: Refer to Chapter 4, Group 1, Safety of Construction of Public Schools.

D. Division of the State Architect Interpretation of Regulations Manual (DSA IR)

1. DSA IR A-6 – Change Order and Field Change Approval Processes.

2. DSA IR A-7 – Project Inspector Certification and Approval.

3. DSA IR A-8 – Project Inspector and Assistant Inspector Duties and Performance.

4. DSA IR A-11 – Incremental Submittals.

5. DSA IR A-12 – Assistant Inspector Approval.

E. Division of the State Architect Website: www.dsa.dgs.ca.gov <http://www.dsa.dgs.ca.gov>

1.4 GENERAL REQUIREMENTS

A. Contractor's Duties:

1. Comply with California Administrative Code, Chapter 4, Article 6, Paragraph 4-343, "Duties of the Contractor" in addition to the duties described in the Contract Documents.

2. Comply with CCR Title 8, Division 1, Chapter 3.2, California Occupational Safety and Health Regulations (Cal/OSHA).

3. Comply with CCR Title 8, Division 1, Chapter 4, Sub-Chapter 4, Construction Safety Orders.

4. Comply with requirements of CCR Title 19, Division 1, State Fire Marshal (SFM). Comply with requirements of California Administrative Code, Chapter 4, Article 6, Paragraph 4-341, "Duties of the Architect, Structural Engineer or Professional Engineer" and Paragraph 4-344, "Duties of Mechanical and Electrical Engineers," in addition to the duties described in the Contract Documents.

B. Architect of Record's (AOR) and AOR's Consultants' Duties: Comply with requirements of California Administrative Code, Chapter 4, Article 6, Paragraph 4-341, "Duties of the Architect, Structural Engineer or Professional Engineer" and Paragraph 4-344, "Duties of Mechanical and Electrical Engineers," in addition to the duties described in the Contract Documents.

C. Arbitration: DSA is not subject to arbitration proceedings.

D. The intent of Drawings and Specifications is to comply with Title 24, CCR at a minimum, for alteration, rehabilitation, or reconstruction work. Should any deterioration or non-complying existing conditions, not part of the Work covered by the Contract Documents, be discovered and cause non-compliance with Title 24, CCR requirements, a Change Order (CO) shall be submitted to DSA for approval, prior to proceeding with remedial work and after receiving Owner's written approval for change.

1.5 REGULATORY REQUIREMENTS

A. Perform all work in accordance with applicable laws, codes, ordinances, rules, and regulations including, without limitation, Parts 1 through 5, Part 9, and Part 12, Title 24, CCR. Maintain a copy of these documents at the project site at all times. Codes adopted by the City, County, State, and Federal agencies govern minimum project requirements. Comply with the latest edition of applicable regulatory requirements and standards unless otherwise indicated or specified.

B. Work as described in Drawings and Specifications shall not be construed as to permit work not in accordance with applicable laws, codes, ordinances, rules, and regulations.

1.6 DSA DEFERRED APPROVALS

A. Portions of the Work may be DSA Deferred Approval in accordance with California Administrative Code, Chapter 4, Article 3, Paragraph 4-317(g), "Deferred Approvals." Cost of preparing and submitting documentation per DSA Deferred Approval requirements including required modifications to Drawings and Specifications, whether or not indicated in the Contract Documents, shall be borne by Contractor. DSA preferences for not accepting items through the Deferred Approval process shall be honored.

B. Do not begin fabrication and installation of deferred approval items without first obtaining DSA approval of Drawings and Specifications.

C. Schedule of Work Subject to DSA Deferred Approval:

1. Elevators.

2. Window wall systems exceeding 10 feet in span.

1.7 DSA INCREMENTAL SUBMITTALS

A. Prepare and submit Incremental Submittals under provisions of DSA IR A-11.

1.8 INSPECTION AND SUPERVISION

A. Supervision by DSA shall be in accordance with California Administrative Code, Chapter 4, Article 5, Paragraph 4-334.

B. Owner will select and pay for the services of a Project Inspector, certified and approved by DSA in accordance with DSA IR A-7.

1. When required, Owner will select and pay for the services of additional full-time Assistant Project Inspector(s) certified and approved by DSA in accordance with DSA IR A-12.

C. Project Inspector shall inspect construction in accordance with California Administrative Code, Chapter 4, Article 5, Paragraph 4-333(b), "Inspection by Project Inspector," and Article 6, Paragraph 4-342, "Duties of the Project Inspector" ; and DSA IR A-8.

1. Project Inspector performance rating by DSA shall be in accordance with DSA IR A-8, Section 2, "DSA's Rating of the Inspector's Performance."

D. Reports: Project Inspector shall submit the following in accordance with DSA IR A-7.

1. Notice of Start of Construction: Notify DSA of start of construction in accordance with California Administrative Code, Chapter 4, Article 5, Paragraph 4-331.

2. Semi-Monthly Reports: Comply with California Administrative Code, Chapter 4, Article 5, Paragraph 4-337.

3. Verified Reports: Comply with California Administrative Code, Chapter 4, Article 5, Paragraph 4-336.

E. Special Inspection Requirements:

1. Comply with California Administrative Code, Chapter 4, Article 5, Paragraph 4-333(c), "Special Inspection."

2. Special inspection costs to be paid by Owner.

3. Conduct special inspection in accordance with DSA-103, Statement of Structural Tests and Inspections.

1.9 TESTING AGENCY REQUIREMENTS

A. Comply with California Administrative Code, Chapter 4, Article 5, Paragraph 4-335, "Tests."

B. Owner will select the Testing Agency, acceptable to DSA, with the advice of Architect and Structural Engineer.

C. Sampling and testing shall be performed by properly qualified persons in accordance with applicable American Society for Testing and Materials (ASTM) standards.

D. Conduct tests in accordance with DSA-103, Statement of Structural Tests and Inspections.

E. Submit one copy of test reports to DSA.

1.10 SUBSTITUTIONS AND REQUESTS FOR INFORMATION

A. Substitutions and Requests for Information (RFIs) that affect structural safety, fire and life safety, access compliance or energy (as applicable) shall be submitted to DSA for review and approval prior to fabrication and installation on the project.

1.11 ADDENDA AND CHANGE ORDERS

A. Comply with California Administrative Code, Chapter 4, Article 5, Paragraph 4-338, "Addenda and Change Orders."

B. Comply with DSA IR A-6.

C. Obtain DSA approval for changes to Code-regulated construction and inspection/testing functions prior to start of that Work. Code-regulated construction refers to Work that is regulated by Code provisions applicable to public school construction, including those adopted by Division of the State Architect-Structural Safety Section (DSA/SS), Division of the State Architect-Access Compliance Section (DSA/AC), and Division of the State Architect-Fire and Life Safety Section (DSA/FLS).

D. Changes can be approved by DSA through Construction Change Document (CCD) Approval Process or Change Order (CO) Process, as applicable. Comply with DSA IR A-6, Article 3, Section 3.1, "Construction Change Document (CCD) Approval Process," and DSA IR A-6, Article 3, Section 3.2, "Change Order (CO) Approval Process."

E. Do not begin any work under addendum or change order until required DSA written approval is obtained.

1.12 CLOSE OUT REQUIREMENTS

A. Comply with Close out requirements in order for Project to be Close Out with Certification.

PART 2 PRODUCTS

2.1 Not Used

PART 3 EXECUTION

3.1 Not Used

END OF SECTION

SECTION 01 3123
WEB-BASED PROJECT MANAGEMENT PLATFORM (PROCORE)

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Requirements for the Contractor to establish, administer, maintain, and pay for a Procore project site that serves as the centralized hub for Project communication, construction documentation, and payment documentation.

B. District administrator-level control of the Platform, and access to the Platform by the Architect/Engineers of Record and other users designated by the District.

C. Platform availability, support, training, data ownership, record retention, and transition requirements.

D. The Platform is a project management tool and does not replace the Contract Documents. If the Platform and the Contract Documents conflict, the Contract Documents govern.

E. Nothing in this Section changes any approval, review, or reporting requirement of the Division of the State Architect (DSA) under Section 01 3114 or Title 24, CCR. Items requiring DSA approval shall be processed as those provisions require; the Platform shall be used to record and transmit them.

1.2 RELATED REQUIREMENTS

A. General Conditions and Supplementary Conditions: Application for Payment, Schedule of Values, change order, notice, and claim procedures

B. Section 01 3000 - Administrative Requirements: Progress meetings, daily construction reports, Requests for Interpretation (RFI), changes to the Work, and submittal procedures.

C. Section 01 3113 - Project Coordination: Coordination drawings and BIM models.

D. Section 01 3114 - Additional Requirements for DSA Reviewed Projects: DSA approvals, Construction Change Documents, Change Orders, deferred approvals, incremental submittals, and DSA forms.

E. Section 01 3216 - Construction Progress Schedule: Schedules, schedule updates, and three-week look-ahead.

F. Section 01 3300 - Submittal Procedures: Submittal Schedule, electronic submittal format, review sequence, review times, and action stamps.

G. Section 01 4000 - Quality Requirements and Section 01 4523 - Testing and Inspection: Test and inspection reports.

H. Section 01 5000 - Temporary Facilities and Controls: Field office telephone and internet service.

I. Section 01 7000 - Execution and Closeout Requirements and Section 01 7800 - Closeout Submittals: Closeout procedures, Project Record Documents, operation and maintenance data, warranties, and bonds.

J. Section 01 9113 - General Commissioning Requirements: Commissioning documentation.

1.3 DEFINITIONS

A. District (Owner): Ventura County Office of Education, including its Owner’s Representative (Project Coordinator under Section 01 3000) and the consultants it designates. The Contract Documents use the terms "District" and "Owner" interchangeably.

B. A/E Team: Perkins Eastman, Architect of Record, and the engineering consultants of record identified on the DSA Signature Sheet (together, the "Architect/Engineers of Record" as that term is used in Section 01 3300).

C. Contractor: The General Contractor, including its project management and field staff, and its Subcontractors and suppliers of every tier.

D. Other District Users: The Project Inspector and assistant inspectors (Section 01 3114), the Testing Agency (Section 01 4523), the Commissioning Authority (Section 01 9113), and other persons the District designates.

E. Platform: The web-based and mobile construction management software of Procore Technologies, Inc., configured for this Project.

F. Project Data: All information, documents, records, photographs, messages, and data entered into or generated by the Platform for this Project.

1.4 PLATFORM REQUIREMENTS

A. Use Procore. Other or supplemental platforms are not permitted unless the District approves them in writing.

B. Set up the Project site within Five [5] calendar days after the Notice to Proceed and before the first submittal, RFI, or Application for Payment. Be prepared to review the Platform set-up at the preconstruction meeting (Section 01 3000, Article 3.1) and to demonstrate it at the first progress meeting (Section 01 3000, Article 3.2).

C. The Platform is the official method of transmitting and recording the items in Article 1.6. Section 01 3000, Paragraph 3.9.J permits delivery of submittals through a website "or other method specified by the Owner"; this Section is that specified method. Where Sections 01 3000 and 01 3300 refer to delivery by email, deliver through the Platform instead. Platform notifications satisfy the email notification requirement of Section 01 3000, Paragraph 3.9.J.

D. Email, paper, or other methods may supplement the Platform but do not replace it unless the District directs otherwise in writing. Items sent outside the Platform are not considered received for purposes of Contract Time, review periods, or notices until entered in the Platform, except formal notices that the General Conditions require to be delivered by other means.

E. Time for review of a submittal begins when the Platform records its release to the reviewer. Where Section 01 3300 requires review and an approval stamp by the Architect/Engineers of Record before the submittal goes to the District, time for the District’s review begins when the Architect releases the submittal to the District in the Platform.

1.5 COST AND LICENSING

A. The Contractor shall pay all Platform costs, including licensing, project set-up, configuration, storage, user seats, integrations, training, technical support, and upgrades or add-on modules needed to meet this Section, for the full term in Paragraph 1.10.C.

B. No Platform cost shall be charged to the District, the A/E Team, or Other District Users, whether directly or through a Change Order, allowance, general conditions line item, Schedule of Values line item, or any other means. These costs are included in the Contract Sum.

C. The Contractor shall not require the District, the A/E Team, or Other District Users to accept click-through license agreements, pay per-user fees, or execute separate agreements with Procore or any third party to gain access.

D. No fee for electronic payment processing, invoicing, or document transmission through the Platform shall be passed to the District. Subcontractor participation in any optional payment-processing feature is between the Contractor and the Subcontractor and shall not affect the District’s payment obligations or the payment procedures in the General Conditions.

1.6 SCOPE OF USE

Activate, configure, and use the corresponding Procore tools for at least the following.

A. Communication and Coordination

1. Project Directory of all Project companies and users, with roles and contact information. Show the DSA Application Number (A# 03-122398) and File Number (56-44) in the Project information.

2. Correspondence and transmittals.
3. Agendas and minutes for preconstruction, progress (biweekly, per Section 01 3000, Article 3.2), coordination, and safety meetings, with action items tracked to closure. Post minutes within 48 hours after each meeting, as Section 01 3000, Paragraph 3.2.E requires.
4. Action items and task assignments.

B. Contract Documents and Construction Documentation

1. Drawings and Specifications: the DSA-approved set, Addenda, Architect's Supplemental Instructions, Construction Change Documents, and DSA-approved Change Orders, with version control and revision history. Superseded documents shall be retained and clearly marked. Do not issue for construction any change that requires DSA approval until that approval is posted.
2. RFIs under Section 01 3000, Article 3.4, including RFIs that Section 01 3114, Article 1.10 requires to be submitted to DSA. Record the DSA response in the RFI.
3. Submittals under Section 01 3300, including the Submittal Schedule (Paragraph 1.5), the submittal register, transmittal information (Paragraph 1.6.E), and the Contractor, Architect/Engineers of Record, and District action stamps and responses.
4. Daily construction reports under Section 01 3000, Article 3.3.
5. Progress photographs, taken at least [weekly] and at key events, organized by date and location. Include photographs of existing conditions before demolition and site work begin.
6. Schedules under Section 01 3216: preliminary and complete construction schedules, updates, and the three-week look-ahead. Provide the schedule in native file format when the District requests it.
7. Field observations, deficiency lists, the Contractor's Correction Punch List, and the Final Correction Punch List (Section 01 7000, Article 3.12).
8. Test reports and inspection reports under Sections 01 4000 and 01 4523, including DSA Form 103 documentation, and reports of the Project Inspector and Testing Agency as the District permits them to be posted.
9. DSA documentation: deferred approval submittals (Section 01 3114, Article 1.6), incremental submittals (Article 1.7), DSA Form 6-C and other DSA forms (Section 01 7000, Paragraph 3.12.A; Section 01 7800, Paragraph 1.3.C).
10. Commissioning documentation under Section 01 9113: startup plans and reports, Prefunctional Checklists, Functional Test records, and deficiency tracking, as the Commissioning Authority directs. Where Section 01 9113 requires direct submission to the Commissioning Authority, post a copy in the Platform.
11. Safety documentation, incident reports, toolbox talks, Storm Water Pollution Prevention Plan records (Section 01 5723), the Site Protection Plan (Section 01 5719), and Waste Disposal Reports (Section 01 7419).
12. Insurance certificates, bonds, permits, and licenses.
13. Proposal Requests, Change Order Requests, Change Events, and Change Orders under Section 01 3000, Article 3.5 and Section 01 3114, Article 1.11.
14. Coordination drawings and BIM models under Section 01 3113. Post review sets in the Platform. Where a Navisworks model is too large for the Platform, transmit it by a District-approved file transfer method and log the transmittal in the Platform.
15. Closeout documents: Project Record Documents, operation and maintenance data, warranties and bonds, training records, and attic stock inventories under Sections 01 3300, 01 7000, and 01 7800.

C. Payment Documentation

1. Schedule of Values and budget, coordinated with the Submittal Schedule as Section 01 3300, Paragraph 1.5.A.1 requires.

2. Applications for Payment under the General Conditions [Article _19__], on AIA Document G702/G703 or the form the General Conditions require, with continuation sheets and the updated schedule required by Section 01 3216, Paragraph 1.4.E.
3. Subcontractor and supplier payment applications and backup.
4. Conditional and unconditional waivers and releases for the Contractor, Subcontractors, and suppliers, in the form the General Conditions require.
5. Certified payroll records and prevailing wage documentation, if required by Labor Code Section 1776 or the District's labor compliance program. This Section does not change the manner in which certified payroll is submitted to the Department of Industrial Relations.
6. Stored materials documentation, including invoices, insurance, and storage location verification.
7. Change Order log and approved Change Orders, with their effect on the Contract Sum and Contract Time.
8. Retention tracking and release documentation.
9. Payment history and status.

D. Workflows: Configure review and approval workflows to follow the sequence the Contract Documents require, which is Contractor, then Architect/Engineers of Record, then District (Section 01 3300, Articles 3.1 and 3.2). Where a wet-ink or notarized signature is required (for example Change Orders, waivers and releases, bonds, certificates under Section 01 3300, Paragraph 2.1.A.4, and warranties under Section 01 7800, Paragraph 3.6.B), scan and upload the signed document and deliver the original as the Contract Documents require.

E. Items that cannot be transmitted electronically, including physical Samples, shall be logged in the Platform when delivered.

1.7 DISTRICT CONTROL AND ACCESS

A. Administrative Control. The District shall have administrator-level access, or the highest level of access Procore provides a project owner, which allows the District to:
1. View all Project information, tools, and documents, except only the Contractor-internal information described in Paragraph 1.7.F.
2. Add, remove, and manage District-side users and their permission levels.
3. Review and approve or reject items assigned to the District, including Applications for Payment, Change Orders, and submittals.
4. Export or download any Project Data at any time.
5. Review the audit trail and change history of documents and records.
6. Approve permission templates and workflow routing for tools that affect District rights or obligations.

B. A/E Team Access. Provide the Architect and its consultants user access with permissions sufficient to perform their contractual duties, including full access to Drawings, Specifications, RFIs, submittals, meetings, daily reports, photographs, observations, punch lists, Change Orders, and Applications for Payment.

C. Other District Users. Provide the Project Inspector, Testing Agency, Commissioning Authority, and other persons the District designates with access at the permission levels the District directs.

D. Number of Users. Provide an unlimited number of District, A/E Team, and Other District User accounts, and no fewer than [10] named users for each of the District and the A/E Team, at no charge.

E. Permissions. Do not reduce, restrict, or remove District, A/E Team, or Other District User permissions without the District's written consent. Platform configuration changes, project transfers, and company-level administrative actions shall not lower the District's access level.

F. Contractor-Internal Information. The Contractor may withhold from District and A/E Team access only information that is private and unrelated to the Project, such as internal overhead, estimating margins, and payroll for personnel not assigned to the Project. Subcontract values, the Schedule of Values, and all information supporting payment requests shall be visible to the District and the Architect.

G. Additions and Changes. The District may request additional accounts or permission changes at any time. Implement them within [2] business days.

1.8 AVAILABILITY AND SUPPORT

A. Access at All Times. Keep the Platform accessible to the District, the A/E Team, and Other District Users 24 hours a day, 7 days a week, from the effective date of set-up through the end of the retention period in Paragraph 1.10.C, excluding scheduled maintenance and outages beyond the Contractor's reasonable control.

B. Account in Good Standing. Keep the Contractor's Procore account, subscription, and licenses in good standing. Do not suspend, downgrade, archive, deactivate, or transfer the Project site without the District's prior written consent. This applies during any dispute between the Contractor and the District, including payment disputes, claims, and termination.

C. Outages. If the Platform is unavailable for more than [4] hours during a business day, notify the District and Architect and provide an alternative means of exchanging documents. Review periods affected by the outage are extended day for day.

D. Support. Designate a Procore Project Administrator on the Contractor's staff who shall:

1. Be the primary contact for Platform questions from the District, the A/E Team, and Other District Users.
2. Respond to access and technical issues within [one] business day.
3. Maintain the folder structure, naming conventions, and permission templates.
4. Ensure timely and complete entries by Contractor and Subcontractor staff.

E. Training. Provide [two] training sessions for District, A/E Team, and Other District User personnel before the first Application for Payment, and additional sessions on request at no cost. Record or document each session and provide written quick-start guides.

F. Subcontractor Compliance. Require all Subcontractors and major suppliers to participate in the Platform, and include this requirement in subcontracts and purchase orders. The Contractor is responsible for its Subcontractors' performance under this Section.

1.9 SUBMITTALS

A. Platform Implementation Plan: Submit within [10] days after the Notice to Proceed as an Action Submittal under Section 01 3300. Include:

1. Name and qualifications of the Procore Project Administrator.
2. Proposed folder structure, naming conventions, and numbering, consistent with Section 01 3300, Paragraph 1.6.E.
3. Proposed roles, permissions, and workflow routing for District, A/E Team, and Other District User review.
4. Initial user list for the District, A/E Team, Other District Users, Contractor, and Subcontractors.
5. Proposed training schedule.
6. Data backup and export plan.

B. Access Confirmation: Written confirmation (email is sufficient) that District, A/E Team, and Other District User accounts have been set up with the required access.

C. The District and Architect will review the Plan, and the Contractor shall revise it as required. Do not begin official use of the Platform until the Plan is accepted, except to set up the account as Paragraph 1.4.B requires.

1.10 DATA OWNERSHIP, RECORDS, AND TRANSITION

A. Ownership. All Project Data is the property of the District. The Contractor holds Project Data in the Platform on the District's behalf for purposes of the Project. Nothing in Procore's terms of use or in any agreement between the Contractor and Procore limits the District's ownership of, or rights to, Project Data.

B. Public Records. The Contractor acknowledges that the District is a public agency subject to the California Public Records Act [Government Code Section 7920.000 et seq.] and to records retention requirements. Cooperate in the District's retrieval and production of Project Data in response to records requests.

C. Retention Period. Keep the Project site active and accessible to the District and the A/E Team, with District administrator-level access, until the latest of:

1. [Twelve (12)] months after Final Completion.
2. Expiration of the correction period and all warranties under Section 01 7800.
3. Resolution of all pending claims and disputes related to the Project.

D. Exports and Final Archive.

1. The District may export Project Data at any time.
2. At Substantial Completion and again at Final Completion, deliver a complete export of Project Data to the District on [secure drive / District-designated storage], in non-proprietary, commonly used formats (PDF/A for documents; CSV or XLSX for logs and registers) with metadata preserved. Include RFI, submittal, Change Order, and payment logs, correspondence, daily reports, photographs, meeting minutes, and the audit trail where available.
3. The export does not replace the Project Record Documents required by Section 01 7800, Article 3.1.
4. At Final Completion, if the District requests, transfer ownership or administrative rights of the Project's closeout and warranty data to the District at no cost.

E. Termination or Dispute. If the Contract is terminated, or the Contractor is in dispute with the District, maintain Project Data without alteration, deletion, or restriction of access, and deliver a complete export within [5] business days after request.

F. No Deletion. Do not delete Project Data or permit it to be deleted, except documents uploaded in error, which shall be documented. Archive superseded documents rather than deleting them.

1.11 SECURITY AND PRIVACY

A. Maintain the Platform in compliance with Procore's standard security practices, and use reasonable measures to protect Project Data from unauthorized access, including unique user credentials and prompt removal of access for departed personnel.

B. Do not use Project Data for any purpose other than performing the Contract, and do not sell, license, or share it with third parties except as necessary to operate the Platform and perform the Work.

C. Where the District designates information as security-sensitive (for example building security systems, access control, camera locations, and emergency plans), restrict access as the District directs and comply with applicable law and District policy on sensitive school facility information.

D. Do not upload student information or personally identifiable information of District students or staff to the Platform, other than business contact information.

1.12 REMEDIES

A. Failure to comply with this Section is a failure to comply with the Contract Documents. In addition to other rights and remedies, the District may:

1. Withhold from payment [$1,000__ per week / per occurrence], or the portion of an Application for Payment that is not supported by timely and complete documentation in the Platform, as the General Conditions permit.
2. Treat any submittal, RFI, or Application for Payment not made through the Platform as incomplete and return it without review.
3. Direct the Contractor, at its expense, to correct deficiencies in access, permissions, or data within [five] business days.

B. Withholding for noncompliance does not extend Contract Time or entitle the Contractor to additional compensation.

PART 2 PRODUCTS

2.1 PLATFORM

A. Procore project management platform with at least the following tools, or their equivalents under then-current names, activated and configured for the Project: Directory, Documents, Drawings, Specifications, RFIs, Submittals, Meetings, Daily Log, Photos, Observations, Inspections, Punch List, Schedule, Correspondence, Transmittals, Prime Contract, Commitments, Change Events, Change Orders, Budget, Invoicing (payment applications), and Closeout.

B. Mobile applications for iOS and Android available to all Project users at no charge.

C. The Contractor may use third-party integrations (for example scheduling, accounting, or e-signature tools) at its own cost, but they shall not be a condition of District, A/E Team, or Other District User participation.

D. The Platform shall operate on current versions of commonly used browsers (Chrome, Edge, Safari, Firefox) without special software installation by District, A/E Team, or Other District Users.

PART 3 EXECUTION

3.1 SET-UP

A. Establish the Project site, folder structure, numbering conventions, and permissions in accordance with the accepted Platform Implementation Plan.

B. Upload the following within Five [5] days after the Notice to Proceed, or before first use, whichever is earlier:

1. The complete DSA-approved Contract Documents (Drawings, Specifications, and Addenda), conformed to the issued-for-construction set.
2. Project Directory.
3. Contract, bonds, and insurance certificates.
4. Submittal list and Submittal Schedule: the complete list of submittals no later than 10 days after the Notice to Proceed (Section 01 3000, Paragraph 3.9.D), and the Submittal Schedule 10 days before starting construction at the site (Section 01 3300, Paragraph 1.5.A).
5. Preliminary schedule (Section 01 3216, Paragraph 1.4.A) and, when accepted, the complete construction schedule (Paragraph 1.4.D).
6. Schedule of Values, when accepted.

C. Configure workflows so District and A/E Team review and approval steps match the Contract Documents, including the review times in Section 01 3300, Paragraph 1.6.C. The review times in Section 01 3300 govern; this Section does not restate them.

3.2 PROJECT OPERATIONS

A. Timeliness. Enter or upload items within [one] business day after occurrence or receipt. Complete daily construction reports by the end of each working day. Upload progress photographs at least [weekly]. Post schedule updates at the intervals in Section 01 3216, Article 3.6, and the three-week look-ahead for each Owner's meeting (Article 3.7). Revise the Submittal Schedule monthly and after each meeting that causes revisions, as Section 01 3300, Paragraph 1.5.H requires.

B. Naming Convention. Name submittal files as Section 01 3300, Paragraph 1.6.E.2 requires, using the Project identifier **[GWNC]** and the Specification Section number, a decimal point, and a sequential number, with an alphabetic suffix for resubmittals. Name other documents consistently, with a descriptive title and revision where applicable.

C. Status Reporting. At each biweekly progress meeting (Section 01 3000, Article 3.2), present and review the Platform logs, including RFIs, submittals, Change Events, and open items, with the Platform displayed live.

D. Applications for Payment. Submit each Application for Payment through the Platform, on the date and with the backup the General Conditions require, including Subcontractor payment applications, waivers and releases, and the updated schedule. An application submitted without complete documentation is incomplete, and the review period does not begin until the documentation is complete.

E. Change Orders. Submit Change Order Requests and their backup (quotes, Subcontractor proposals, and time impact) through the Platform. Record DSA approval status in the Change Order record, and do not begin work under a Change Order or addendum until the DSA written approval Section 01 3114, Paragraph 1.11.E requires has been obtained and posted. Upload executed Change Orders and update the Schedule of Values.

3.3 MONITORING AND CORRECTIVE ACTION

A. The District or Architect may at any time notify the Contractor of deficiencies in the access, completeness, or timeliness of the Platform. Respond with a corrective action plan within [two] business days.

B. The District may audit the Platform at any time to verify data integrity, permissions, and completeness. Cooperate with the audit.

3.4 CLOSEOUT

A. Before the Substantial Completion inspection (Section 01 7000, Article 3.12), confirm that all required closeout documents have been uploaded, including Project Record Documents, operation and maintenance data (Section 01 7800, Paragraph 1.3.A), warranties and bonds (Paragraph 1.3.B), training records and videos, attic stock inventories, commissioning documents (Section 01 9113), and the Contractor's Correction Punch List.

B. Deliver the Project Data exports required by Paragraph 1.10.D.

C. Maintain the Platform for the retention period in Paragraph 1.10.C.

END OF SECTION

SECTION 01 3216
CONSTRUCTION PROGRESS SCHEDULE

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Preliminary schedule.

B. Construction progress schedule, bar chart type.

1.2 RELATED SECTIONS

A. Section 01 3000 - Administrative Requirements

1.3 REFERENCE STANDARDS

A. AGC (CPSM) - Construction Planning and Scheduling Manual; 2004.

1.4 SUBMITTALS

A. Within 10 days after date of Agreement, submit preliminary schedule.

B. If preliminary schedule requires revision after review, submit revised schedule within 5 days.

C. Within 10 days after review of preliminary schedule, submit draft of proposed complete schedule for review.

D. Within 30 days after notice to proceed, submit complete, detailed construction schedule.

1. Submit three copies of the schedule on no more than two pages, use full size sheets if necessary.

2. Submit two copies of schedule in 11 by 17 format, landscape.

E. Submit updated schedule with each Application for Payment.

1.5 QUALITY ASSURANCE

A. Scheduler: Contractor's personnel or specialist Consultant specializing in CPM scheduling with 5 years minimum experience in scheduling construction work of a complexity comparable to this Project, and having use of computer facilities capable of delivering a detailed graphic printout within 48 hours of request.

1.6 SCHEDULE FORMAT

A. Listings: In chronological order according to the start date for each activity. Identify each activity with the applicable specification section number.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.1 PRELIMINARY SCHEDULE

A. Prepare preliminary schedule in the form of a horizontal bar chart.

3.2 CONTENT OF FINAL SCHEDULE

A. Show complete sequence of construction by activity, with dates for beginning and completion of each element of construction.

B. Identify each item by specification section number.

C. Identify work of separate stages and other logically grouped activities.

D. Show accumulated percentage of completion of each item, and total percentage of Work completed, as of the first day of each month.

E. Show a single line critical path. Dual paths are not acceptable.

F. Provide submittal dates for long lead items and order dates.

G. Show dates for Substantial Completion and Final Completion.

H. Provide legend for symbols and abbreviations used.

3.3 NETWORK ANALYSIS

A. Prepare network analysis diagrams and supporting mathematical analyses using the Critical Path Method.

B. Illustrate order and interdependence of activities and sequence of work; how start of a given activity depends on completion of preceding activities, and how completion of the activity may restrain start of subsequent activities.

C. Mathematical Analysis: Tabulate each activity of detailed network diagrams, using calendar dates, and identify for each activity:

1. Preceding and following event numbers.
2. Activity description.
3. Estimated duration of activity, in maximum 15 day intervals.
4. Earliest start date.
5. Earliest finish date.
6. Actual start date.
7. Actual finish date.
8. Latest start date.
9. Latest finish date.
10. Total and free float; float time shall accrue to Owner and to Owner's benefit.
11. Percentage of activity completed.

3.4 REVIEW AND EVALUATION OF SCHEDULE

A. Participate in joint review and evaluation of schedule with Architect at each submittal.

B. Evaluate project status to determine work behind schedule and work ahead of schedule.

C. After review, revise as necessary as result of review, and resubmit within 5 business days.

3.5 UPDATING SCHEDULE

A. Maintain schedules to record actual start and finish dates of completed activities.

B. Indicate progress of each activity to date of revision, with projected completion date of each activity.

C. Annotate diagrams to graphically depict current status of Work.

D. Identify activities modified since previous submittal, major changes in Work, and other identifiable changes.

E. Indicate changes required to maintain Date of Substantial Completion.

3.6 UPDATE INTERVALS

A. Provide monthly updates from notice to proceed to start of construction.

B. Provide updates every other week during construction.

3.7 PROVIDE A 3 WEEK LOOK-AHEAD SCHEDULE AT EACH OWNER'S MEETING

END OF SECTION

SECTION 01 3300
SUBMITTAL PROCEDURES

PART 1 GENERAL

1.1 SUMMARY

A. Section includes requirements for the submittal schedule and administrative and procedural

1. requirements for submitting Shop Drawings, Product Data, Samples, and other submittals.

1.2 RELATED SECTIONS

A. Other Division 1 Specification Sections.

1.3 DEFINITIONS

A. Action Submittals: Written and graphic information and physical samples that require District's responsive action.

B. Informational Submittals: Written and graphic information and physical samples that do not require District's responsive action. Submittals may be rejected for not complying with requirements.

1.4 QUALITY ASSURANCE

A. Perform no portion of Work requiring an Action Submittal and review of Shop Drawings, Product Data, Samples, or similar submittals until respective Action Submittal has been approved by Architect/Engineers of Record and reviewed by District. All Work shall be in accordance with Accepted/Accepted As Noted Submittals.

B. Contractor shall not be relieved of its sole responsibility for deviations from requirements of Contract Documents by review or acceptance by District of Shop Drawings, Product Data, Samples or similar Submittals.

C. Contractor shall not be relieved of its sole responsibility for errors or omissions in Shop Drawings, Product Data, Samples or similar Submittals by District's review thereof.

D. Direct specific attention, in writing or on resubmitted Shop Drawings, Product Data, Samples or similar Submittals, to revisions (other than those requested by District on previous Submittals).

E. Informational Submittals upon which District is not expected to take responsible action may be so identified in Contract Documents.

F. When professional calculations or certification of performance criteria of materials, systems or equipment is required by Contract Documents, District shall be entitled to rely upon accuracy and completeness of such calculations and certifications.

G. Submittals may be rejected for not complying with requirements of Contract Documents.

1.5 SUBMITTAL SCHEDULE

A. Submittal Schedule. Ten (10) days prior to starting construction at the site, the Contractor shall prepare and submit, in accordance with the Contract Documents, a Submittal Schedule. The Submittal Schedule shall be coordinated with the Contractor's Construction Schedule and allow the District such time for review Submittals as may be required by the Contract Documents, or if none is required, an average time of 14 days for such review. The Contractor shall keep the Submittal Schedule current and updated in accordance with the requirements of the Contract Documents.

1. Coordinate Submittal Schedule with Work of Sub-contractors, Schedule of Values and list of products, as well as Contractor's Construction Schedule.

B. Include scheduled activities for all Fabrication BIM Models, Shop Drawings, Product Data, Samples and similar Submittals, including, without limitation, coordination drawings, and certificates of compliance, manufacturer's certificates, warranties, operations and maintenance manuals, attic stock (extra Material), demonstration and training (including video documentation), as-built plans, transfer of keys, and all other types of documents that are required to be submitted by Contractor under the Contract Documents.

C. Coordinate preparation of Submittal Schedule with District, allowing more than 14 days of review time for complicated or lengthy Submittals and less time than 14 days for those less complicated and less lengthy Submittals. Allow time for separate review by Architect/Engineer of Record prior to submittal to review by District.

D. Schedule Submittals to avoid concurrent Submittals to maximum extent possible.

E. Where Submittal is concurrent with or overlaps Submittals currently being reviewed, indicate priority of each outstanding Submittal.

F. Prepare schedule in chronological order. Provide following information:

1. Scheduled date for first Submittal.
2. Related Section number.
3. Submittal category.
4. Name of Sub-contractor.
5. Description of part of Work covered.
6. Scheduled date for re-submittal.
7. Number of Contractor's shop drawings, coordination drawings or other drawings anticipated within each submittal.
8. Review time by Contractor's team, including Architect/Engineers of Record, prior to submission to District.

G. Distribution of Submittal Schedule: Following comments resulting from District's response to initial submission, print and distribute copies to District, Contractor's team, Sub-contractors, and other parties required to comply with Submittal dates indicated.

1. Post copies in Project meeting room and temporary field office.
2. When additional revisions are made, distribute to same parties and post in same locations. Delete parties from distribution when they have completed their assigned part of Work and are no longer involved in construction activities.
3. Adhere to accepted schedule except when specifically otherwise permitted.

H. Schedule Updating: Revise Submittal Schedule every month and after each meeting or other activity where revisions have been recognized or made. Issue updated Submittal Schedule concurrently with report of each meeting.

1.6 SUBMITTAL ADMINISTRATIVE REQUIREMENTS

A. Digital Data Files: Electronic copies of digital data files of the Contract Drawings will be provided and/or produced by Contractor and Sub-contractors for use as background only in preparing submittals.

1. Contractor shall use Building Information Models for trades ~~outlined in SOCCCD BIM Standards~~. Digital CAD files and drawings are acceptable ~~for those trades not listed in SOCCCD BIM Standards.~~

B. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.

1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.

2. Coordinate transmittal of different types of submittals for related parts of the Work so processing will not be delayed because of need to review submittals concurrently for coordination.

    a. District reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.

3. Fabrication Models: For trades required to submit fabrication models, coordination of these models with the coordinated Design BIM used to produce the DSA Approved Construction Documents shall be the responsibility of the Contractor.

C. Processing Time: Allow time for submittal review, including time for reviews by Architect/Engineers of Record, followed by District and applicable District Consultant and re-submittals, as follows. Time for review shall commence on District's receipt of submittal. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit reasonable processing, including re-submittals.

1. Initial Review: Allow an average review time of 14 days for initial review of each submittal. Allow additional time if coordination with subsequent submittals is required. District will advise Contractor when a submittal being processed must be delayed for coordination.

2. Intermediate Review: If intermediate submittal is necessary, process it in same manner as initial submittal.

3. Re-submittal Review: Allow an average review time of 14 days for review of each resubmittal.

D. Paper Submittals: NOT USED

E. Electronic Submittals: REQUIRED. Identify and incorporate information in each electronic submittal file as follows:

1. Assemble complete submittal package into a single indexed file incorporating submittal requirements of a single Specification Section and transmittal form with links enabling navigation to each item.

2. Name file with submittal number or other unique identifier, including revision identifier.

    a. File name shall use project identifier and Specification Section number followed by a decimal point and then a sequential number (e.g., LNHS-061000.01). Resubmittals shall include an alphabetic suffix after another decimal point (e.g., LNHS-061000.01.A).

3. Provide means for insertion to permanently record Contractor's review and approval markings and action taken by Architect/Engineers of Record, and by District.

4. Transmittal Form for Electronic Submittals: Use electronic form acceptable to District, containing the following information:

    a. Project name.

    b. DSA Approval Number.

    c. Date.

    d. Name and address of Architect/Engineers of Record.

    e. Name of District.

    f. Name of Contractor.

    g. Name of firm or entity that prepared submittal.

    h. Names of Sub-contractor, manufacturer, and supplier.

    i. Category and type of submittal.

    j. Submittal purpose and description.

k. Specification Section number and title.

l. Specification paragraph number or drawing designation and generic name for each of multiple items.

m. Drawing number and detail references, as appropriate.

n. Location(s) where product is to be installed, as appropriate.

o. Related physical samples submitted directly.

p. Indication of full or partial submittal.

q. Transmittal number, numbered consecutively.

r. Submittal and transmittal distribution record.

s. Other necessary identification.

t. Remarks.

5. Metadata: Include the following information as keywords in the electronic submittal file metadata:

a. Project name.

b. Number and title of appropriate Specification Section.

c. Manufacturer name.

d. Product name.

F. Deviations: Highlight, encircle, or otherwise identify deviations from Contract Documents on Submittals clearly designating those portions as deviating from the Contract Documents and include separate written notification.

G. Resubmittals: Make re-submittals in same form and number of copies as initial submittal.

1. Note date and content of previous submittal.

2. Note date and content of revision in label or title block and clearly indicate extent of revision.

3. Resubmissions are subject to same terms and conditions as original Submittal.

4. Should more than 1 resubmission be required, Contractor may, at the sole discretion of the District, reimburse District for time spent by the District's staff, Consultants or other reviewers in processing additional resubmissions at either the agreed rates as established by contract, or if none is established, at the rate of 2.5 times the reviewer's Direct Personnel Expense (DPE) for District's staff, or 1.1 times the billed rate of District's consultants. For purposes of this Paragraph, "Direct Personnel Expense" is defined as direct salaries of the reviewer's personnel engaged on Project and portion of costs of mandatory, and customary contributions and benefits related thereto, including employment taxes and other statutory employee benefits, insurance, sick leave, holidays, vacations, pensions, and similar contributions and benefits.

5. Resubmit submittals until they are marked with approval notation from Architect/Engineers of Record's and District's action stamp.

H. Distribution: Furnish copies of final submittals to manufacturers, Sub-contractors, suppliers, fabricators, installers, authorities having jurisdiction, and others as necessary for performance of construction activities. Show distribution on transmittal forms.

I. Use for Construction: Retain complete copies of submittals on Project site. Use only final action submittals that are marked with approval notation from Architect/Engineers of Record's and "Accepted or Accepted As Noted" from District.

1. Fabrication Models shall be visually presented to District demonstrating full coordination with other systems prior to use for fabrication and installation.

PART 2 PRODUCTS

2.1 SUBMITTAL PROCEDURES

A. General Submittal Procedure Requirements:

1. Submit electronic submittals via email as PDF electronic files.

a. District will return annotated file. Annotate and retain one copy of file as an electronic Project record document file.

b. Markups and screen captures shall be included within the provided fabrication models, where appropriate.

2. Action Submittals: For Product Data, Shop Drawings and Samples, and other actions requiring review by the District, including Fabrication Model in IFC Compliant format for coordination with Design Model, for trades noted in BIM Standards. Submit seven copies of each submittal unless otherwise indicated.

a. If additional copies are needed for distribution to District Consultants or others not listed below, they shall be provided as required by the Contract Documents or as requested by District.

b. District will, upon initial receipt of a submission or resubmission of a Submittal, retain 5 copies and forward 1 copy to the District.

c. District will, following review and action by reviewers on a submission or resubmission of a Submittal, distribute signed and stamped copies as follows: 1 to District, 1 to Inspector of Record, and 2 to Contractor.

d. Contractor shall retain returned copy as Record Document and using it prepare copies for distribution to Sub-contractor.

3. Informational Submittals: For submittals not requiring responsive action by the District and other action required by Specifications. Submit three paper copies of each submittal unless otherwise indicated. District will not return copies.

4. Certificates and Certifications Submittals: Provide a notarized statement that includes signature of entity responsible for preparing certification. Certificates and certifications shall be signed by an officer or other individual authorized to sign documents on behalf of that entity.

a. Provide a digital signature with digital certificate on electronically-submitted certificates and certifications where indicated.

b. Provide a notarized statement on original paper copy certificates and certifications where indicated.

B. Product Data: Collect information into a single submittal for each element of construction and type of product or equipment.

1. If information must be specially prepared for submittal because standard published data are not suitable for use, submit as Shop Drawings, not as Product Data.

2. Mark each copy of each submittal to show which products and options are applicable.

3. Include the following information, as applicable:

a. Manufacturer's catalog cuts.

b. Manufacturer's product specifications.

c. Manufacturer's installation instructions.

d. Mill reports.

e. Standard product operating and maintenance manuals

f. Manufacturer's written recommendations.

g. Manufacturer’s standard product warranty.

h. Standard color charts.

i. Statement of compliance with specified referenced standards, and recognized trade association standards.

j. Testing by recognized testing agency.

k. Application of testing agency labels and seals.

l. Approval numbers of organizations or agencies as required by Governmental Authorities having jurisdiction.

m. Notation of dimensions verified by field measurement.

n. Notation of coordination requirements.

o. Availability and delivery time information.

p. Complete training demonstration video: Prepare electronic version in a format satisfactory to the District of all training demonstrations.

q. Inventory Listing: Inventory of tools, spare parts, extra material, keys, and similar items.

r. Manuals: Operations & Maintenance (O&M) manual, Warranties manual, Extended Warranties manual (if applicable), other demonstration and training documents including demonstration and training video documentation.

4. For equipment, include the following in addition to the above, as applicable:

a. Wiring diagrams showing factory-installed wiring.

b. Printed performance curves.

c. Operational range diagrams.

d. Clearances required to other construction, if not indicated on accompanying Shop Drawings.

5. Submit Product Data before or concurrent with Samples.

C. Shop Drawings: Prepare Project-specific information, drawn or modeled accurately to scale. Use reproductions of the Contract Documents or standard printed data as background only for insertion of specific data and design required by each trade.

1. Preparation: Fully illustrate requirements in the Contract Documents. Include the following information, as applicable:

a. Identification of products.

b. Dimensions.

c. Fabrication and installation drawings.

d. Roughing-in and setting diagrams.

e. Wiring diagrams showing field-installed wiring, including power, signal, and control wiring.

f. Shopwork manufacturing instructions.

g. Templates and patterns.

h. Design calculations.

i. Schedules.

j. Compliance with specified standards.

k. Notation of coordination requirements.

l. Notation of dimensions established by field measurement.

m. Notation of as-built conditions.

n. Relationship and attachment to adjoining construction clearly indicated.

o. Seal and signature of professional engineer if specified.

2. Wiring Diagrams: Differentiate between manufacturer-installed and field-installed wiring.

3. Sheet Size: Except for templates, patterns, and similar full-size drawings, submit Shop Drawings on sheets at least 8-1/2 by 11 inches (215 by 280 mm), but no larger than 30 by 42 inches (750 by 1067 mm).

4. BIM: All Building Information Models in native format and in compliance with SOCCCD BIM Standards.

   a. For trades required to provide electronic fabrication models, shop drawings shall be directly exported from the models.

D. Samples: Submit Samples for review of kind, color, pattern, and texture for a check of these characteristics with other elements and for a comparison of these characteristics between submittal and actual component as delivered and installed.

1. Transmit Samples that contain multiple, related components such as accessories together in one submittal package.

2. Identification: Attach label on unexposed side of Samples that includes the following:

   a. Generic description of Sample.

   b. Product name and name of manufacturer.

   c. Sample source.

   d. Number and title of applicable Specification Section.

3. For projects where electronic submittals are required, provide corresponding electronic submittal of Sample transmittal, digital image file illustrating Sample characteristics, and identification information for record.

4. Disposition: Maintain sets of approved Samples at Project site, available for quality control comparisons throughout the course of construction activity. Sample sets may be used to determine final acceptance of construction associated with each set.

   a. Samples that may be incorporated into the Work are indicated in individual Specification Sections. Such Samples must be in an undamaged condition at time of use.

b. Samples not incorporated into the Work, or otherwise designated as District's property, are the property of Contractor.

5. Samples for Initial Selection: Submit manufacturer's color charts consisting of units or sections of units showing the full range of colors, textures, and patterns available.

6. Samples for Verification: Submit full-size units or Samples of size indicated, prepared from same material to be used for the Work, cured and finished in manner specified, and physically identical with material or product proposed for use, and that show full range of color and texture variations expected. Samples include, but are not limited to, the following: partial sections of manufactured or fabricated components; small cuts or containers of materials; complete units of repetitively used materials; swatches showing color, texture, and pattern; color range sets; and components used for independent testing and inspection.

7. Preparation: Mount, display, or package Samples in manner specified to facilitate review of qualities indicated. Prepare Samples to match Architect of Record's exemplar where so indicated. Attach label on unexposed side that includes following:

   a. Generic description of Sample.

   b. Product name or name of manufacturer.

   c. Sample source.

8. Additional Information: On attached separate sheet, prepared on Contractor's letterhead, provide following:

   a. Size limitations.

   b. Compliance with recognized standards.

   c. Availability.

   d. Compliance with Applicable Laws.

   e. Statement of acceptable uses or statement indicating suitability of product specified for proposed use.

   f. Delivery time.

9. Submit Samples for review of kind, color, pattern, and texture for final check of these characteristics with other elements and for comparison of these characteristics between final Submittal and actual component as delivered and installed.

   a. If variation in color, pattern, texture, or other characteristic is inherent in product represented by Sample, submit at least 3 sets of paired units that show approximate limits of variations.

   b. Refer to individual Specification Sections for requirements for Samples that illustrate workmanship, fabrication techniques, details of assembly, connections, operation, and similar construction characteristics.

10. Disposition: Maintain sets of approved Samples at Project site, available for quality control comparisons throughout course of construction activity. Sample sets may be used to determine final acceptance of construction associated with each set.

    a. Samples that may be incorporated into Work are indicated in individual Specification Sections. Such Samples must be in undamaged condition at time of use.

    b. Samples not incorporated into Work, or otherwise designated as District's property, are property of Contractor.

E. Product List: As required in individual Specification Sections, prepare a written summary indicating types of products required for the Work and their intended location. Include the following information in tabular form:

1. Type of product. Include unique identifier for each product.
2. Number and name of room or space.
3. Location within room or space.

F. Coordination Drawings Submittals: Comply with requirements specified in General Conditions.

G. Contractor's Construction Schedule: Comply with requirements specified in General Conditions.

H. Application for Payment and Schedule of Values: Comply with requirements specified in General Conditions.

I. Subcontract List: Prepare written summary identifying individuals or firms proposed for each portion of Work, including those who are to furnish products or equipment fabricated to special design. Use CSI Form 1.5A or other form acceptable to District. Include following information in tabular form:

1. Name, address, and telephone number of entity performing subcontract or supplying products.
2. Number and title of related Specification Sections covered by subcontract.
3. Drawing number and detail references, as appropriate, covered by subcontract.

J. Test and Inspection Reports and Schedule of Tests and Inspections Submittals: Comply with requirements specified in Section 01 40 00 "Quality Requirements."

K. Closeout Submittals and Maintenance Material Submittals: Comply with requirements specified in Section 01 77 00 "Closeout Procedures."

L. Maintenance Data: Comply with requirements specified in Section 01 78 23 "Operation and Maintenance Data."

M. LEED Submittals: Comply with requirements as necessary to obtain certification of LEED level specified in Contract Documents.

N. Qualification Data: Prepare written information that demonstrates capabilities and experience of firm or person. Include lists of completed projects with project names and addresses, contact information of Design Consultants and districts, and other information specified.

O. Welding Certificates: Prepare written certification that welding procedures and personnel comply with requirements in the Contract Documents. Submit record of Welding Procedure Specification and Procedure Qualification Record on AWS forms. Include names of firms and personnel certified.

P. Installer Certificates: Submit written statements on manufacturer's letterhead certifying that Installer complies with requirements in the Contract Documents and, where required, is authorized by manufacturer for this specific Project.

Q. Manufacturer Certificates: Submit written statements on manufacturer's letterhead certifying that manufacturer complies with requirements in the Contract Documents. Include evidence of manufacturing experience where required.

R. Product Certificates: Submit written statements on manufacturer's letterhead certifying that product complies with requirements in the Contract Documents.

S. Material Certificates: Submit written statements on manufacturer's letterhead certifying that material complies with requirements in the Contract Documents.

T. Material Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting test results of material for compliance with requirements in the Contract Documents.

U. Product Test Reports: Submit written reports indicating that current product produced by manufacturer complies with requirements in the Contract Documents. Base reports on evaluation of tests performed by manufacturer and witnessed by a qualified testing agency, or on comprehensive tests performed by a qualified testing agency.

V. Research/Evaluation Reports: Submit written evidence, from a model code organization acceptable to authorities having jurisdiction, that product complies with building code in effect for Project. Include following information:

1. Name of evaluation organization.
2. Date of evaluation.
3. Time period when report is in effect.
4. Product and manufacturers' names.
5. Description of product.
6. Test procedures and results.
7. Limitations of use.

W. Schedule of Tests and Inspections: Comply with requirements specified in Section 01 40 00 "Quality Requirements."

X. Preconstruction Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of tests performed before installation of product, for compliance with performance requirements in the Contract Documents.

Y. Compatibility Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of compatibility tests performed before installation of product. Include written recommendations for primers and substrate preparation needed for adhesion.

Z. Field Test Reports: Submit written reports indicating and interpreting results of field tests performed either during installation of product or after product is installed in its final location, for compliance with requirements in the Contract Documents.

AA. Design Data: Prepare and submit written and graphic information, including, but not limited to, performance and design criteria, list of applicable codes and regulations, and calculations. Include list of assumptions and other performance and design criteria and a summary of loads. Include load diagrams if applicable. Provide name and version of software, if any, used for calculations. Include page numbers.

AB. Maintenance Data: Prepare written and graphic instructions and procedures for operation and normal maintenance of products and equipment. Comply with requirements in Section 01 78 23.

AC. Manufacturer's Instructions: Prepare written or published information that documents manufacturer's recommendations, guidelines, and procedures for installing or operating product or equipment. Include name of product and name, address, and telephone number of manufacturer. Include following, as applicable:

1. Preparation of substrates.
2. Required substrate tolerances.
3. Sequence of installation or erection.
4. Required installation tolerances.
5. Required adjustments.
6. Recommendations for cleaning and protection.

AD. Manufacturer's Field Reports: Prepare written information documenting factory-authorized service representative's tests and inspections. Include following, as applicable:

1. Name, address, and telephone number of factory-authorized service representative making report.
2. Statement on condition of substrates and their acceptability for installation of product.

3. Statement that products at Project site comply with requirements.

4. Summary of installation procedures being followed, whether they comply with requirements and, if not, what corrective action was taken.

5. Results of operational and other tests and statement of whether observed performance complies with requirements.

6. Statement whether conditions, products, and installation will affect warranty.

7. Other required items indicated in individual Specification Sections.

2.2 DELEGATED-DESIGN SERVICES

A. Performance and Design Criteria: Where professional design services or certifications by a design professional are specifically required of Contractor by the Contract Documents, provide products and systems complying with specific performance and design criteria indicated.

1. If criteria indicated are not sufficient to perform services or certification required, submit a written request for additional information to District.

B. Delegated-Design Services Certification: In addition to Shop Drawings, Product Data, and other required submittals, submit three paper copies of certificate, signed and sealed by the responsible design professional, for each product and system specifically assigned to Contractor to be designed or certified by a design professional.

1. Indicate that products and systems comply with performance and design criteria in the Contract Documents. Include list of codes, loads, and other factors used in performing these services.

PART 3 EXECUTION

3.1 CONTRACTOR'S REVIEW

A. Action and Informational Submittals: Review and approve each submittal and check for coordination with other Work of the Contract and for compliance with the Contract Documents. Note corrections and field dimensions. Obtain Architect/Engineers of Record’s approval and mark with approval stamp prior to submission to District.

1. Submittals that do not bear Contractor's approval stamp and Architect/Engineers of Record’s approval stamp as required herein will be returned without action.

B. Architect/Engineers of Record’s Action: approval is for purpose of checking for conformance with the Contract Documents.

1. Where action and return of Submittals is required, Architect of Record will review each Submittal, mark to indicate action taken, and return.

2. Compliance with Contract Documents is Contractor's and Architect/Engineers of Record’s responsibility.

3. Review of separate item shall not indicate acceptance of assembly of which item is part.

4. Deviations from Contract Documents that are included in Submittals, including those that have been noted as such by Contractor, must be expressly accepted by Architect/Engineers of Record and clearly noted as such in Submittal, prior to review by District.

5. Architect/Engineers of Record will stamp each final submittal with an action stamp and will mark stamp appropriately to indicate action.

C. Project Closeout and Maintenance Material Submittals: See requirements in Section 01 77 00 "Closeout Procedures."

D. Approval Stamp: Stamp each submittal with a uniform, approval stamp that has been reviewed and approved by Contractor. Include Project name and location, submittal number, Specification Section title and number, name of reviewer, date of Contractor's approval, Architect/Engineers of Record's approval stamp and statement certifying that submittal has been reviewed, checked, and approved for compliance with the Contract Documents.

3.2 DISTRICT'S ACTION

A. General: District will not review submittals that do not bear Contractor's approval stamp and Architect/Engineers of Record's approval stamp and will return them without action.

B. District review is for limited purpose of checking for conformance with information given and design concept expressed in Contract Documents.

1. Purpose of Submittal is to demonstrate for those portions of Work for which submittals are required, manner in which Contractor proposes to conform to information given and design concept expressed on Contract Documents.

2. Review is not conducted for purpose of determining accuracy and completeness of other details such as dimensions and quantities, or for substantiating instructions for installation or performance of equipment or systems, all of which remain responsibility of Contractor.

C. Except for Submittals for record or for information, where action and return of Submittals is not required, District will review each Submittal, mark to indicate action taken, and return.

1. Compliance with specified characteristics is Contractor's responsibility and is not considered part of District's review.

2. Acceptance of Submittals with deviations from the Contract Documents that have been noted in the manner required by the Contract Documents shall not relieve Contractor from its sole responsibility for additional costs and delays associated with changes required to accommodate such deviations. Deviations included in Submittals, including those that have been noted as such by Contractor, that have not been expressly accepted by Architect/Engineers of Record are deemed rejected and excepted from any review of Submittal by District.

3. Review of separate item shall not indicate acceptance of assembly of which item is part.

4. Make those revisions required by District.

5. Notations by District which, if implemented, would require Contractor to perform Extra Work or cause Delay shall be brought to District's attention, in writing in the manner required by the General Conditions, before proceeding with Work.

6. When professional certification of performance criteria of materials, systems or equipment is required by Contract Documents, District shall be entitled to rely upon accuracy and completeness of such calculations and certifications.

D. Action Submittals: District will review each submittal, make marks to indicate acceptance, corrections or revisions required, and return it. District will stamp each submittal with an action stamp and will mark stamp appropriately to indicate action as follows:

1. Accepted: Means fabrication, manufacture, or construction may proceed provided that the Submittal complies with Contract Documents.

2. Accepted as Noted: Means fabrication, manufacture, or construction may proceed provided that Submittal complies with the Contract Documents and incorporates reviewer's notations. If Contractor cannot comply with such notations, Design-Builder shall make revisions and resubmit.

3. Revise and Resubmit: Means fabrication, manufacture, or construction may NOT proceed. In resubmitting, Contractor shall limit corrections to items marked.

4. Rejected: Means Submittal does not comply with expressed design intent of Contract Documents. Do not reuse Submittals stamped “Rejected.” Prepare Submittal again and resubmit.

E. Informational Submittals: District will review each submittal and will not return it, or will return it if it does not comply with requirements. District will forward each submittal to appropriate party.

F. Incomplete submittals are unacceptable, will be considered non responsive, and will be returned for re-submittal without review.

G. Submittals not required by the Contract Documents may not be reviewed and may be discarded.

END OF SECTION

SECTION 01 4000
QUALITY REQUIREMENTS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Submittals.

B. Control of installation.

C. Tolerances.

D. Testing and inspection agencies and services.

E. Control of installation.

F. Tolerances.

G. Manufacturers' field services.

H. Defect Assessment.

1.2 RELATED REQUIREMENTS

A. Section 01 3000 - Administrative Requirements: Submittal procedures.

B. Section 01 6000 - Product Requirements: Requirements for material and product quality.

1.3 REFERENCE STANDARDS

A. ASTM C1021 - Standard Practice for Laboratories Engaged in Testing of Building Sealants; 2008 (Reapproved 2014).

B. ASTM C1077 - Standard Practice for Laboratories Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Laboratory Evaluation; 2014.

C. ASTM E329 - Standard Specification for Agencies Engaged in Construction Inspection and/or Testing; 2014a.

D. ASTM E543 - Standard Specification for Agencies Performing Nondestructive Testing; 2013.

E. IAS AC89 - Accreditation Criteria for Testing Laboratories; 2010.

1.4 SUBMITTALS

A. Testing Agency Qualifications:

1. Provide qualifications of testing agencies to be used by the Contractor during the course of the work.

B. Test Reports: For Contractor provided testing, submit the following:

1. Include:

a. Date issued.

b. Project title and number.

c. Name of inspector.

d. Date and time of sampling or inspection.

e. Identification of product and specifications section.

f. Location in the Project.

g. Type of test/inspection.

h. Date of test/inspection.

i. Results of test/inspection.

j. Compliance with Contract Documents.

k. Provide interpretation of test results.

C. Certificates: When specified in individual specification sections, submit certification by the manufacturer and Contractor or installation/application subcontractor to Architect, in quantities specified for Product Data.

1. Indicate material or product complies with or exceeds specified requirements. Submit supporting reference data, affidavits, and certifications as appropriate.

D. Manufacturer's Instructions: When specified in individual specification sections, submit printed instructions for delivery, storage, assembly, installation, start-up, adjusting, and finishing, for the Owner's information. Indicate special procedures, perimeter conditions requiring special attention, and special environmental criteria required for application or installation.

1.5 REFERENCES AND STANDARDS

A. For products and workmanship specified by reference to a document or documents not included in the Project Manual, also referred to as reference standards, comply with requirements of the standard, except when more rigid requirements are specified or are required by applicable codes.

B. Comply with reference standard of date of issue current on date of Contract Documents, except where a specific date is established by applicable code.

C. Obtain copies of standards where required by product specification sections.

1.6 Testing and Inspection Agencies and Services

A. Owner will employ and pay for services of an independent testing agency to perform other specified testing.

B. Contractor shall pay for and perform testing required by these specifications that are not listed on the DSA Testing and Inspection Form.

C. Employment of agency in no way relieves Contractor of obligation to perform Work in accordance with requirements of Contract Documents.

D. Contractor Employed Agency:

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.1 CONTROL OF INSTALLATION

A. Monitor quality control over suppliers, manufacturers, products, services, site conditions, and workmanship, to produce work of specified quality.

B. Comply with manufacturers' instructions, including each step in sequence.

C. Should manufacturers' instructions conflict with Contract Documents, request clarification from Architect before proceeding.

D. Comply with specified standards as minimum quality for the work except where more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.

E. Have work performed by persons qualified to produce required and specified quality.

F. Verify that field measurements are as indicated on shop drawings or as instructed by the manufacturer.

G. Secure products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion, and disfigurement.

3.2 TOLERANCES

A. Monitor fabrication and installation tolerance control of products to produce acceptable Work. Do not permit tolerances to accumulate.

B. Comply with manufacturers' tolerances. Should manufacturers' tolerances conflict with Contract Documents, request clarification from Architect before proceeding.

C. Adjust products to appropriate dimensions; position before securing products in place.

3.3 TESTING AND INSPECTION

A. See individual specification sections for testing required.

B. Contractor Responsibilities:

1. Deliver to agency at designated location, adequate samples of materials proposed to be used that require testing, along with proposed mix designs.

2. Cooperate with laboratory personnel, and provide access to the Work and to manufacturers' facilities.

3. Provide incidental labor and facilities:

a. To provide access to Work to be tested/inspected.

b. To obtain and handle samples at the site or at source of Products to be tested/inspected.

c. To facilitate tests/inspections.

d. To provide storage and curing of test samples.

4. Notify Architect and laboratory 24 hours prior to expected time for operations requiring testing/inspection services.

5. Employ services of an independent qualified testing laboratory and pay for additional samples, tests, and inspections required by Contractor beyond specified requirements.

6. Arrange with Owner's agency and pay for additional samples, tests, and inspections required by Contractor beyond specified requirements.

C. Re-testing, re-inspection, stand-by time, and other cost or time impacts required because of non-conformance to specified requirements shall be paid for by the Contractor.

3.4 MANUFACTURERS' FIELD SERVICES

A. When specified in individual specification sections, require material or product suppliers or manufacturers to provide qualified staff personnel to observe site conditions, conditions of surfaces and installation, quality of workmanship, start-up of equipment, test, adjust, and balance equipment as applicable, and to initiate instructions.

B. Report observations and site decisions or instructions given to applicators or installers that are supplemental or contrary to manufacturers' written instructions.

3.5 DIVISION OF THE STATE ARCHITECT TESTING AND INSPECTION FORM

A. Contractor is responsible for obtaining the DSA Testing and Inspection Form (DSA-103) approved for the project and to cooperate with the testing agency in performing the tests indicated.

B. Excavations, Foundations and Retaining Walls - CBC, Chapter 18A:

C. Concrete - CBC, Chapter 19A:

1. Materials:

a. Test of Materials 1903A.1 - ACI 318

b. Portland Cement Tests 1704A.4.1, 1916A.1 - ASTM C 150

c. Concrete Aggregate 1704A.4.1, 1903A.5 - ACI 318

d. Reinforcing Bars 1704A.4.1, 1916A.2

e. Structural Steel, Steel Pipe or Tubing 1906A.3

f. Admixtures 1904A.4

2. Quality:

a. Proportions of Concrete 1905A.2, 1905A.3, 1905A.4

b. Mixing and Placing 1905A.8 to; 1905A.12;

c. Concrete Testing 1905A.6.3 to 1905A6.5

3. Inspection:

a. Project Site Inspection 1905A.7

b. Batch Plant or Weigh-master Inspection 1704A.4.2

c. Reinforcing Bar Welding Inspection 1903A.7, Table 1704A.3

d. Post Installed Anchors in Concrete: 1916A.7.

D. Steel - CBC, Chapters 17A & 22A:

1. Materials:

a. Structural Steel 2205A.1

b. Cold Formed Steel 2209A.1

c. Material Identification 2203.A.1

2. Inspection and Tests:

a. Test of Structural Steel 2210A.1

b. Non Destructive Weld Tests 1704A.2, 1704A.3

c. Tests of High Strength Bolts, 2212.A.1

d. Tests of End Welded Studs 2212A.2

e. Shop Fabrication Inspection 1704A2, 1704A.3

f. Welding Inspection 1704A.3.1.4

g. High Strength Bolt Inspection 1704A.3

h. Steel Joist Load Tests 2206A, 1703A.3.2.1

E. Wood - CBC, Chapter 23A:

1. Materials:

a. Lumber and Plywood Grading 2303.1

b. Glue - Laminated Members 2303.1.3

2. Inspection:

a. Glue - Laminated Fabrication 1704A.6.3.1, 2303.1.3

b. Timber Connectors 1704A.6.4

c. Manufactured Trusses 1704A.6.2, 1704A.6.3.2, 2303.4.7

F. Exterior Wall Coverings - CBC, Chapter 14, 25A:

1. Materials:

a. Portland Cement Plaster 2512

3.6 DEFECT ASSESSMENT

A. Replace Work or portions of the Work not complying with specified requirements.

B. If, in the opinion of the Architect, it is not practical to remove and replace the work, Architect will direct an appropriate remedy or adjust payment.

END OF SECTION

SECTION 01 4523
TESTING AND INSPECTION

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Testing and inspection services to meet requirements of the California Building Code (CBC).

B. Tests of materials are required by a DSA certified Testing Agency as set forth in Section 4-335 of the California Building Standards Commission's, California Administrative Code.

C. DSA Form 103, Structural Testing and Inspections

1.2 RELATED SECTIONS

A. Section 01 3113: Project Coordination.

B. Section 01 3216: Construction Progress Schedule.

C. Section 01 4000: Quality Requirements.

D. Section 01 5000: Temporary Facilities and Controls

E. Section 01 7329: Cutting and Patching.

F. Section 01 7800: Closeout Submittals.

1.3 COORDINATION OF TESTS AND INSPECTIONS

A. Contractor shall establish a protocol for requesting inspections and special inspections so as to not delay the progress of the work. Contractor shall review General Conditions for additional requirements.

1.4 TESTING COSTS

A. Owner will pay special inspections and testing identified in the Statement of Structural Tests and Special Inspections (DSA FORM 103) except Contractor shall reimburse the Owner for retesting costs caused by failure of materials to pass initial tests. Contractor shall arrange and pay for all other testing that are specified in other specification sections.

1. Reimbursement of Inspection Costs: The Contractor shall reimburse to the Owner all or any part, as the Owner may deem just and proper, of the actual excessive inspection costs incurred by the Owner due to any or all of the following:

a. Contractor's failure to complete the Work within the Contract Time stated in the Agreement, and any previously authorized extensions thereof.

b. Claims between separate contractors

c. Covering of any of the Work before the required inspections of tests are performed.

d. Extra inspections required for Contractor's correction of defective Work.

e. Overtime costs for acceleration of Work done for Contractor's convenience.

1.5 CONTRACTOR-FURNISHED ASSISTANCE`

A. When requested, Contractor shall furnish access, facilities, and labor assistance as necessary for duties to be performed at the site by Test Laboratory, and Inspector, including ladders, hoisting, temporary lighting, water, and like services.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.1 SCHEDULES FOR TESTING

A. Establishing Schedule:

1. By advance discussion with the testing laboratory selected by the Owner, determine the time required for the laboratory to perform its tests and to issue each of its findings.

2. Provide required time within the construction schedule.

B. Revising Schedule: When changes of construction schedule are necessary during construction, coordinate such changes of schedule with the testing laboratory as required.

C. Adherence to Schedule: When the testing laboratory is ready to test according to the determined schedules, but is prevented from testing or taking specimens due to incompleteness of the work, extra charges for testing attributable to the delay may be back-charged to the Contractor and may be deducted by the Owner from the contract sum.

3.2 TESTS

A. Owner will select and provide an independent DSA certified testing agency (Testing Agency) to conduct tests, sampling, and testing of materials. Selection of material to be tested shall be by the Testing Agency and not by Contractor.

B. The Contractor shall not incorporate into the work any material shipped from the source of supply prior to having satisfactorily passed the required testing and inspection, or prior to the receipt of notice from Project Inspector that the testing and inspection is not required.

C. Owner will select, and directly reimburse, the Testing Agency for costs of all DSA required tests and inspections; however, the Owner may be reimbursed by Contractor for such costs as specified or noted in related sections of the Contract Documents.

D. The independent Testing Agency is not authorized to release, revoke, alter, or enlarge requirements of the Contract Documents or approve or accept any portion of the Work.

E. The Testing Agency shall not perform any duties of Contractor.

F. Contractor shall provide an insulated curing box with the capacity for twenty (20) concrete cylinders and will relocate said box and cylinders as rapidly as required in order to provide for progress of the Work.

3.3 TEST REPORTS

A. Test reports shall include all tests performed, regardless of whether such tests indicate the material is satisfactory or unsatisfactory. Samples taken but not tested shall also be reported. Records of special sampling operations, when and as required, shall also be reported. Reports shall indicate the material (or materials) was sampled and tested in accordance with requirements of CBC, Title 24, Parts 1 and 2, as indicated on the Drawings. Test reports shall indicate specified design strength and specifically state whether or not the material (or materials) tested comply with the specified requirements.

3.4 VERIFICATION OF TEST REPORTS

A. Each Testing Agency shall submit to the Division of the State Architect, in duplicate, a verified report covering all tests required to be performed by that Testing Agency during the progress of the Work. Such report, covering all required tests, shall be furnished in accordance with DSA requirements under PR 13-01.

3.5 INSPECTION BY OWNER

A. Owner, and its representatives, shall have access, for purposes of inspection, at all times to all parts of the Work and to all shops wherein the Work is in preparation. Contractor shall, at all times, maintain proper facilities and provide safe access for such inspection.

B. DISTRICT REPRESENTATIVE shall have the right to reject materials and/or workmanship deemed defective Work and to require correction. Defective workmanship shall be corrected in a satisfactory manner and defective materials shall be removed from the premises and legally disposed of without charge to Owner. If Contractor does not correct such defective Work within a reasonable time, fixed by written notice and in accordance with the terms and conditions of the Contract Documents, Owner may correct such defective Work and proceed in accordance with related Articles of the Contract Documents.

C. Contractor is responsible for compliance to all applicable local, state, and federal regulations regarding codes, regulations, ordinances, restrictions, and requirements.

3.6 PROJECT INSPECTOR

A. A Project Inspector shall be employed by Owner in accordance with requirements of Title 24 of the California Code of Regulations with their duties specifically defined therein. Additional DSA certified inspectors may be employed and assigned to the Work by Owner in accordance with the requirements of California Building Standards Commission's, California Administrative Code with their duties as specifically defined in Section 4-333, 4-342, and in DSA IR A-8.

B. Inspection of Work shall not relieve Contractor from any obligation to fulfill all terms and conditions of the Contract Documents.

C. Contractor shall be responsible for scheduling times of inspection, tests, sample taking, and similar activities of the Work.

3.7 TESTS AND INSPECTIONS

A. Perform testing per Section 01 4000.

END OF SECTION

SECTION 01 5000
TEMPORARY FACILITIES AND CONTROLS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Temporary Utilities: Electricity, lighting, heating, cooling, ventilation, telephone service, water, sanitary facilities.

B. Construction Facilities: Temporary buildings, vehicular access, parking, project identification, progress cleaning, and fire prevention facilities.

C. Temporary Controls: Barriers, enclosures, security, water control, dust control, erosion control, noise control, and pollution control.

D. Protection of Work.

E. Removal of utilities, facilities, and controls.

1.2 RELATED SECTIONS

A. Section 01 7000 – Execution and Closeout Requirements: Final cleaning.

1.3 TEMPORARY ELECTRICITY

A. Provide and pay for power service required from utility source as needed for construction operations. Exercise measures to conserve energy.

B. Provide power outlets for construction operations, with branch wiring and distribution boxes located as required. Provide flexible power cords as required for portable construction tools and equipment.

C. Install and maintain temporary distributions of electrical power to locations at the Site as necessary or appropriate for efficient prosecution of the Work. Remove temporary distributions as appropriate or as directed by District.

D. Provide main service disconnect and overcurrent protection at convenient location.

1.4 TEMPORARY LIGHTING

A. Provide and maintain lighting for construction operations to achieve minimum lighting level of 2 watts per square foot.

B. Provide and maintain a minimum of one watt per square foot of lighting at exterior staging and storage areas after dark for security purposes.

C. Provide branch wiring from power source to distribution boxes with lighting conductors, pigtails, and lamps for specified lighting levels.

D. Maintain lighting and provide routine repairs.

1.5 TEMPORARY HEATING

A. Provide heating devices and heat as needed to maintain specified conditions for construction operations. Exercise measures to conserve energy. Use of permanent HVAC equipment to meet indoor air quality requirements of section 01 81 19 is not permitted.

B. Maintain minimum ambient temperature of 50 degrees F in areas where construction is in progress, unless indicated otherwise in product Sections.

1.6 TEMPORARY VENTILATION

A. Ventilate enclosed areas to achieve curing of materials, to dissipate humidity, and to prevent accumulation of dust, fumes, vapors, or gases.

1.7 TELEPHONE SERVICE

A. Provide, maintain and pay for cellular telephone service to field at time of project mobilization and for the duration of the project.

B. Provide, maintain and pay for separate lines for telephone, internet access and facsimile machine service to field office at time of project mobilization and for the duration of the project.

1.8 TEMPORARY WATER SERVICE

A. Provide and pay for suitable quality water service as needed to maintain specified conditions for construction operations. Connect to nearest water source. Exercise measures to conserve water.

B. Extend branch piping with outlets located so water is available by hoses with threaded connections. Provide temporary pipe insulation to prevent freezing.

1.9 TEMPORARY SANITARY FACILITIES

A. Provide and maintain required temporary facilities for use by construction personnel. Maintain daily in sanitary and clean condition.

1.10 FIELD OFFICES AND SHEDS

A. Offices: Weather-tight, with telephone, facsimile machine, lighting, electrical outlets, heating, cooling, and ventilating equipment, and equipped with sturdy furniture drawing rack and drawing display table.

B. Provide space for project meetings, with table and chairs to accommodate a minimum of six persons.

C. Locate offices and sheds from new structures so as to not disrupt or interfere with daily operations.

D. Construction: Portable or mobile buildings, or buildings constructed with floors raised above ground, securely fixed to foundations with steps and landings at entrance doors.

1. Construction: Structurally sound, secure, weather tight enclosures for office and storage spaces. Maintain during progress of Work; remove at completion of Work.

2. Temperature Transmission Resistance of Floors, Walls, and Ceilings: Compatible with occupancy and storage requirements.

3. Exterior Materials: Weather resistant.

4. Interior Materials in Offices: Sheet type materials for walls and ceilings, pre-finished or painted; resilient floors and bases.

5. Windows: Minimum total area of 10 percent of floor area, with operable sash and insect screens. Locate to provide views of construction area.

6. Lighting for Offices: 50 foot-candles at desk top height, exterior lighting at entrance doors.

7. Interior Materials in Storage Sheds: As required to provide specified conditions for storage of products.

E. Provide separate office space or field office building for inspector which shall be used as the field office for Inspector of Record. This office shall have all of the amenities described in Article 1.10.A above, shall be no less than 20 feet long, include power, phone line, fax line, internet, desk, plan table, 2 executive chairs, heating and air conditioning.

F. Storage Areas And Sheds: Size to storage requirements for products of individual Sections, allowing for access and orderly provision for maintenance and for inspection of products to requirements of Section 01 60 00.

G. Preparation: Fill and grade sites for temporary structures sloped for drainage away from buildings.

H. Installation:

1. Install office spaces ready for occupancy within 15 days of date fixed in Notice to Proceed.

I. Maintenance And Cleaning:

1. Weekly janitorial services for offices; periodic cleaning and maintenance for office and storage areas.

2. Maintain approach walks free of mud, water, and snow.

J. Removal: At completion of Work remove buildings, foundations, utility services, and debris. Restore areas.

1.11 VEHICULAR ACCESS

A. Construct temporary all-weather access roads from public thoroughfares to serve construction area, of width and load bearing capacity to accommodate unimpeded traffic for construction purposes.

B. Extend and relocate vehicular access as Work progress requires, provide detours as necessary for unimpeded traffic flow.

C. Provide unimpeded access for emergency vehicles. Maintain 20 foot wide driveways with turning space between and around combustible materials.

D. Provide and maintain access to fire hydrants and control valves free of obstructions.

E. Provide means of removing mud from vehicle wheels before entering streets.

1.12 PARKING

A. Coordinate parking areas to accommodate construction personnel with District.

B. Provide temporary surface parking areas to accommodate construction personnel.

C. When site space is not adequate, provide additional off-site parking.

D. Construction traffic is permitted only on designated streets and driveways and during permissible hours of construction as found in the General Conditions. Tracked vehicles not allowed on paved areas.

E. Use existing parking facilities is not permitted by construction personnel.

F. Do not allow heavy vehicles or construction equipment in parking areas.

G. Do not allow vehicle parking on existing pavement.

H. Permanent Pavements And Parking Facilities:

1. Bases for permanent roads and parking areas may be used for construction traffic.

2. Avoid traffic loading beyond paving design capacity. Tracked vehicles not allowed.

I. Maintenance:

1. Maintain traffic and parking areas in sound condition.

2. Maintain existing paved areas used for construction; promptly repair breaks, potholes, low areas, standing water, and other deficiencies, to maintain paving and drainage in original condition.

J. Removal, Repair:

1. Remove temporary materials and construction before Project Completion.

2. Repair existing facilities damaged by use, to original condition.

1.13 PROJECT IDENTIFICATION

A. Project Identification Sign:

1. One painted sign, 32 square foot area, bottom 6 feet above ground.

2. Content:

a. Project title and name of District as indicated on Contract Documents.

b. Names and titles of authorities.

c. Names and titles of Architect and Consultants.

d. Name of Prime Contractor and major Subcontractors.

B. Project Informational Signs:

1. Painted informational signs of same colors and lettering as Project Identification sign, or standard products; size lettering for legibility at 100 feet distance.

2. Provide sign at each field office, storage shed, and directional signs to direct traffic into and within site. Relocate as Work progress requires.

3. No other signs are allowed without District permission except those required by law.

C. Design sign and structure to withstand 60 miles per hour wind velocity.

D. Sign Painter: Experienced as professional sign painter for minimum three years.

E. Finishes, Painting: Adequate to withstand weathering, fading, and chipping for duration of construction.

F. Show content, layout, lettering, color, structure, sizes, and grades of members.

G. Sign Materials:

1. Structure and Framing: Wood or metal, structurally adequate.

2. Sign Surfaces: Exterior grade plywood with medium density overlay, minimum 3/4 inches thick, standard large sizes to minimize joints.

3. Rough Hardware: Galvanized.

4. Paint and Primers: Exterior quality, one prime coat and two finish coats; sign background color as selected by Architect.

5. Lettering: Exterior quality paint or pre-cut vinyl self-adhesive products, colors as selected by Architect.

H. Installation:

1. Install project identification sign within 15 days after date fixed by Notice to Proceed.

2. Erect at designated location as determined by College Director of Facilities.

3. Erect supports and framing on secure foundation, rigidly braced and framed to resist wind loadings.

4. Install sign surface plumb and level, with butt joints. Anchor securely.

5. Paint exposed surfaces of sign, supports, and framing.

I. Maintenance: Maintain signs and supports clean, repair deterioration and damage.

J. Removal: Remove signs, framing, supports, and foundations at completion of Project and restore area.

1.14 PROGRESS CLEANING AND WASTE REMOVAL

A. Maintain areas free of waste materials, debris and rubbish. Maintain site in a clean and orderly condition.

B. Remove debris and rubbish from pipe chases, plenums, attics, crawl spaces and other closed or remote spaces prior to enclosing the space.

C. Broom and vacuum clean interior areas prior to start of surface finishing and continue cleaning to eliminate dust.

D. Remove waste materials, debris and rubbish from site daily and dispose off-site at a minimum of weekly.

1.15 FIRE PREVENTION FACILITIES

A. Prohibit smoking with buildings under construction and demolition. College Director of Facilities to designate area on site where smoking is permitted unless district-wide smoking prohibition is in force. Provide approved ashtrays in designated smoking areas.

B. Establish fire watch for cutting and welding and other hazardous operations capable of starting fires. Maintain fire watch before, during, and after hazardous operations until threat of fire does not exist.

C. Portable Fire Extinguishers: NFPA 10; 10 pound capacity, 4A-60B: C UL rating.

1. Provide one fire extinguisher at each stair on each floor of buildings under construction and demolition.

2. Provide minimum one fire extinguisher in every construction trailer and storage shed.

3. Provide minimum one fire extinguisher on roof during roofing operations using heat producing equipment.

1.16 BARRIERS AND ENCLOSURES

A. Provide 6 foot high temporary chain link fence barriers with green privacy screen to prevent unauthorized entry to construction areas, and to protect adjacent properties from damage from construction operations and demolition in accordance with OSHA requirements. .

B. Provide protection for plants designated to remain. Replace damaged plants.

C. Exterior Enclosures: Provide temporary insulated weather tight closure of exterior openings to accommodate acceptable working conditions and protection for products, to allow for temporary heating and maintenance of required ambient temperatures identified in individual specification sections, and to prevent entry of unauthorized persons. Provide access doors with self-closing hardware and locks.

D. Interior Enclosures: Provide temporary partitions and ceilings to separate work areas from District occupied areas, to prevent penetration of dust and moisture into District occupied areas, and to prevent damage to existing materials and equipment.

1.17 SECURITY

A. Provide security and facilities to protect Work and District occupied areas affected by the Work from unauthorized entry, vandalism or theft.

B. Initiate program at project mobilization. Maintain program throughout construction period until District occupancy.

1.18 WATER CONTROL

A. Grade site to drain. Maintain excavations free of water. Provide, operate, and maintain pumping equipment.

B. Protect site from puddling or running water. Provide water barriers as required to protect site from soil erosion.

1.19 DUST CONTROL

A. Execute Work by methods to minimize raising dust from construction operations.

B. Provide positive means to prevent air-borne dust from dispersing into atmosphere.

1.20 EROSION AND SEDIMENT CONTROL

A. Plan and execute construction by methods to control surface drainage from cuts and fills, from borrow and waste disposal areas. Prevent erosion and sedimentation.

B. Minimize surface area of bare soil exposed at one time.

C. Provide temporary measures including berms, dikes, and drains, and other devices to prevent water flow.

D. Construct fill and waste areas by selective placement to avoid erosive surface silts or clays.

E. Periodically inspect earthwork to detect evidence of erosion and sedimentation; promptly apply corrective measures.

1.21 NOISE CONTROL

A. Provide methods, means, and facilities to minimize noise produced by construction operations.

1.22 POLLUTION CONTROL

A. Provide methods, means, and facilities to prevent contamination of soil, water, and atmosphere from discharge of noxious, toxic substances, and pollutants produced by construction operations.

B. Comply with pollution and environmental control requirements of authorities having jurisdiction.

1.23 PROTECTION OF INSTALLED WORK

A. Protect installed Work and provide special protection where specified in individual specification Sections.

B. Provide temporary and removable protection for installed Products. Control activity in immediate work area to minimize damage.

C. Provide protective coverings at walls, projections, jambs, sills and soffits of openings.

D. Protect finished floors, stairs and other surfaces from traffic, dirt, wear, damage or movement of heavy objects, by protecting with durable sheet materials.

1.24 REMOVAL OF UTILITIES, FACILITIES, AND CONTROLS

A. Remove temporary above-grade or buried utilities, equipment, facilities, and materials prior to Project Completion.

B. Clean and repair damage caused by installation or use of temporary work.

C. Restore existing facilities used during construction to original condition. Restore permanent facilities used during construction to specified condition.

PART 2 PRODUCTS

2.1 Not Used

PART 3 EXECUTION

3.1 Not Used

END OF SECTION

SECTION 01 5619
TEMPORARY NOISE BARRIERS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Special requirements for noise and acoustics management during construction operations.

1.2 RELATED SECTIONS

A. Section 01 4000 – Quality Requirements.

1.3 REFERENCES

A. Unless otherwise noted, standards, manuals, and codes refer to the latest edition of such standards, manuals, and codes as of the date of issue of this Project Manual.

B. Referenced Standards:

1. ASTM E1686 – Standard Guide for Applying Environmental Noise Measurement Methods and Criteria.

2. ASTM E1780 – Standard Guide for Measuring Outdoor Sound Received from a Nearby Fixed Source.

1.4 DEFINITIONS

A. Ambient noise level: The total noise associated with a given environment, being usually a composite of normal or existing sounds from all sources near and far, excluding the noise source at issue.

B. Property line: The real or imaginary line along the ground surface and its vertical extension, which separates real property owned or controlled by one person from contiguous real property owned or controlled by another person or from any public right-of-way or from any public space.

C. Receiving noise area: Any real property where people live or work and where noise is heard, excluding the project or source area.

1.5 REGULATORY REQUIREMENTS

A. Comply with any City Noise Ordinances and as specified in this Section. Where conflicts arise, the more stringent requirements apply.

PART 2 PRODUCTS

2.1 MATERIALS AND EQUIPMENT

A. Provide equipment, sound-deadening devices, and take noise abatement measures that are necessary for compliance.

PART 3 EXECUTION

3.1 NOISE MANAGEMENT

A. Noise Control: Perform demolition and construction operation to minimize noise. Perform noise-producing work in less sensitive hours of the day or week as directed by District.

B. Repetitive and/or intermittent, high-noise level noise: Permitted only during Daytime. Follow parameters defined below or per City Noise Ordinances, whichever is more stringent.

1. Do not exceed the following dB limitations:

Sound level in dB	Time Duration of Impact Noise
70	More than 12 minutes in any hour.
80	More than 3 minutes in any hour.

C. Maximum permissible construction equipment noise levels (dB) at 50 feet (15.24 m):

Earthmoving	dB	Materials Handling	dB
Front Loaders	75	Concrete Mixers	75
Backhoes	75	Concrete Pumps	75
Dozers	75	Cranes	75
Tractors	75	Derricks Impact	75
Scrapers	80	Pile Drivers	95
Graders	75	Jack Hammers	75
Trucks	75	Rock Drills	80
Pavers, Stationary	80	Pneumatic Tools	80
Pumps	75	Saws	75
Generators	75	Vibrators	75
Compressors	75		

3.2 Ambient Noise:

A. Maximum noise levels (dB) for receiving noise area at property line shall be per most stringent application between the General Conditions Article 3.12 or as follows:

1.	Residential receiving area	Daytime:	65 dB
		Nighttime:	60 dB
2.	Commercial/industrial receiving area	Daytime:	67 dB
		Nighttime:	65 dB

B. In the event the existing local noise level exceeds the maximum allowable receiving noise level (dB), the receiving noise level maximum for construction operations shall be adjusted as follows:

1. Residential receiving area: Maximum 3 additional dB above the local ambient as measured at property line.

2. Commercial/industrial receiving area: Maximum 5 additional dB above the local ambient measured at the property line.

3.3 FIELD QUALITY CONTROL

A. Assess potential effects of construction noise on adjacent neighbors and facility occupants in accordance with General Conditions, ASTM E1686 and as follows:

1. Ambient noise measurement: Measure at the property line at a height of at least 4 feet above the immediate surrounding surface. Average the ambient noise level over a period of at least 15 minutes.

2. Ambient noise measurement at urban sites: Conduct during morning peak traffic hours between 7 a.m. and 9 a.m. and afternoon peak traffic hours between 4 p.m. and 6 p.m. In addition, conduct a 24-hour measurement

at the proposed project site to document the noise pattern throughout the day. Adjust and weigh for seasonal and climatic variations.

B. Monitor noise produced from construction operations in accordance with ASTM E1780.

END OF SECTION

SECTION 01 5719
TEMPORARY ENVIRONMENTAL CONTROLS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Description of a Site Protection Plan

B. Site Protection Requirements

1.2 RELATED SECTIONS

A. Section 01 7419 – Construction Waste Management and Disposal.

B. Division 31 – Earthwork.

C. Division 32 – Exterior Improvements.

D. Division 33 – Utilities.

1.3 SITE PROTECTION

A. Goals: District has set the following site protection goals for jobsite operations on the project, within the limits of the construction schedule, Contract Sum, and available materials, equipment, products, and services. The goals assume that all jurisdictional requirements are met as a minimum for stormwater management and erosion control. Goals include:

1. Eliminate unnecessary site disturbance.

2. Minimize impact on the site's natural (soil and water) functions.

3. Eliminate water pollution and water quality degradation.

1.4 SITE PROTECTION PLAN

A. Within fourteen (14) days after receipt of Notice to Proceed with construction and prior to any waste removal by Contractor from the Project, Contractor shall develop and submit to District for review a site protection plan. The Plan shall contain the following:

1. Site protection materials list and documentation.

2. Maintenance/inspection schedule for site protection measures.

3. Construction vehicles protocol, including parking, project access, maintenance, and tire wash.

1.5 REFERENCES

A. Reference best management practices in EPA's "Storm Water Management for Construction Activities", Chapter 3 and relevant local jurisdiction publications.

1.6 SUBSTITUTIONS

A. Should Contractor desire to use procedures, materials, equipment, or products that are not specified but meet the intent of these specifications to protect air quality on the site, Contractor shall propose these substitutions under provisions of Section 01 60 00, Product Requirements.

PART 2 PRODUCTS

2.1 MATERIALS

A. Provide least-toxic products for use on the site (as specified in Divisions 31, 32, 33).

PART 3 EXECUTION

3.1 ALL PHASES

A. Conduct regular inspection and maintenance of site protection measures. Inspect all erosion and sedimentation measures after each heavy rainfall, defined as 1/2 inch in less than 24 hours.

B. Provide redundant mechanisms for site protection of any critical or sensitive areas on the site. Silt fencing fabric and other temporary site protection measures shall last for the life of the construction phase of the project.

C. For oil and sediment separators, ensure detergent does not enter separator.

D. Establish and post construction vehicles protocol for parking and access on the site. Provide a rocked heavy construction vehicle entrance and tire wash.

E. Establish and post clean-up procedures for spills to prevent illicit discharges. To minimize risk, reduce hazardous wastes, including paints and other finish products, solvents, adhesives, and oils, abide by the following:

1. Avoid overstocking.
2. Adopt a first in, first out policy.
3. Label containers properly.
4. Control access to storage areas and routinely inspect containers.
5. Inspect all containers upon receipt. Reject leaking or damaged containers.
6. Coordinate topsoil preparation, planting, and maintenance using Integrated Pest Management (least toxic) protocol. Use least-toxic products for controlling pests and insects in detention ponds and for soil prep. Chemical weed eradication is prohibited.
7. Use safety meetings, signage, and subcontractor agreements to communicate the goals of the site protection plan.

END OF SECTION

SECTION 01 5723
TEMPORARY STORM WATER POLLUTION PREVENTION

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Preparation, implementation and monitoring of Storm Water Pollution Prevention Plan (SWPPP) for the purpose of preventing the discharge of pollutants from the Project site into receiving waters. This includes the elimination of pollution discharges such as improper dumping, spills or leakage from storage tanks or transfer areas.

B. Compliance with local, state and federal regulations.

C. Payment of application and annual fees required by the State Water Resources Control Board (SWRCB) until the date of Substantial Completion.

D. Certification the Project has met all of the conditions of the General Construction Activity Storm Water Permit (GCASP).

1.2 RELATED SECTIONS

A. Section 01 3300 - Submittal Procedures

B. Section 01 5000 - Temporary Facilities and Controls

C. Section 01 7000 – Execution and Closeout Requirements

PART 2 PRODUCTS

2.1 MATERIALS

A. Provide the quality, grade and type of materials as specified in BMP Handbook and project SWPPP.

PART 3 EXECUTION

3.1 QUALITY ASSURANCE

A. Comply with the following as a minimum requirement.

1. California Storm Water Best Management Practice Handbook for Construction Activity (BMP Handbook) 2009 Edition.

2. Project Specific SWPPP (if required).

3.2 PREPARATION AND SUBMITTAL:

A. It is the sole responsibility of the Contractor to comply with all aspects of the Statewide Construction General Permit for SWPPP. The General Permit requires, prior to the start of soil disturbing activities, a site specific SWPPP will be approved on the SMARTS Water Board website and in place at the construction site.

B. Contractor shall prepare a SWPPP and related permit application and submit to SMARTS Water Board website for District's final submittal. Provide District with necessary information so that District may provide Contractor with necessary access.

3.3 IMPLEMENTATION

A. Install perimeter controls prior to starting Work at the Project site. Install erosion controls on disturbed areas after 14 days of inactivity or sooner if rain is imminent. BMPs shall match the SWPPP map at all times.

B. Contain on-site storm water on the Project site. Do not drain on-site water directly into the storm drain.

C. Contractor will designate a Qualified SWPPP Practitioner (QSP) to implement the inspections and reporting as required by the GCASP.

D. Contractor will designate a Qualified SWPPP Developer (QSD) who shall revise the SWPPP to suit changing site conditions and also when properly installed systems of BMPs are ineffective.

E. Prepare and upload all necessary annual reports to SMARTS Water Board for District's final submittal.

F. Upon Substantial Completion:

1. Leave storm water pollution prevention controls in place when required for post-construction storm water management and remove those that are not needed as determined by District. District will maintain prevention controls left in place.

2. Post-construction storm water operation and the management plan as mentioned in the compliance certifications are considered to be in place at Final Completion

3. Prepare and upload all necessary information for complete Notice of Completion report to SMARTS Water Board for District's final submittal.

3.4 MONITORING

A. The designated QSP will conduct weekly, quarterly and pre/during/post storm inspections. The QSP will ensure that the site BMPs are in line with the SWPPP requirements at all times.

3.5 LIABILITIES AND PENALTIES

A. Review of the SWPPP and inspection log by District shall not relieve Contractor from liabilities arising from non-compliance of storm water pollution regulations.

B. Payment of penalties for non-compliance by Contractor shall be the sole responsibility of the Contractor.

C. Compliance with the Clean Water Act pertaining to the project, is the sole responsibility of the Contractor. Any fine against the District due to non-compliance by Contractor, shall entitle the District to recover all costs of the fine by appropriate assessment.

3.6 CHANGE OF INFORMATION

A. Submit completed NOI Form for change of information (Construction Site Information and Material Handling/Management Practices) for District's acceptance and submittal at SMARTS Water Board website.

3.7 CONTRACTOR'S WATER POLLUTION CONTROL MANAGER SHALL:

A. Be responsible for all water pollution control work.

B. Be the QSP's primary contact for all water pollution control work.

C. Have the authority to mobilize resources (crews, supplies, equipment, etc.) to make immediate repairs of water pollution control measures or to supplement water pollution control measures to maintain compliance with all federal, state, and local laws, ordinances, and regulations related to the protection of water quality, including the General Permit for Storm Water Discharges associated with Constructions and Land Disturbances Activities.

D. Unless otherwise directed by the District or specified in these Special Provisions, the Contractor's responsibility for SWPPP/CSMP implementation shall continue throughout any temporary suspension of work.

E. The district may withhold progress payments or order the suspension of construction operations without an extension of the contract time, if the Contractor fails to comply with the requirements of "Water Pollution Control" as determined by the Engineer.

F. All BMP repairs shall be implemented by the Contractor within 72 hrs. All BMP repairs shall also be implemented by the Contractor prior to a qualifying storm event, as defined in the Construction General Permit.

G. Payment for Water Pollution Control shall be on a bid item basis, and shall include full compensation for the work performed, including implementing, installing, constructing, operating, maintaining, and removing and disposing of temporary BMP's, performing the observations, inspections, sampling, analysis, reporting, and street sweeping, and as specified in the CASQA Handbooks, Construction General Permit, SWPPP, Municipal Permit, and these Special Provisions, and as directed by the Engineer. Contractor shall include per item costs for all BMP consumables, as shown in the SWPPP. Generally these shall include fiber rolls, silt fence, tracking controls, erosion controls (spray-on binders or rolled erosion control products, etc.)

H. This work includes street sweeping. The SWPPP/CSMP shall describe and include the use of street sweeping as a Water Pollution Control practice for sediment control and tracking control. Street sweeping shall also conform to all applicable AQMD requirements. No dirt shall be allowed to be tracked on project roadways, or roadways adjacent to the project.

END OF SECTION

SECTION 01 6000
PRODUCT REQUIREMENTS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. General product requirements.

B. Transportation, handling, storage and protection.

C. Product option requirements.

D. Substitution limitations.

E. Maintenance materials, including extra materials, spare parts, tools, and software.

1.2 RELATED REQUIREMENTS

A. Section 01 2500 - Product Substitution Procedures.

B. Section 01 4000 - Quality Requirements.

C. Section 01 6116 - Volatile Organic Compound (VOC) Content Restrictions.

D. Section 01 7419 - Construction Waste Management and Disposal: Waste disposal requirements potentially affecting product selection, packaging and substitutions.

1.3 REFERENCE STANDARDS

A. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

1.4 SUBMITTALS

A. Product Data Submittals: Submit manufacturer's standard published data and installation instructions. Mark each copy to identify applicable products, models, options, and other data. Supplement manufacturers' standard data to provide information specific to this Project.

1. Identify options for each product that will be used.

B. Shop Drawing Submittals: Prepared specifically for this Project; indicate utility and electrical characteristics, utility connection requirements, and location of utility outlets for service for functional equipment and appliances.

1. Detail structural assemblies and structural connections to the building components.

C. Sample Submittals: Illustrate functional and aesthetic characteristics of the product, with integral parts and attachment devices. Coordinate sample submittals for interfacing work.

1. For selection from standard finishes, submit samples of the full range of the manufacturer's standard colors, textures, and patterns.

PART 2 PRODUCTS

2.1 NEW PRODUCTS

A. Provide new products only.

B. Where other criteria are met, Contractor shall give preference to products that:

1. If used on interior, have lower emissions, as defined in Section 01 6116.

2. If wet-applied, have lower VOC content, as defined in Section 01 6116.

2.2 PRODUCT OPTIONS

A. Products Specified by Reference Standards or by Description Only: Use any product meeting those standards or description.

B. Products Specified by Naming One or More Manufacturers with a Provision for equal: Equal products are acceptable with Architect's or Owner's review.

C. If specified product does not come with required options, select alternate manufacturer or customize product to suit.

2.3 MAINTENANCE MATERIALS

A. Furnish extra materials, spare parts, tools, and software of types and in quantities specified in individual specification sections.

B. Deliver to a site selected by the Owner within the District's boundaries; obtain receipt prior to final payment. Prior to delivery, coordinate delivery with Owner.

PART 3 EXECUTION

3.1 SUBSTITUTION LIMITATIONS

A. Document each request with complete data substantiating compliance of proposed substitution with Contract Documents. Organize in side-by-side tabular format with specified product attributes in the left column and proposed substitution in the right column.

B. A request for substitution constitutes a representation that the submitter:

1. Has investigated proposed product and determined that it meets or exceeds the quality level of the specified product.

2. Will provide the same warranty for the substitution as for the specified product.

3. The installer is qualified or certified to install the proposed substitution.

4. 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.

5. Waives claims for additional costs or time extension that may subsequently become apparent.

6. Credit cost savings for substitutions to Owner.

C. Substitution Submittal Procedure:

1. Submit one copy of request for substitution for consideration. Limit each request to one proposed substitution.

2. Submit shop drawings, product data, and certified test results attesting to the proposed product equivalence. Burden of proof is on proposer.

3. The Architect will notify Contractor in writing of decision to accept or reject request.

4. If the product is accepted as equal, but additional information indicates that the product is not equal in a significant quality or property, the product will be removed and replaced at no cost to the Owner or a credit will be passed on to the Owner for diminished quality.

3.2 TRANSPORTATION AND HANDLING

A. Coordinate schedule of product delivery to designated prepared areas in order to minimize site storage time and potential damage to stored materials.

B. Transport and handle products in accordance with manufacturer's instructions.

C. Transport materials in covered trucks to prevent contamination of product and littering of surrounding areas.

D. Promptly inspect shipments prior to off-loading and stockpiling to ensure that products comply with requirements, quantities are correct, and products are undamaged.

E. Provide equipment and personnel to handle products by methods to prevent soiling, disfigurement, or damage, and to minimize handling.

F. Arrange for the return of packing materials, such as wood pallets, where economically feasible.

G. Provide traffic control and flagmen for deliveries.

3.3 STORAGE AND PROTECTION

A. Designate receiving/storage areas for incoming products so that they are delivered according to installation schedule and placed convenient to work area in order to minimize waste due to excessive materials handling and misapplication. See Section 01 7419.

B. Store and protect products in accordance with manufacturers' instructions.

C. Store with seals and labels intact and legible.

D. Store sensitive and absorbent products in weather tight, climate controlled, enclosures in an environment favorable to product.

E. For exterior storage of fabricated products, place on sloped supports above ground and wrap in plastic.

F. Protect products from damage or deterioration due to construction operations, weather, precipitation, humidity, temperature, sunlight and ultraviolet light, dirt, dust, and other contaminants.

G. Comply with manufacturer's warranty conditions, if any.

H. Cover products subject to deterioration with impervious sheet covering. Provide ventilation to prevent condensation and degradation of products.

I. Prevent contact with material that may cause corrosion, discoloration, or staining.

J. Provide equipment and personnel to store products by methods to prevent soiling, disfigurement, or damage.

K. Arrange storage of products to permit access for inspection. Periodically inspect to verify products are undamaged and are maintained in acceptable condition.

END OF SECTION

SECTION 01 6116
VOLATILE ORGANIC COMPOUND (VOC) CONTENT RESTRICTIONS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Requirements for Indoor-Emissions-Restricted products.

B. Requirements for VOC-Content-Restricted products.

1.2 RELATED REQUIREMENTS

A. Section 01 4000 - Quality Requirements: Procedures for testing and certifications.

B. Section 01 6000 - Product Requirements: Fundamental product requirements, substitutions and product options, delivery, storage, and handling.

1.3 DEFINITIONS

A. Indoor-Emissions-Restricted Products: All products in the following product categories, whether specified or not:

1. Interior paints and coatings applied on site.

2. Interior adhesives and sealants applied on site, including flooring adhesives.

3. Flooring.

4. Products making up wall and ceiling assemblies.

5. Insulation.

B. VOC-Content-Restricted Products: Products in the following product categories, whether specified or not:

1. Interior paints and coatings applied on site.

2. Interior adhesives and sealants applied on site, including flooring adhesives.

C. Interior of Building: Anywhere inside the exterior weather barrier.

D. Adhesives: Gunnable, trowelable, liquid-applied, and aerosol adhesives, whether specified or not; including flooring adhesives, resilient base adhesives, and pipe jointing adhesives.

E. Sealants: All gunnable, trowelable, and liquid-applied joint sealants and sealant primers, whether specified or not; including firestopping sealants and duct joint sealers.

F. Inherently Non-Emitting Materials: Products composed wholly of minerals or metals, unless they include organic-based surface coatings, binders, or sealants; and specifically the following:

1. Concrete.

2. Metals that are plated, anodized, or powder-coated.

3. Glass.

4. Ceramics.

1.4 REFERENCE STANDARDS

A. 40 CFR 59, Subpart D - National Volatile Organic Compound Emission Standards for Architectural Coatings; U.S. Environmental Protection Agency; current edition.

B. CARB (SCM) - Suggested Control Measure for Architectural Coatings; California Air Resources Board; 2007.

C. SCAQMD 1113 - South Coast Air Quality Management District Rule No.1113; current edition.

D. SCAQMD 1168 - South Coast Air Quality Management District Rule No.1168; current edition.

PART 2 PRODUCTS

2.1 MATERIALS

A. All Products: Comply with the most stringent of Federal, State, and local requirements, or these specifications.

B. Indoor-Emissions-Restricted Products: Comply with Indoor Emissions Standard and Test Method, except for:

1. Inherently Non-Emitting Materials.

C. VOC-Content-Restricted Products: VOC content not greater than required by the following:

1. Adhesives, Including Flooring Adhesives: SCAQMD 1168 Rule.

2. Joint Sealants: SCAQMD 1168 Rule.

3. Paints and Coatings: Each color; most stringent of the following:

a. 40 CFR 59, Subpart D.

b. SCAQMD 1113 Rule.

c. CARB (SCM).

PART 3 EXECUTION

3.1 FIELD QUALITY CONTROL

A. Owner reserves the right to reject non-compliant products, whether installed or not, and require their removal and replacement with compliant products at no extra cost to Owner.

B. Additional costs to restore indoor air quality due to installation of non-compliant products will be borne by Contractor.

END OF SECTION

SECTION 01 7000
EXECUTION AND CLOSEOUT REQUIREMENTS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Examination, preparation, and general installation procedures.

B. Requirements for alterations work, except removal, disposal, and/or remediation of hazardous materials and toxic substances.

C. Surveying for laying out the work.

D. Cleaning and protection.

E. Starting of systems and equipment.

F. Demonstration and instruction of Owner personnel.

G. Closeout procedures, including Contractor's Correction Punch List, except payment procedures.

H. General requirements for maintenance service.

1.2 RELATED REQUIREMENTS

A. Section 01 1000 - Summary.

B. Section 01 3000 - Administrative Requirements.

C. Section 01 4000 - Quality Requirements.

D. Section 01 7800 - Closeout Submittals.

1.3 REFERENCE STANDARDS

A. NFPA 241 - Standard for Safeguarding Construction, Alteration, and Demolition Operations; 2013.

1.4 SUBMITTALS

A. Survey work: Submit name, address, and telephone number of Surveyor before starting survey work.

1. Submit a copy of site drawing signed by the Land Surveyor, that the elevations and locations of the work are in compliance with Contract Documents.

B. Project Record Documents: Accurately record actual locations of capped and active utilities.

1.5 QUALIFICATIONS

A. For surveying work, employ a land surveyor registered in California and acceptable to Architect. Submit evidence of surveyor's Errors and Omissions insurance coverage in the form of an Insurance Certificate. Employ only individual(s) trained and experienced in collecting and recording accurate data relevant to ongoing construction activities,

1.6 PROJECT CONDITIONS

A. Use of explosives is not permitted.

B. Grade site to drain. Maintain excavations free of water. Provide, operate, and maintain pumping equipment.

C. Protect site from puddling or running water. Provide water barriers to protect site from soil erosion.

D. Protect site from puddling or running water. Provide water barriers as required to protect site from soil erosion.

E. Perform dewatering activities, as required, for the duration of the project.

F. Ventilate enclosed areas to assist cure of materials, to dissipate humidity, and to prevent accumulation of dust, fumes, vapors, or gases.

G. Dust Control: Execute work by methods to minimize raising dust from construction operations. Provide positive means to prevent air-borne dust from dispersing into atmosphere and over adjacent property.

H. Erosion and Sediment Control: Plan and execute work by methods to control surface drainage from cuts and fills, from borrow and waste disposal areas. Prevent erosion and sedimentation.

1. Minimize amount of bare soil exposed at one time.

2. Provide temporary measures such as berms, dikes, and drains, to prevent water flow.

3. Construct fill and waste areas by selective placement to avoid erosive surface silts or clays.

4. Periodically inspect earthwork to detect evidence of erosion and sedimentation; promptly apply corrective measures.

I. Noise Control: Provide methods, means, and facilities to minimize noise produced by construction operations.

1. At All Times: Excessively noisy tools and operations will not be tolerated on site anywhere at any time of day; excessively noisy includes jackhammers, pile drivers, pneumatic hammers, air-operated nail guns, and diesel engines.

2. Outdoors: Limit conduct of especially noisy exterior work to the hours of 8 am to 5 pm.

3. Indoors: Limit conduct of especially noisy interior work to the hours of 6 pm to 7 am.

4. Provide sound attenuation systems to prevent disruption of staff and students, neighboring residents and to meet City noise ordinance requirements.

J. Pest and Rodent Control: Provide methods, means, and facilities to prevent pests and insects from damaging the work.

K. Rodent Control: Provide methods, means, and facilities to prevent rodents from accessing or invading premises.

L. Pollution Control: Provide methods, means, and facilities to prevent contamination of soil, water, and atmosphere from discharge of noxious, toxic substances, and pollutants produced by construction operations. Comply with federal, state, and local regulations.

1.7 COORDINATION

A. Coordinate scheduling, submittals, and work of the various sections of the Project Manual to ensure efficient and orderly sequence of installation of interdependent construction elements, with provisions for accommodating items installed later.

B. Notify affected utility companies and comply with their requirements.

C. Verify that utility requirements and characteristics of new operating equipment are compatible with building utilities. Coordinate work of various sections having interdependent responsibilities for installing, connecting to, and placing in service, such equipment.

D. Coordinate space requirements, supports, and installation of mechanical and electrical work that are indicated diagrammatically on drawings. Follow routing indicated for pipes, ducts, and conduit, as closely as practicable; place runs parallel with lines of building. Utilize spaces efficiently to maximize accessibility for other installations, for maintenance, and for repairs.

E. In finished areas , conceal pipes, ducts, and wiring within the construction. Coordinate locations of fixtures and outlets with finish elements. Exposed piping or ducts will not be allowed unless specifically noted as such on the Drawings.

F. Coordinate completion and clean-up of work of separate sections.

G. After Owner occupancy of premises, coordinate access to site for correction of defective work and work not in accordance with Contract Documents, to minimize disruption of Owner's activities.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that existing site conditions and substrate surfaces are acceptable for subsequent work. Start of work means acceptance of existing conditions.

B. Verify that existing substrate is capable of structural support or attachment of new work being applied or attached.

C. Examine and verify specific conditions described in individual specification sections.

D. Take field measurements before confirming product orders or beginning fabrication, to minimize waste due to over-ordering or misfabrication.

E. Verify that utility services are available, of the correct characteristics, and in the correct locations.

F. Prior to Cutting: Examine existing conditions prior to commencing work, including elements subject to damage or movement during cutting and patching. After uncovering existing work, assess conditions affecting performance of work. Beginning of cutting or patching means acceptance of existing conditions.

G. Verify Drawings are coordinated and match existing conditions prior to start of work.

3.2 PREPARATION

A. Clean substrate surfaces prior to applying next material or substance.

B. Seal cracks or openings of substrate prior to applying next material or substance.

C. Apply manufacturer required or recommended substrate primer, sealer, or conditioner prior to applying any new material or substance in contact or bond.

3.3 LAYING OUT THE WORK

A. Verify locations of survey control points prior to starting work.

B. Promptly notify Architect of any discrepancies discovered.

C. Protect survey control points prior to starting site work; preserve permanent reference points during construction.

D. Promptly report to Architect the loss or destruction of any reference point or relocation required because of changes in grades or other reasons.

E. Replace dislocated survey control points based on original survey control. Make no changes without prior written notice to Architect.

F. Utilize recognized engineering survey practices.

G. Establish elevations, lines and levels. Locate and lay out by instrumentation and similar appropriate means:

1. Site improvements including pavements; stakes for grading, fill and topsoil placement; utility locations, slopes, and invert elevations.

2. Grid or axis for structures.

3. Building foundation, column locations, ground floor elevations.

H. Periodically verify layouts by same means.

I. Maintain a complete and accurate log of control and survey work as it progresses.

3.4 GENERAL INSTALLATION REQUIREMENTS

A. Install products as specified in individual sections, in accordance with manufacturer's instructions and recommendations, and so as to avoid waste due to necessity for replacement.

B. Make vertical elements plumb and horizontal elements level, unless otherwise indicated.

C. Install equipment and fittings plumb and level, neatly aligned with adjacent vertical and horizontal lines, unless otherwise indicated.

D. Make consistent texture on surfaces, with seamless transitions, unless otherwise indicated.

E. Make neat transitions between different surfaces, maintaining texture and appearance.

3.5 ALTERATIONS

A. Drawings showing existing construction and utilities are based on casual field observation and existing record documents only.

1. Verify that construction and utility arrangements are as indicated.

2. Report discrepancies to Architect before disturbing existing installation.

3. Beginning of alterations work constitutes acceptance of existing conditions.

B. Services (Including but not limited to HVAC, Plumbing, Fire Protection, Electrical, Telecommunications, and Fire Alarm): Remove, relocate, and extend existing systems to accommodate new construction.

1. Maintain existing active systems that are to remain in operation; maintain access to equipment and operational components; if necessary, modify installation to allow access or provide access panel.

2. Where existing systems or equipment are not active and Contract Documents require reactivation, put back into operational condition; repair supply, distribution, and equipment as required.

3. Where existing active systems serve occupied facilities but are to be replaced with new services, maintain existing systems in service until new systems are complete and ready for service.

a. Disable existing systems only to make switchovers and connections; minimize duration of outages.

b. Provide temporary connections as required to maintain existing systems in service.

4. Verify that abandoned services serve only abandoned facilities.

5. Remove abandoned pipe, ducts, conduits, and equipment, including those above accessible ceilings; remove back to source of supply where possible, otherwise cap stub and tag with identification; patch holes left by removal using materials specified for new construction.

C. Protect existing work to remain.

1. Prevent movement of structure; provide shoring and bracing if necessary.

2. Perform cutting to accomplish removals neatly and as specified for cutting new work.

3. Repair adjacent construction and finishes damaged during removal work.

D. Comply with all other applicable requirements of this section.

3.6 PROGRESS CLEANING

A. Maintain areas free of waste materials, debris, and rubbish. Maintain site in a clean and orderly condition. Broom sweep work areas at the end of each day.

B. Remove debris and rubbish from pipe chases, plenums, attics, crawl spaces, and other closed or remote spaces, prior to enclosing the space.

C. Broom and vacuum clean interior areas prior to start of surface finishing, and continue cleaning to eliminate dust.

D. Clean parking areas daily, including street parking used by workers.

E. Sweep parking areas, driveways and streets used for the work. Removal of oil and other stains left by equipment or worker vehicles.

F. Collect and remove waste materials, debris, and trash/rubbish from area daily and dispose off-site weekly; do not burn or bury.

3.7 PROTECTION OF INSTALLED WORK

A. Protect installed work from damage by construction operations.

B. Provide special protection where specified in individual specification sections.

C. Provide temporary and removable protection for installed products. Control activity in immediate work area to prevent damage.

D. Provide protective coverings at walls, projections, jambs, sills, and soffits of openings.

E. Protect finished floors, stairs, and other surfaces from traffic, dirt, wear, damage, or movement of heavy objects, by protecting with durable sheet materials.

F. Prohibit traffic or storage upon waterproofed or roofed surfaces. If traffic or activity is necessary, obtain recommendations for protection from waterproofing or roofing material manufacturer.

G. Remove protective coverings when no longer needed; reuse or recycle coverings if possible.

3.8 SYSTEM STARTUP

A. Coordinate schedule for start-up of various equipment and systems.

B. Verify that each piece of equipment or system has been checked for proper lubrication, drive rotation, belt tension, control sequence, and for conditions that may cause damage.

C. Verify tests, meter readings, and specified electrical characteristics agree with those required by the equipment or system manufacturer.

D. Verify that wiring and support components for equipment are complete and tested.

E. Execute start-up under supervision of applicable Contractor personnel and manufacturer's representative in accordance with manufacturers' instructions.

F. Submit a written report that equipment or system has been properly installed and is functioning correctly.

3.9 DEMONSTRATION AND INSTRUCTION

A. Demonstrate start-up, operation, control, adjustment, trouble-shooting, servicing, maintenance, and shutdown of each item of equipment at scheduled time, at equipment location.

B. For equipment or systems requiring seasonal operation, perform demonstration for other season within six months.

C. Provide a qualified person who is knowledgeable about the Project to perform demonstration and instruction of Owner's personnel.

D. Utilize operation and maintenance manuals as basis for instruction. Review contents of manual with Owner's personnel in detail to explain all aspects of operation and maintenance.

3.10 ADJUSTING

A. Adjust operating products and equipment to ensure smooth and unhindered operation.

B. Test and balance HVAC systems affected by the work.

3.11 FINAL CLEANING

A. Execute final cleaning prior to final project assessment.

B. Use cleaning materials that are nonhazardous.

C. Clean interior and exterior glass, surfaces exposed to view; remove temporary labels, stains and foreign substances, polish transparent and glossy surfaces, vacuum carpeted and soft surfaces.

D. Remove all labels that are not permanent. Do not paint or otherwise cover fire test labels or nameplates on mechanical and electrical equipment.

E. Clean equipment and fixtures to a sanitary condition with cleaning materials appropriate to the surface and material being cleaned.

F. Clean filters of operating equipment.

G. Clean debris from roofs, gutters, downspouts, scuppers, overflow drains, area drains, and drainage systems.

H. Clean site; sweep paved areas, rake clean landscaped surfaces.

I. Remove waste, surplus materials, trash/rubbish, and construction facilities from the site; dispose of in legal manner; do not burn or bury.

3.12 CLOSEOUT PROCEDURES

A. Make submittals that are required by Division of the State Architect or other authorities.

1. Complete DSA Form 6-C.

B. Accompany Project Coordinator on preliminary inspection to determine items to be listed for completion or correction in the Contractor's Correction Punch List for Contractor's Notice of Substantial Completion.

C. Notify Architect when work is considered ready for Architect's Substantial Completion inspection.

D. Submit written certification containing Contractor's Correction Punch List, that Contract Documents have been reviewed, work has been inspected, and that work is complete in accordance with Contract Documents and ready for Architect's Substantial Completion inspection.

E. Owner will occupy the building as specified in Section 01 1000.

F. Conduct Substantial Completion inspection and create Final Correction Punch List containing Architect's and Contractor's comprehensive list of items identified to be completed or corrected and submit to Architect.

G. Correct items of work listed in Final Correction Punch List and comply with requirements for access to Owner-occupied areas.

H. Notify Architect when work is considered finally complete and ready for Architect's Substantial Completion final inspection.

I. Complete items of work determined by Architect listed in executed Certificate of Substantial Completion.

3.13 MAINTENANCE

A. Provide service and maintenance of components indicated in specification sections.

B. Examine system components at a frequency consistent with reliable operation. Clean, adjust, and lubricate as required.

C. Include systematic examination, adjustment, and lubrication of components. Repair or replace parts whenever required. Use parts produced by the manufacturer of the original component.

D. Maintenance service shall not be assigned or transferred to any agent or subcontractor without prior written consent of the Owner.

END OF SECTION

SECTION 01 7329
CUTTING AND PATCHING

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Procedural requirements and limitations for cutting and patching work.

B. Patching of existing materials and construction disturbed by Work under this Contract, including repair of damage to existing materials and construction caused by:

1. Installation of new products, materials, and equipment or systems.

2. Relocation or reinstallation of existing products, materials, and equipment or systems.

C. Removal, patching, and restoration work at new roofing system, when required.

D. Removal, patching, and restoration work at existing roofing system.

1.2 RELATED SECTIONS

A. Section 01 33 00 – Submittal Procedures.

B. Section 01 35 16 – Alteration Project Procedures: Cutting and patching for alterations work.

C. Section 01 60 00 – Product Requirements: Product options and substitutions.

D. Divisions 02 through 49 Sections for specific requirements and limitations applicable to cutting and patching individual parts of the Work, including the following:

1. Cutting and patching incidental to work of the individual Section.

2. Advance notification to other Sections of openings required in work of those Sections.

3. Limitations on cutting structural members.

4. Patching of fire-rated construction.

1.3 DEFINITIONS

A. Cutting: Removal of in-place construction for installation or performance of other Work.

B. Patching: Repair work required for restoration of damaged surfaces to original condition after installation of other Work.

1.4 SUBMITTALS

A. Submit written request in advance of cutting or patching which affects:

1. Integrity of moisture-resistant, water-resistant, and exposed to weather elements.

2. Utility services and mechanical/electrical systems.

a. List utilities that cutting or patching operations will disturb or affect. List utilities to be relocated and those that will be temporarily out of service. Indicate how long service will be disrupted.

b. Ensure written agreement by College Director of Facilities of established timeframes for all service disruption.

3. Operational elements.

4. Visual qualities of sight exposed elements.
5. Existing structural elements.
6. Efficiency, maintenance, or safety of element.
7. Work of District or separate contractor.

B. Include in request:

1. Identification of Project.
2. Location and description of affected Work.
3. Necessity for cutting or patching.
4. Description of proposed Work and products to be used.
5. Alternatives to cutting and patching.
6. List of services and systems that will be temporarily out of service and length of disruption.
7. List of services and systems that will be relocated.
8. Reinforcement to structural elements, with details and engineering calculations showing integration of reinforcement with original structure.
9. Effect on work of District or separate contractor.
10. Written permission of affected separate contractor.
11. Date and time the work will be executed.

C. District's Approval: Obtain approval of cutting and patching submittals before commencing cutting and patching work. Approval does not waive right to require removal and replacement of unsatisfactory work.

1.5 QUALITY ASSURANCE

A. Structural Elements: Do not cut and patch structural elements in a manner that could change their load-carrying capacity or load-deflection ratio.

B. Operational Elements: Do not cut and patch operating elements and related components in a manner that results in reducing their capacity to perform as intended or results in increased maintenance or decreased operational life or safety.

C. Cutting and Patching Conference: Before proceeding, meet at Project site with parties involved in cutting and patching, including mechanical and electrical trades. Review areas of potential interference and conflict. Coordinate procedures and resolve potential conflicts before proceeding.

1.6 WARRANTY

A. Existing Applicable Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during cutting and patching operations, by appropriate methods and with suitable materials so that existing applicable warranties are not voided.

PART 2 PRODUCTS

2.1 MATERIALS

A. Primary Products: Those required for original installation.

B. Product Substitution: For any proposed change in materials, submit request for substitution as specified in Section 01 60 00.

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine existing conditions prior to commencing Work, including elements subject to damage or movement during cutting and patching.

B. After uncovering existing work, assess conditions affecting performance of Work.

C. Beginning of cutting or patching means acceptance of existing conditions.

D. Identify hazardous substances or conditions exposed during the Work to District for decision or remedy.

3.2 PREPARATION

A. Provide temporary supports to ensure structural integrity of the Work. Provide devices and methods to protect other portions of Project from damage.

B. Provide protection from elements for areas which may be exposed by uncovering Work.

C. Maintain excavations free of water.

3.3 CUTTING

A. Execute cutting and fitting to complete the Work.

B. Uncover in-place Work to reinstall improperly sequenced Work.

C. Remove and replace defective or non-conforming Work.

D. Obtain material samples of installed Work for testing, when requested.

E. Provide openings in the Work for penetration of mechanical and electrical work.

F. Employ experienced installer to perform cutting of moisture-resistant, water-resistant, and exposed to weather elements, and surfaces exposed to view.

G. Cut rigid materials in straight, true and parallel or perpendicular lines.

H. In general, 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.

I. Cut masonry and concrete materials using masonry saw or core drill.

J. Pneumatic tools are not allowed without prior approval from District.

K. 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.

L. Excavating and Backfilling: Comply with requirements in applicable Division 31 Sections where required by cutting and patching operations.

3.4 PATCHING

A. Execute patching to complement adjacent Work.

B. Fit products together to integrate with other Work.

C. Execute Work by appropriate methods to avoid damage to other Work and to provide surfaces suitable for patching and finishing.

D. Employ experienced installer to perform patching of moisture-resistant, water-resistant, and exposed to weather elements, and surfaces exposed to view.

E. Restore Work with new materials and products in accordance with requirements of the Contract Documents.

F. Fit Work tight to pipes, sleeves, ducts, conduit and other penetrations through surfaces.

G. Maintain integrity of wall, ceiling, or floor construction; completely seal voids.

H. At penetrations of fire rated walls, partitions, ceiling or floor construction, completely seal voids with fire rated material to full thickness of the penetrated element. Firestopping shall meet or exceed the fire rating of the assembly in which it is installed. Refer to Section 07 84 00.

I. Refinish surfaces to match adjacent finish in all respects (type, texture, thickness, color, etc.). For continuous surfaces, refinish to nearest intersection or natural break. For an assembly, refinish entire unit.

J. Removal, Patching, and Restoration Work at New Roofing System: Work under this Project may require removal, patching, and restoration work at completed roofing system. Roof patching and restoration work shall be compatible with and identical to the original roofing system. Provide roof patching and restoration work in accordance with roofing manufacturer's written instructions, or applicable NRCA procedures and details, whichever is more stringent.

1. Roofing Warranties: Contractor shall ensure that applicable warranties on the roofing system remain intact after completion of patching and restoration work.

2. Prior to commencement of roof patching work, submit materials/product data and procedures proposed for roof patching and restoration work for District's review.

3. Submit documentation under provisions of Section 01 33 00.

4. Provide documentary evidence that roofing warranties are not voided due to roof patching and restoration work completed under this Project.

3.5 CLEANING

A. Clean areas and spaces where cutting and patching are performed. Completely remove paint, mortar, oils, putty, and similar materials.

END OF SECTION

SECTION 01 7419
CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

PART 1 GENERAL

1.1 WASTE MANAGEMENT REQUIREMENTS

A. Owner requires that this project generate the least amount of trash and waste possible.

B. Employ processes that ensure the generation of as little waste as possible due to error, poor planning, breakage, mishandling, contamination, or other factors.

C. Minimize trash/waste disposal in landfills; reuse, salvage, or recycle as much waste as economically feasible.

D. Contractor shall submit periodic Waste Disposal Reports; all landfill disposal, incineration, recycling, salvage, and reuse must be reported regardless of to whom the cost or savings accrues; use the same units of measure on all reports.

E. Methods of trash/waste disposal that are not acceptable are:

1. Burning on the project site.

2. Burying on the project site.

3. Dumping or burying on other property, public or private.

4. Other illegal dumping or burying.

F. Regulatory Requirements: Contractor is responsible for knowing and complying with regulatory requirements, including but not limited to Federal, state and local requirements, pertaining to legal disposal of all construction and demolition waste materials.

1.2 DEFINITIONS

A. Clean: Untreated and unpainted; not contaminated with oils, solvents, caulk, or the like.

B. Construction and Demolition Waste: Solid wastes typically including building materials, packaging, trash, debris, and rubble resulting from construction, remodeling, repair and demolition operations.

C. Hazardous: Exhibiting the characteristics of hazardous substances, i.e., ignitibility, corrosivity, toxicity or reactivity.

D. Nonhazardous: Exhibiting none of the characteristics of hazardous substances, i.e., ignitibility, corrosivity, toxicity, or reactivity.

E. Nontoxic: Neither immediately poisonous to humans nor poisonous after a long period of exposure.

F. Recyclable: The ability of a product or material to be recovered at the end of its life cycle and remanufactured into a new product for reuse by others.

G. Recycle: To remove a waste material from the project site to another site for remanufacture into a new product for reuse by others.

H. Recycling: The process of sorting, cleansing, treating and reconstituting solid waste and other discarded materials for the purpose of using the altered form. Recycling does not include burning, incinerating, or thermally destroying waste.

I. Return: To give back reusable items or unused products to vendors for credit.

J. Reuse: To reuse a construction waste material in some manner on the project site.

K. Salvage: To remove a waste material from the project site to another site for resale or reuse by others.

L. Sediment: Soil and other debris that has been eroded and transported by storm or well production run-off water.

M. Source Separation: The act of keeping different types of waste materials separate beginning from the first time they become waste.

N. Toxic: Poisonous to humans either immediately or after a long period of exposure.

O. Trash: Any product or material unable to be reused, returned, recycled, or salvaged.

P. Waste: Extra material or material that has reached the end of its useful life in its intended use. Waste includes salvageable, returnable, recyclable, and reusable material.

1.3 SUBMITTALS

A. Waste Disposal Reports: Submit at specified intervals, with details of quantities of trash and waste, means of disposal or reuse, and costs; show both totals to date and since last report.

1. Submit updated Report with each Application for Progress Payment; failure to submit Report will delay payment.

2. Submit Report on a form acceptable to Owner.

3. Landfill Disposal: Include the following information:

a. Identification of material.

b. Amount, in tons or cubic yards, of trash/waste material from the project disposed of in landfills.

c. State the identity of landfills, total amount of tipping fees paid to landfill, and total disposal cost.

d. Include manifests, weight tickets, receipts, and invoices as evidence of quantity and cost.

4. Recycled and Salvaged Materials: Include the following information for each:

a. Identification of material, including those retrieved by installer for use on other projects.

b. Amount, in tons or cubic yards, date removed from the project site, and receiving party.

c. Transportation cost, amount paid or received for the material, and the net total cost or savings of salvage or recycling each material.

d. Include manifests, weight tickets, receipts, and invoices as evidence of quantity and cost.

e. Certification by receiving party that materials will not be disposed of in landfills or by incineration.

5. Material Reused on Project: Include the following information for each:

a. Identification of material and how it was used in the project.

b. Amount, in tons or cubic yards.

c. Include weight tickets as evidence of quantity.

6. Other Disposal Methods: Include information similar to that described above, as appropriate to disposal method.

PART 3 EXECUTION

2.1 WASTE MANAGEMENT PLAN IMPLEMENTATION

A. Manager: Designate an on-site person or persons responsible for instructing workers and overseeing and documenting results of the Waste Management Plan.

B. Communication: Distribute copies of the Waste Management Plan to job site foreman, each subcontractor, Owner, and Architect.

C. Instruction: Provide on-site instruction of appropriate separation, handling, and recycling, salvage, reuse, and return methods to be used by all parties at the appropriate stages of the project.

D. Facilities: Provide specific facilities for separation and storage of materials for recycling, salvage, reuse, return, and trash disposal, for use by all contractors and installers.

1. Provide containers as required.

2. Provide adequate space for pick-up and delivery and convenience to subcontractors.

3. Keep recycling and trash/waste bin areas neat and clean and clearly marked in order to avoid contamination of materials.

E. Hazardous Wastes: Separate, store, and dispose of hazardous wastes according to applicable regulations.

F. Recycling: Separate, store, protect, and handle at the site identified recyclable waste products in order to prevent contamination of materials and to maximize recyclability of identified materials. Arrange for timely pickups from the site or deliveries to recycling facility in order to prevent contamination of recyclable materials.

G. Reuse of Materials On-Site: Set aside, sort, and protect separated products in preparation for reuse.

H. Salvage: Set aside, sort, and protect products to be salvaged for reuse off-site.

END OF SECTION

SECTION 01 7800
CLOSEOUT SUBMITTALS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Project Record Documents.

B. Operation and Maintenance Data and Manual.

C. Warranties and bonds.

D. DSA forms

1.2 RELATED REQUIREMENTS

A. Section 01 3000 - Administrative Requirements.

B. Section 01 7000 - Execution and Closeout Requirements.

C. Individual Product Sections: Specific requirements for operation and maintenance data.

D. Individual Product Sections: Warranties required for specific products or Work.

1.3 SUBMITTALS

A. Operation and Maintenance Data:

1. Submit two copies of preliminary draft or proposed formats and outlines of contents before start of Work. Architect will review draft and return one copy with comments.

2. For equipment, or component parts of equipment put into service during construction and operated by Owner, submit completed documents within ten days after acceptance.

3. Submit one copy of completed documents 15 days prior to final inspection. This copy will be reviewed and returned after final inspection, with Architect comments. Revise content of all document sets as required prior to final submission.

4. Submit one set of revised final documents in electronic form within 10 days after final inspection.

B. Warranties and Bonds:

1. For equipment or component parts of equipment put into service during construction with Owner's permission, submit documents within 10 days after acceptance.

2. Make other submittals within 10 days after Date of Substantial Completion, prior to final Application for Payment.

3. For items of Work for which acceptance is delayed beyond Date of Substantial Completion, submit within 10 days after acceptance, listing the date of acceptance as the beginning of the warranty period.

C. DSA Forms

1. Submit completed DSA form 6-C at completion of the work.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.1 PROJECT RECORD DOCUMENTS

A. Maintain on site one set of the following record documents; record actual revisions to the Work:

1. Drawings.
2. Specifications.
3. Addenda.
4. Change Orders and other modifications to the Contract.
5. Reviewed shop drawings, product data, and samples.
6. Manufacturer's instruction for assembly, installation, and adjusting.

B. Ensure entries are complete and accurate, enabling future reference by Owner.

C. Store record documents separate from documents used for construction.

D. Record information concurrent with construction progress.

E. Specifications: Legibly mark and record at each product section description of actual products installed, including the following:

1. Manufacturer's name and product model and number.
2. Product substitutions or alternates utilized.
3. Changes made by Addenda and modifications.

F. Record Drawings and Shop Drawings: Legibly mark each item to record actual construction including:

1. Measured depths of foundations in relation to finish first floor datum.
2. Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.
3. Measured locations of internal utilities and appurtenances concealed in construction, referenced to visible and accessible features of the Work.
4. Field changes of dimension and detail.
5. Details not on original Contract drawings.

3.2 OPERATION AND MAINTENANCE DATA

A. Source Data: For each product or system, list names, addresses and telephone numbers of Subcontractors and suppliers, including local source of supplies and replacement parts.

B. Product Data: Mark each sheet to clearly identify specific products and component parts, and data applicable to installation. Delete inapplicable information.

C. Drawings: Supplement product data to illustrate relations of component parts of equipment and systems, to show control and flow diagrams. Do not use Project Record Documents as maintenance drawings.

D. Typed Text: As required to supplement product data. Provide logical sequence of instructions for each procedure, incorporating manufacturer's instructions.

3.3 OPERATION AND MAINTENANCE DATA FOR MATERIALS AND FINISHES

A. For Each Product, Applied Material, and Finish:

1. Product data, with catalog number, size, composition, and color and texture designations.

2. Information for re-ordering custom manufactured products.

B. Instructions for Care and Maintenance: Manufacturer's recommendations for cleaning agents and methods, precautions against detrimental cleaning agents and methods, and recommended schedule for cleaning and maintenance.

C. Additional information as specified in individual product specification sections.

D. Where additional instructions are required, beyond the manufacturer's standard printed instructions, have instructions prepared by personnel experienced in the operation and maintenance of the specific products.

3.4 OPERATION AND MAINTENANCE DATA FOR EQUIPMENT AND SYSTEMS

A. For Each Item of Equipment and Each System:

1. Description of unit or system, and component parts.

2. Identify function, normal operating characteristics, and limiting conditions.

3. Include performance curves, with engineering data and tests.

4. Complete nomenclature and model number of replaceable parts.

B. Where additional instructions are required, beyond the manufacturer's standard printed instructions, have instructions prepared by personnel experienced in the operation and maintenance of the specific products.

C. Panelboard Circuit Directories: Provide electrical service characteristics, controls, and communications; typed.

D. Operating Procedures: Include start-up, break-in, and routine normal operating instructions and sequences. Include regulation, control, stopping, shut-down, and emergency instructions. Include summer, winter, and any special operating instructions.

E. Maintenance Requirements: Include routine procedures and guide for preventative maintenance and trouble shooting; disassembly, repair, and reassembly instructions; and alignment, adjusting, balancing, and checking instructions.

F. Provide servicing and lubrication schedule, and list of lubricants required.

G. Include manufacturer's printed operation and maintenance instructions.

H. Include sequence of operation by controls manufacturer.

I. Provide original manufacturer's parts list, illustrations, assembly drawings, and diagrams required for maintenance.

J. Include test and balancing reports.

K. Additional Requirements: As specified in individual product specification sections.

3.5 ASSEMBLY OF OPERATION AND MAINTENANCE MANUALS

A. Assemble operation and maintenance data into durable manuals for Owner's personnel use, with data arranged in the same sequence as, and identified by, the specification sections.

B. Where systems involve more than one specification section, provide separate tabbed divider for each system.

C. Binders: Three (3) copies of commercial quality, 8-1/2 by 11 inch three D side ring binders with durable plastic covers; 2 inch maximum ring size. When multiple binders are used, correlate data into related consistent groupings.

D. Cover: Identify each binder with typed or printed title OPERATION AND MAINTENANCE INSTRUCTIONS; identify title of Project; identify subject matter of contents.

E. Project Directory: Title and address of Project; names, addresses, and telephone numbers of Architect, Consultants, Contractor and subcontractors, with names of responsible parties.

F. Tables of Contents: List every item separated by a divider, using the same identification as on the divider tab; where multiple volumes are required, include all volumes Tables of Contents in each volume, with the current volume clearly identified.

G. Dividers: Provide tabbed dividers for each separate product and system; identify the contents on the divider tab; immediately following the divider tab include a description of product and major component parts of equipment.

H. Text: Manufacturer's printed data, or typewritten data on 24 pound paper.

I. Drawings: Provide with reinforced punched binder tab. Bind in with text; fold larger drawings to size of text pages.

J. Arrangement of Contents: Organize each volume in parts as follows:

1. Project Directory.

2. Table of Contents, of all volumes, and of this volume.

3. Operation and Maintenance Data: Arranged by system, then by product category.

a. Source data.

b. Product data, shop drawings, and other submittals.

c. Operation and maintenance data.

d. Field quality control data.

e. Photocopies of warranties and bonds.

3.6 WARRANTIES AND BONDS

A. Obtain warranties and bonds, executed in duplicate by responsible Subcontractors, suppliers, and manufacturers, within 10 days after completion of the applicable item of work. Except for items put into use with Owner's permission, leave date of beginning of time of warranty until Date of Substantial completion is determined.

B. Verify that documents are in proper form, contain full information, and are notarized.

C. Co-execute submittals when required.

D. Retain warranties and bonds until time specified for submittal.

E. Manual: Bind in commercial quality 8-1/2 by 11 inch three D side ring binders with durable plastic covers.

F. Cover: Identify each binder with typed or printed title WARRANTIES AND BONDS, with title of Project; name, address and telephone number of Contractor and equipment supplier; and name of responsible company principal.

G. Table of Contents: Neatly typed, in the sequence of the Table of Contents of the Project Manual, with each item identified with the number and title of the specification section in which specified, and the name of product or work item.

H. Separate each warranty or bond with index tab sheets keyed to the Table of Contents listing. Provide full information, using separate typed sheets as necessary. List Subcontractor, supplier, and manufacturer, with name, address, and telephone number of responsible principal.

END OF SECTION

SECTION 01 9113
GENERAL COMMISSIONING REQUIREMENTS

PART 1 GENERAL

1.1 SUMMARY

A. Commissioning is intended to achieve the following specific objectives; this section specifies the Contractor's responsibilities for commissioning:

1. Verify that the work is installed in accordance with the Contract Documents and the manufacturer's recommendations and instructions, and that it receives adequate operational checkout prior to startup: Startup reports and Prefunctional Checklists executed by Contractor are utilized to achieve this.

2. Verify and document that functional performance is in accordance with the Contract Documents: Functional Tests executed by Contractor and witnessed by the Commissioning Authority are utilized to achieve this.

3. Verify that operation and maintenance manuals submitted to Owner are complete: Detailed operation and maintenance (O&M) data submittals by Contractor are utilized to achieve this.

4. Verify that the Owner's operating personnel are adequately trained: Formal training conducted by Contractor is utilized to achieve this.

B. The Commissioning Authority directs and coordinates all commissioning activities; this section describes some but not all of the Commissioning Authority's responsibilities.

PART 2 PRODUCTS

2.1 TEST EQUIPMENT

A. Provide all standard testing equipment required to perform startup and initial checkout and required Functional Testing; unless otherwise noted such testing equipment will NOT become the property of Owner.

B. Calibration Tolerances: Provide testing equipment of sufficient quality and accuracy to test and/or measure system performance with the tolerances specified. If not otherwise noted, the following minimum requirements apply:

1. Temperature Sensors and Digital Thermometers: Certified calibration within past year to accuracy of 0.5 degree F and resolution of plus/minus 0.1 degree F.

2. Pressure Sensors: Accuracy of plus/minus 2.0 percent of the value range being measured (not full range of meter), calibrated within the last year.

3. Calibration: According to the manufacturer's recommended intervals and when dropped or damaged; affix calibration tags or keep certificates readily available for inspection.

C. Equipment-Specific Tools: Where special testing equipment, tools and instruments are specific to a piece of equipment, are only available from the vendor, and are required in order to accomplish startup or Functional Testing, provide such equipment, tools, and instruments as part of the work at no extra cost to Owner; such equipment, tools, and instruments are to become the property of Owner.

D. Dataloggers: Independent equipment and software for monitoring flows, currents, status, pressures, etc. of equipment.

1. Dataloggers required to for Functional Tests will be provided by the Commissioning Authority and will not become the property of Owner.

PART 3 EXECUTION

3.1 COMMISSIONING PLAN

A. Commissioning Authority will prepare the Commissioning Plan.

1. Attend meetings called by the Commissioning Authority for purposes of completing the commissioning plan.

2. Require attendance and participation of relevant subcontractors, installers, suppliers, and manufacturer representatives.

B. Contractor is responsible for compliance with the Commissioning Plan.

C. Commissioning Plan: The commissioning schedule, procedures, and coordination requirements for all parties in the commissioning process.

D. Commissioning Schedule:

1. Submit anticipated dates of startup of each item of equipment and system to Commissioning Authority within 60 days after award of Contract.

2. Re-submit anticipated startup dates monthly, but not less than 4 weeks prior to startup.

3. Prefunctional Checklists and Functional Tests are to be performed in sequence from components, to subsystems, to systems.

4. Provide sufficient notice to Commissioning Authority for delivery of relevant Checklists and Functional Test procedures, to avoid delay.

3.2 STARTUP PLANS AND REPORTS

A. Startup Plans: For each item of equipment and system for which the manufacturer provides a startup plan, submit the plan not less than 8 weeks prior to startup.

B. Startup Reports: For each item of equipment and system for which the manufacturer provides a startup checklist (or startup plan or field checkout sheet), document compliance by submitting the completed startup checklist prior to startup, signed and dated by responsible entity.

C. Submit directly to the Commissioning Authority.

3.3 PREFUNCTIONAL CHECKLISTS

A. A Prefunctional Checklist is required to be filled out for each item of equipment or other assembly specified to be commissioned.

1. No sampling of identical or near-identical items is allowed.

2. These checklists do not replace manufacturers' recommended startup checklists, regardless of apparent redundancy.

3. Prefunctional Checklist forms will not be complete until after award of the contract; the following types of information will be gathered via the completed Checklist forms:

a. Certification by installing contractor that the unit is properly installed, started up, and operating and ready for Functional Testing.

b. Confirmation of receipt of each shop drawing and commissioning submittal specified, itemized by unit.

c. Manufacturer, model number, and relevant capacity information; list information "as specified," "as submitted," and "as installed."

d. Serial number of installed unit.

e. List of inspections to be conducted to document proper installation prior to startup and Functional Testing; these will be primarily static inspections and procedures; for equipment and systems may include normal manufacturer's start-up checklist items and minor testing.

f. Sensor and actuator calibration information.

B. Contractor is responsible for filling out Prefunctional Checklists, after completion of installation and before startup; witnessing by the Commissioning Authority is not required unless otherwise specified.

1. Each line item without deficiency is to be witnessed, initialed, and dated by the actual witness; checklists are not complete until all line items are initialed and dated complete without deficiencies.

2. Checklists with incomplete items may be submitted for approval provided the Contractor attests that incomplete items do not preclude the performance of safe and reliable Functional Testing; re-submission of the Checklist is required upon completion of remaining items.

3. Individual Checklists may contain line items that are the responsibility of more than one installer; Contractor shall assign responsibility to appropriate installers or subcontractors, with identification recorded on the form.

4. If any Checklist line item is not relevant, record reasons on the form.

5. Contractor may independently perform startup inspections and/or tests, at Contractor's option.

6. Regardless of these reporting requirements, Contractor is responsible for correct startup and operation.

7. Submit completed Checklists to Commissioning Authority within two days of completion.

C. Commissioning Authority is responsible for furnishing the Prefunctional Checklists to Contractor.

1. Initial Drafts: Contractor is responsible for initial draft of Prefunctional Checklist where so indicated in the Contract Documents.

2. Provide all additional information requested by Commissioning Authority to aid in preparation of checklists, such as shop drawing submittals, manufacturers' startup checklists, and O&M data.

3. Commissioning Authority may add any relevant items deemed necessary regardless of whether they are explicitly mentioned in the Contract Documents or not.

4. When asked to review the proposed Checklists, do so in a timely manner.

D. Commissioning Authority Witnessing: Required for:

1. Each piece of primary equipment, unless sampling of multiple similar units is allowed by the commissioning plan.

2. A sampling of non-primary equipment, as allowed by the commissioning plan.

E. Deficiencies: Correct deficiencies and re-inspect or re-test, as applicable, at no extra cost to Owner.

1. If difficulty in correction would delay progress, report deficiency to the Commissioning Authority immediately.

3.4 FUNCTIONAL TESTS

A. A Functional Test is required for each item of equipment, system, or other assembly specified to be commissioned, unless sampling of multiple identical or near-identical units is allowed by the final test procedures.

B. Contractor is responsible for execution of required Functional Tests, after completion of Prefunctional Checklist and before closeout.

C. Commissioning Authority is responsible for witnessing and reporting results of Functional Tests, including preparation and completion of forms for that purpose.

D. Contractor is responsible for correction of deficiencies and re-testing at no extra cost to Owner; if a deficiency is not corrected and re-tested immediately, the Commissioning Authority will document the deficiency and the Contractor's stated intentions regarding correction.

1. Deficiencies are any condition in the installation or function of a component, piece of equipment or system that is not in compliance with the Contract Documents or does not perform properly.

2. When the deficiency has been corrected, the Contractor completes the form certifying that the item is ready to be re-tested and returns the form to the Commissioning Authority; the Commissioning Authority will reschedule the test and the Contractor shall re-test.

3. Identical or Near-Identical Items: If 10 percent, or three, whichever is greater, of identical or near-identical items fail to perform due to material or manufacturing defect, all items will be considered defective; provide a proposal for correction within 2 weeks after notification of defect, including provision for testing sample installations prior to replacement of all items.

4. Contractor shall bear the cost of Owner and Commissioning Authority personnel time witnessing re-testing.

5. Contractor shall bear the cost of Owner and Commissioning Authority personnel time witnessing re-testing if the test failed due to failure to execute the relevant Prefunctional Checklist correctly; if the test failed for reasons that would not have been identified in the Prefunctional Checklist process, Contractor shall bear the cost of the second and subsequent re-tests.

E. Functional Test Procedures:

1. Some test procedures are included in the Contract Documents; where Functional Test procedures are not included in the Contract Documents, test procedures will be determined by the Commissioning Authority with input by and coordination with Contractor.

2. Examples of Functional Testing:

a. Test the dynamic function and operation of equipment and systems (rather than just components) using manual (direct observation) or monitoring methods under full operation (e.g., the chiller pump is tested interactively with the chiller functions to see if the pump ramps up and down to maintain the differential pressure setpoint).

b. Systems are tested under various modes, such as during low cooling or heating loads, high loads, component failures, unoccupied, varying outside air temperatures, fire alarm, power failure, etc.

c. Systems are run through all the HVAC control system’s sequences of operation and components are verified to be responding as the sequence's state.

d. Traditional air or water test and balancing (TAB) is not Functional Testing; spot checking of TAB by demonstration to the Commissioning Authority is Functional Testing.

F. Deferred Functional Tests: Some tests may need to be performed later, after substantial completion, due to partial occupancy, equipment, seasonal requirements, design or other site conditions; performance of these tests remains the Contractor's responsibility regardless of timing.

3.5 SENSOR AND ACTUATOR CALIBRATION

A. Calibrate all field-installed temperature, relative humidity, carbon monoxide, carbon dioxide, and pressure sensors and gauges, and all actuators (dampers and valves) on this piece of equipment shall be calibrated. Sensors installed in the unit at the factory with calibration certification provided need not be field calibrated.

B. Calibrate using the methods described below; alternate methods may be used, if approved by Commissioning Authority and Owner beforehand. See PART 2 for test instrument requirements. Record methods used on the relevant Prefunctional Checklist or other suitable forms, documenting initial, intermediate and final results.

C. All Sensors:

1. Verify that sensor location is appropriate and away from potential causes of erratic operation.

2. Verify that sensors with shielded cable are grounded only at one end.

3. For sensor pairs that are used to determine a temperature or pressure difference, for temperature make sure they are reading within 0.2 degree F of each other, and for pressure, within tolerance equal to 2 percent of the reading, of each other.

4. Tolerances for critical applications may be tighter.

D. Sensors Without Transmitters - Standard Application:

1. Make a reading with a calibrated test instrument within 6 inches of the site sensor.

2. Verify that the sensor reading, via the permanent thermostat, gauge or building automation system, is within the tolerances in the table below of the instrument-measured value.

3. If not, install offset, calibrate or replace sensor.

E. Sensors With Transmitters - Standard Application.

1. Disconnect sensor.

2. Connect a signal generator in place of sensor.

3. Connect ammeter in series between transmitter and building automation system control panel.

4. Using manufacturer's resistance-temperature data, simulate minimum desired temperature.

5. Adjust transmitter potentiometer zero until 4 mA is read by the ammeter.

6. Repeat for the maximum temperature matching 20 mA to the potentiometer span or maximum and verify at the building automation system.

7. Record all values and recalibrate controller as necessary to comply with specified control ramps, reset schedules, proportional relationship, reset relationship and P/I reaction.

8. Reconnect sensor.

9. Make a reading with a calibrated test instrument within 6 inches of the site sensor.

10. Verify that the sensor reading, via the permanent thermostat, gauge or building automation system, is within the tolerances in the table below of the instrument-measured value.

11. If not, replace sensor and repeat.

12. For pressure sensors, perform a similar process with a suitable signal generator.

F. Sensor Tolerances for Standard Applications: Plus/minus the following maximums:

1. Watthour, Voltage, Amperage: 1 percent of design.

2. Pressure, Air, Water, Gas: 3 percent of design.

3. Air Temperatures (Outside Air, Space Air, Duct Air): 0.4 degrees F.

4. Relative Humidity: 4 percent of design.

5. Barometric Pressure: 0.1 inch of Hg.

6. Flow Rate, Air: 10 percent of design.

7. Flow Rate, Water: 4 percent of design.

8. AHU Wet Bulb and Dew Point: 2.0 degrees F.

G. Critical Applications: For some applications more rigorous calibration techniques may be required for selected sensors. Describe any such methods used on an attached sheet.

H. Valve/Damper Stroke Setup and Check:

1. For all valve/damper actuator positions checked, verify the actual position against the control system readout.

2. Set pump/fan to normal operating mode.

3. Command valve/damper closed; visually verify that valve/damper is closed and adjust output zero signal as required.

4. Command valve/damper to open; verify position is full open and adjust output signal as required.

5. Command valve/damper to a few intermediate positions.

6. If actual valve/damper position does not reasonably correspond, replace actuator or add pilot positioner (for pneumatics).

I. Isolation Valve or System Valve Leak Check: For valves not associated with coils.

1. With full pressure in the system, command valve closed.

2. Use an ultra-sonic flow meter to detect flow or leakage.

3.6 TEST PROCEDURES - GENERAL

A. Provide skilled technicians to execute starting of equipment and to execute the Functional Tests. Ensure that they are available and present during the agreed upon schedules and for sufficient duration to complete the necessary tests, adjustments and problem-solving.

B. Provide all necessary materials and system modifications required to produce the flows, pressures, temperatures, and conditions necessary to execute the test according to the specified conditions. At completion of the test, return all affected equipment and systems to their pre-test condition.

C. Sampling: Where Functional Testing of fewer than the total number of multiple identical or near-identical items is explicitly permitted, perform sampling as follows:

1. Identical Units: Defined as units with same application and sequence of operation; only minor size or capacity difference.

2. Sampling is not allowed for:

a. Major equipment.

b. Life-safety-critical equipment.

c. Prefunctional Checklist execution.

3. XX = the percent of the group of identical equipment to be included in each sample; defined for specific type of equipment.

4. YY = the percent of the sample that if failed will require another sample to be tested; defined for specific type of equipment.

5. Randomly test at least XX percent of each group of identical equipment, but not less than three units. This constitutes the "first sample."

6. If YY percent of the units in the first sample fail, test another XX percent of the remaining identical units.

7. If YY percent of the units in the second sample fail, test all remaining identical units.

8. If frequent failures occur, resulting in more troubleshooting than testing, the Commissioning Authority may stop the testing and require Contractor to perform and document a checkout of the remaining units prior to continuing testing.

D. Manual Testing: Use hand-held instruments, immediate control system readouts, or direct observation to verify performance (contrasted to analyzing monitored data taken over time to make the “observation”).

E. Simulating Conditions: Artificially create the necessary condition for the purpose of testing the response of a system; for example apply hot air to a space sensor using a hair dryer to see the response in a VAV box.

F. Simulating Signals: Disconnect the sensor and use a signal generator to send an amperage, resistance or pressure to the transducer and control system to simulate the sensor value.

G. Over-Writing Values: Change the sensor value known to the control system in the control system to see the response of the system; for example, change the outside air temperature value from 50 degrees F to 75 degrees F to verify economizer operation.

H. Indirect Indicators: Remote indicators of a response or condition, such as a reading from a control system screen reporting a damper to be 100 percent closed, are considered indirect indicators.

I. Monitoring: Record parameters (flow, current, status, pressure, etc.) of equipment operation using dataloggers or the trending capabilities of the relevant control systems; where monitoring of specific points is called for in Functional Test Procedures:

1. All points that are monitored by the relevant control system shall be trended by Contractor; at the Commissioning Authority’s request, Contractor shall trend up to 20 percent more points than specified at no extra charge.

2. Other points will be monitored by the Commissioning Authority using dataloggers.

3. At the option of the Commissioning Authority, some control system monitoring may be replaced with datalogger monitoring.

4. Provide hard copies of monitored data in columnar format with time down left column and at least 5 columns of point values on same page.

5. Graphical output is desirable and is required for all output if the system can produce it.

6. Monitoring may be used to augment manual testing.

3.7 OPERATION AND MAINTENANCE MANUALS

A. Add design intent documentation furnished by Architect to manuals prior to submission to Owner.

B. Submit manuals related to items that were commissioned to Commissioning Authority for review; make changes recommended by Commissioning Authority.

C. Commissioning Authority will add commissioning records to manuals after submission to Owner.

END OF SECTION

SECTION 02 4100
DEMOLITION

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Selective demolition of built site elements.

B. Abandonment and removal of existing utilities and utility structures.

1.2 RELATED REQUIREMENTS

A. Section 01 1000 - Summary

B. Section 01 5000 - Temporary Facilities and Controls

C. Section 01 7000 - Execution and Closeout Requirements

D. Section 01 7419 - Construction Waste Management and Disposal

E. Section 31 1000 - Site Clearing

F. Section 31 2000 - Earthwork

1.3 REFERENCE STANDARDS

A. 29 CFR 1926 - U.S. Occupational Safety and Health Standards; current edition.

B. NFPA 241 - Standard for Safeguarding Construction, Alteration, and Demolition Operations; 2013.

1.4 SUBMITTALS

A. Project Record Documents: Accurately record actual locations of capped and active utilities and subsurface construction.

PART 2 PRODUCTS

2.1 MATERIALS

A. Fill Material: As specified in Section 31 2200 - Earthwork

PART 3 EXECUTION

3.1 GENERAL PROCEDURES AND PROJECT CONDITIONS

A. Comply with applicable codes and regulations for demolition operations and safety of adjacent structures and the public.

1. Use of explosives is not permitted.

2. Take precautions to prevent uncontrolled collapse of structures to be removed; do not allow worker or public access within range of potential collapse of unstable structures.

3. Provide, erect, and maintain temporary barriers and security devices.

4. Use physical barriers to prevent access to areas that could be hazardous to workers or the public.

5. Conduct operations to minimize effects on and interference with adjacent structures and occupants.

6. Do not close or obstruct roadways or sidewalks without permit.

7. Conduct operations to minimize obstruction of public and private entrances and exits; do not obstruct required exits at any time; protect persons using entrances and exits from removal operations.

8. Obtain written permission from owners of adjacent properties when demolition equipment will traverse, infringe upon or limit access to their property.

B. Do not begin removal until receipt of notification to proceed from Owner.

C. Protect existing structures and other elements that are not to be removed.

1. Provide bracing and shoring.

2. Prevent movement or settlement of adjacent structures.

3. Stop work immediately if adjacent structures appear to be in danger.

D. Fill holes where foundations and subgrade utilities are removed to match adjacent grades.

E. If hazardous materials are discovered during removal operations, stop work and notify Architect and Owner; hazardous materials include regulated asbestos containing materials, lead, PCB's, and mercury.

F. Perform demolition in a manner that maximizes salvage and recycling of materials.

1. Comply with requirements of Section 01 7419 - Construction Waste Management and Disposal.

G. Partial Removal of Paving and Curbs: Neatly saw cut at right angle to surface.

3.2 EXISTING UTILITIES

A. Coordinate work with utility companies; notify before starting work and comply with their requirements; obtain required permits.

B. Protect existing utilities to remain from damage.

C. Do not disrupt public utilities without permit from authority having jurisdiction.

D. Do not close, shut off, or disrupt existing life safety systems that are in use without at least 7 days prior written notification to Owner.

E. Do not close, shut off, or disrupt existing utility branches or take-offs that are in use without at least 3 days prior written notification to Owner.

F. Locate and mark utilities to remain; mark using highly visible tags or flags, with identification of utility type; protect from damage due to subsequent construction, using barricades.

G. Remove exposed piping, valves, meters, equipment, supports, and foundations of disconnected and abandoned utilities.

3.3 DEBRIS AND WASTE REMOVAL

A. Remove debris, junk, and trash from site.

B. Leave site in clean condition, ready for subsequent work.

C. Clean up spillage and wind-blown debris from public and private lands.

END OF SECTION

SECTION 03 0516
UNDER-SLAB VAPOR BARRIER

PART 1 - GENERAL

1.1 SUMMARY

A. Products supplied under this section:

1. Vapor barrier and installation accessories for installation under concrete slabs.

B. Related sections:

1. Section 03 30 00 Cast-in-Place Concrete

2. Section 07 26 00 Vapor Retarders

1.2 REFERENCES

A. ASTM International

1. ASTM E1745-17: Standard Specification for Plastic Water Vapor Retarders Used in Contact with Soil or Granular Fill Under Concrete Slabs.

2. ASTM E1643-18a: Selection, Design, Installation, and Inspection of Water Vapor Retarders Used in Contact with Earth or Granular Fill Under Concrete Slabs.

B. Technical Reference - American Concrete Institute (ACI):

1. ACI 302.2R-06: Guide for Concrete Slabs that Receive Moisture-Sensitive Flooring Materials.

2. ACI 302.1R-15: Guide to Concrete Floor and Slab Construction.

1.3 SUBMITTALS

A. Quality control/assurance:

1. Summary of test results per paragraph 9.3 of ASTM E1745.

2. Manufacturer’s samples and literature.

3. Manufacturer’s installation instructions for placement, seaming, penetration prevention and repair, and perimeter seal per ASTM E1643.

4. All mandatory ASTM E1745 testing must be performed on a single production roll per ASTM E1745 Section 8.1.

5. Contact vapor barrier manufacturer to schedule a pre-construction meeting and to coordinate a review, in-person or digital, of the vapor barrier installation.

6. Vapor barrier manufacturer must warrant in writing (a) compliance with the designated ASTM E1745 classification, and (b) no manufacturing defects in the product for, at least, the Life of the Building.

7. Manufacturer verify in writing 20 years in the industry with no reported product failures.

PART 2 - PRODUCTS

2.1 MATERIALS

2.2 Vapor barrier shall have all the following qualities:

A. Maintain permeance of less than 0.01 Perms as tested in accordance with mandatory conditioning tests per ASTM E1745 Section 7.1 (7.1.1-7.1.5).

B. Other performance criteria:

1. Strength: ASTM E1745 Class A.

2. Thickness: 15 mils minimum

3. Provide third party documentation that all testing was performed on a single production roll per ASTM E1745 Section 8.1

4. Warranty: (a) compliance with the designated ASTM E1745 classification, and (b) no manufacturing defects in the product for, at least, the Life of the Building.

C. Vapor barrier products:

1. Basis of Design: Stego Wrap Vapor Barrier (15-mil) by Stego Industries LLC., (877) 464-7834 www.stegoindustries.com

2.3 ACCESSORIES

A. Seams:

1. Stego Tape by Stego Industries LLC, (877) 464-7834 www.stegoindustries.com.

B. Sealing Penetrations of Vapor barrier:

1. Stego Mastic by Stego Industries LLC, (877) 464-7834 www.stegoindustries.com.

2. Stego Tape by Stego Industries LLC, (877) 464-7834 www.stegoindustries.com.

C. Perimeter/terminated edge seal:

D. Stego Crete Claw (textured tape) by Stego Industries LLC, (877) 464-7834 www.stegoindustries.com.

1. 2. Stego Term Bar by Stego Industries LLC, (877) 464-7834 www.stegoindustries.com.

2. 3. StegoTack Tape (double-sided sealant tape) by Stego Industries LLC, (877) 464-7834 www.stegoindustries.com.

3. One-sided seaming tape is not a recommended method of sealing at the terminated edge.

E. Penetration Prevention:

1. Beast Foot by Stego Industries LLC, (877) 464-7834 www.stegoindustries.com.

F. Vapor Barrier-Safe Hand Screed System

1. Beast Screed by Stego Industries, LLC, (877) 464-7834 www.stegoindustries.com.

PART 3 - EXECUTION

3.1 PREPARATION

A. Ensure that subsoil is approved by Architect or Geotechnical Engineer.

1. Level and compact base material.

B. Contact vapor barrier manufacturer to schedule a pre-construction meeting and to coordinate a review, in-person or digital, of the vapor barrier installation.

3.2 INSTALLATION

A. Install vapor barrier in accordance ASTM E1643.

1. Unroll vapor barrier with the longest dimension parallel with the direction of the concrete placement and face laps away from the expected direction of the placement whenever possible.

2. Extend vapor barrier to the perimeter of the slab. If practicable, terminate it at the top of the slab, otherwise (a) at a point acceptable to the structural engineer or (b) where obstructed by impediments, such as dowels, water stops, or any other site condition requiring early termination of the vapor barrier. At the point of termination, seal vapor barrier to the foundation wall, grade beam or slab itself.

a. Seal vapor barrier to the entire slab perimeter using manufacturer’s textured tape with a surface that creates a mechanical seal to freshly-placed concrete, per manufacturer's instructions.

3. Overlap joints 6 inches and seal with manufacturer’s seam tape.

4. Apply seam tape/textured tape/double-sided tape to a clean and dry vapor barrier.

5. Seal all penetrations (including pipes) per manufacturer’s instructions.

6. Avoid the use of stakes driven through vapor barrier by utilizing screed and forming systems that will not leave punctures in the vapor barrier.

7. Repair damaged areas with vapor barrier material of similar (or better) permeance, puncture and tensile.

END OF SECTION

SECTION 03 1000
CONCRETE FORMWORK

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Formwork for cast-in-place concrete, with shoring, bracing, and anchorage.

B. Openings for other affected work.

C. Form accessories.

D. Stripping forms.

1.2 REFERENCES (LATEST EDITIONS UNLESS NOTED OTHERWISE)

A. CBC - California Building Code, (CCR) California Code of Regulations, Title 24, Part 2, Chapter 19A.

B. ACI 301 - Specifications for Structural Concrete for Buildings.

C. PS-1 - Construction and Industrial Plywood.

1.3 SYSTEM DESCRIPTION

A. Design, engineer, and construct formwork, shoring, and bracing to meet design and code requirements, so that resultant concrete conforms to required shapes, lines, and dimensions.

1.4 QUALITY ASSURANCE

A. Construct and erect concrete formwork in accordance with ACI 301.

1.5 REGULATORY REQUIREMENTS

A. Conform to CBC - California Building Code, (CCR) California Code of Regulations, Title 24, Part 2.

PART 2 - PRODUCTS

2.1 FORM MATERIALS

A. Plywood: PS-1, BB Plyform grade, Class I, Exterior classification.

B. Lumber: Douglas Fir species; construction grade; with grade stamp clearly visible.

C. Tubular Column: Round, of spirally wound laminated fiber; surface treated with release agent.

2.2 FORMWORK ACCESSORIES

A. Form Ties: Snap-off metal of adjustable length; cone type; 1 inch break back dimension; free of defects that will leave holes no larger than one inch diameter in concrete surface.

B. Form Release Agent: Colorless material which will not stain concrete, absorb moisture, or impair natural bonding or color characteristics of coating intended for use on concrete.

C. Fillets for Chamfered Corners: Wood strips type; 3/4 x 3/4 inch size; maximum possible lengths.

D. Dovetail Anchor Slots: Minimum 22 gage galvanized steel; foam filled; release tape sealed slots; bent tab anchors; securable to concrete formwork; manufactured by Heckmann Building Products Co., www.heckmannbuildingprods.com.

E. Flashing Reglets: 26 gage thick galvanized steel; longest possible lengths; release tape sealed slots; with alignment splines for joints; securable to concrete formwork; Type CO reglet manufactured by Fry Reglet www.fryreglet.com.

F. Nails, Spikes, Lag Bolts, Through Bolts, Anchorages: Sized as required; of strength and character to maintain formwork in place while placing concrete.

PART 3 - EXECUTION

3.1 INSPECTION

A. Verify lines, levels, and measurements before proceeding with formwork.

3.2 PREPARATION

A. Obtain Architect's approval for use of earth forms for footings.

B. Minimize form joints. Symmetrically align joints and make watertight to prevent leakage of mortar.

C. Arrange and assemble formwork to permit stripping, so that concrete is not damaged during its removal.

D. Arrange forms to allow stripping without removal of principal shores, where required to remain in place.

3.3 ERECTION

A. Erect formwork, shoring and bracing to achieve design requirements, in accordance with requirements of ACI 301.

B. Provide bracing to ensure stability of formwork. Strengthen formwork liable to be overstressed by construction loads.

C. Provide chamfer strips on external corners of walls.

D. Obtain approval before framing openings in structural members which are not indicated on Drawings.

E. Do not displace or damage vapor barrier placed by Section 03 3000.

F. Construct formwork to maintain tolerances in accordance with ACI 301.

3.4 APPLICATION OF FORM RELEASE AGENT

A. Apply form release agent on formwork in accordance with manufacturer's instructions. Apply prior to placing reinforcing steel, anchoring devices, and embedded items.

B. Do not apply form release agent where concrete surfaces are scheduled to receive applied coverings which may be affected by agent. Soak contact surfaces of untreated forms with clean water. Keep surfaces wet prior to placing concrete.

3.5 INSERTS, EMBEDDED PARTS, AND OPENINGS

A. Provide formed openings where required for work embedded in or passing through concrete.

B. Coordinate work of other Sections in forming and setting openings, slots, recesses, chases, sleeves, bolts, anchors, and other inserts.

C. Install accessories in accordance with manufacturer's instructions, level and plumb. Ensure items are not disturbed during concrete placement.

3.6 FORM REMOVAL

A. Do not remove forms and bracing until concrete has sufficient strength to support its own weight and imposed loads.

B. Do not damage concrete surfaces during form removal.

C. Store reusable forms for exposed architectural concrete to prevent damage to contact surfaces.

3.7 CLEANING

A. Clean forms to remove foreign matter as erection proceeds.

B. Ensure that water and debris drain to exterior through clean-out ports.

3.8 EARTH FORMS

A. Construct wood edge strips at top sides of excavations as indicated on drawings.

B. Provide forms for footings and foundation walls wherever concrete cannot be placed against solid earth.

C. Remove loose dirt and debris from form area prior to concrete placement.

D. Concrete for foundations may be placed directly into neat excavations provided the foundation trench walls are stable as determined by the Architect (Structural Engineer) subject to the approval of the Division of the State Architect.

E. When earth formed foundations are used, the minimum formwork shown on the drawings is mandatory to insure clean excavations prior to and during concrete placement.

F. Provide 3-1/2 inch high starter wall for all concrete and masonry walls below grade.

END OF SECTION

SECTION 03 2000
CONCRETE REINFORCEMENT

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Reinforcing steel bars, welded steel wire fabric fabricated steel bar or rod mats for cast-in-place concrete.

B. Support chairs, bolsters, bar supports, and spacers, for supporting reinforcement.

1.2 REFERENCES - (LATEST EDITIONS UNLESS NOTED OTHERWISE)

A. CBC - California Building Code, (CCR) California Code of Regulations, Title 24, Part 2, Chapter 19A (ACI 318).

B. ACI 301 - Specifications for Structural Concrete for Buildings.

C. ACI 315 (SP-66) - Details and Detailing of Concrete Reinforcement.

D. ACI 318 - Building Code Requirements for Structural Concrete.

E. ASTM A1064 – Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete

F. ASTM A615 - Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement.

G. ASTM A706 - Standard Specification for Deformed and Plain Low-Alloy Steel Bars for Concrete Reinforcement.

H. AWS D1.4 - Structural Welding Code Reinforcing Steel.

I. CRSI - Manual of Practice.

J. CRSI - Placing Reinforcing Bars.

1.3 QUALITY ASSURANCE

A. Perform concrete reinforcement work in accordance with CRSI Manual of Standard Practice.

B. Conform to ACI 301 and ACI 315 (SP-66).

C. Conform to CBC California Building Code, (CCR) California Code of Regulations, Title 24, Part 2.

1.4 CERTIFICATES

A. Submit mill test certificates of supplied concrete reinforcing, indicating physical and chemical analysis.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Reinforcing Steel: ASTM A615, Grade 60. Billet-steel deformed bars, uncoated finish.

B. Welded Reinforcement: ASTM A706, Grade 60, deformed bars, unfinished.

C. Welded Steel Wire Fabric: ASTM A1064 plain type; coiled rolls; uncoated finish.

D. Steel Wire: ASTM A1064, plain, cold drawn steel.

2.2 ACCESSORY MATERIALS

A. Tie Wire: Minimum 16 gage annealed type to tie perpendicular bars together.

1. Chairs, Bolsters, Bar Supports, Spacers: Sized and shaped for strength and support of reinforcement during installation and placement of concrete including load bearing pad on bottom to prevent vapor barrier puncture.

2.3 FABRICATION

A. Fabricate in accordance with ACI 315 (SP-66), providing concrete cover specified in Section 03 3000.

B. Locate reinforcing splices not indicated on Drawings at points of minimum stress. Indicate location of splices on shop drawings.

C. Weld reinforcing bars in accordance with AWS D1.4.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Before placing concrete, clean reinforcement of foreign particles or coatings.

B. Place, support, and secure reinforcement against displacement. Do not deviate from alignment or measurement.

C. Mix fibrous reinforcement into concrete material according to Section 03 3000.

D. Do not displace or damage vapor barrier required by Section 03 3000.

3.2 FIELD QUALITY CONTROL

A. Field inspection and testing will be performed as required by the Division of the State Architect and District Inspector in accordance with CBC 17A, 19A, and approved DSA form 103.

END OF SECTION

SECTION 03 3000
CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Cast-in-place concrete foundation walls and footings.

1. Floors and slabs.

2. Control, expansion, and contraction joint devices associated with concrete work.

3. Curing and sealing compound.

1.2 REFERENCES (LATEST EDITIONS UNLESS NOTED OTHERWISE)

A. CBC - California Building Code, (CCR) California Code of Regulations Title 24, Part 2, Chapter 19A

B. CBC - California Building Code, (CCR) California Code of Regulations, Title 24, Part 2, California State Accessibility Standards.

C. ADAAG - Americans with Disabilities Act (ADA) Accessibility Guidelines for Buildings and Facilities.

D. ACI 301 - Specifications for Structural Concrete for Buildings.

E. ACI 302.1R - Guide for Concrete Floor and Slab Construction.

F. ASTM C33 - Concrete Aggregates.

G. ASTM C94 - Ready-Mixed Concrete.

H. ASTM C150 - Portland Cement.

I. ASTM C260 - Air-Entraining Admixtures for Concrete.

J. ASTM C289 - Potential Reactivity of Aggregate.

K. ASTM C309 - Liquid Membrane Forming Compound.

L. ASTM C330 - Lightweight Aggregates for Structural Concrete.

M. ASTM C494 - Standard Specifications for Chemical Admixtures for Concrete.

N. ASTM C567 - Unit Weight of Structural Lightweight Concrete.

O. ASTM C618- Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture for Concrete.

P. ASTM C932 - Surface - Applied Bonding Agents.

Q. ASTM C1315 - Liquid Membrane - Forming Compounds Having Special Properties for Curing and Sealing Concrete.

R. ASTM D226 - Asphalt Saturated Organic Felt used in Roofing and Waterproofing.

S. ASTM D1751 - Preformed Expansion Joint Filler for Concrete Paving and Structural Construction.

T. ASTM E96 – Standard Test Methods for Water Vapor Transmission of Materials.

U. ASTM E1643 - Installation of Water Vapor Retarders used in Contact with Earth or Granular Fill Under Concrete Slab.

V. ASTM E1155 - Determining Floor Flatness and Levelness Using the F-Number System.

W. ASTM E1745 - Standard Specifications for Plastic Water Vapor Retarders Used in Contact with Soil Or Granular Fill Under Concrete Slabs.

X. ASTM F1869 - Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride.

Y. National Ready Mix Concrete Association - Plant Certification Program.

Z. Stormwater Best Management Practice Handbook (BMP Handbook), Construction Edition, as published by the California Storm Water Quality Association

1.3 QUALITY ASSURANCE

A. Perform work in accordance with ACI 301.

B. Obtain materials from same source throughout the Work.

1.4 QUALIFICATIONS

A. Manufacturer: Manufacturer of ready-mix concrete products complying with ASTM C94 requirements for production facilities and equipment. Certified according to National Ready Mix Concrete Associates Plant Certification Program.

1.5 DESIGN MIX

A. Submit design mix for each class of concrete, prepared by a California Registered Civil Engineer, to Testing Laboratory and Architect for Structural Engineer of Record review.

1.6 REGULATORY REQUIREMENTS

A. Conform to CBC - California Building Code, (CCR) California Code of Regulations, Title 24, Part 2.

B. Conform to CBC - California Building Code, (CCR) California Code of Regulations, Title 24, Part 2, and ADAAG for access requirements for individuals with disabilities.

1.7 SUBMITTALS

A. Submit product data and manufacturer's instructions.

1.8 ENVIRONMENTAL REQUIREMENTS

A. Provide concrete curing, finishing, and waste management techniques as defined in Section 4 of the Storm Water Best Management Practice Handbook, (BMP Handbook) Construction Edition.

PART 2 - PRODUCTS

2.1 FORMWORK

A. As specified in Section 03 1000.

2.2 REINFORCEMENT

A. Reinforcing steel as specified in Section 03 2000.

2.3 CONCRETE MATERIALS

A. Cement: ASTM C150, Type II/V Portland type; low alkali; grey color.

B. Fine and Coarse Aggregates Normal Weight Concrete: ASTM C33, non-reactive when tested in accordance with ASTM C289 and Appendix X-1 of ASTM C33.

C. Water, ASTM C1602: Clean and not detrimental to concrete.

2.4 ADMIXTURES

A. Air Entrainment: ASTM C260.

B. Fly Ash: ASTM C618, Class F.

C. Water Reducing Admixture: ASTM C494, Type A.

D. Calcium chloride

2.5 VAPOR BARRIER

A. Material per spec section 03 0516.

B. Accessories: Minimum 4 inch wide polyethylene tape with pressure sensitive adhesive.

C. Manufactures:

1. Stego Industries, www.stegoindustries.com.

D. Substitutions: Under Provisions of Section 01 6000.

2.6 ACCESSORIES

A. Underlayment: ASTM D226, Type I (No. 15) asphalt saturated roofing felt.

B. Bonding Agent: ASTM C932; Weld-Crete as manufactured by Larsen Products Corp., www.larsenproducts.com.

C. Non-shrink Grout: Premixed compound consisting of non-metallic aggregate, cement, water reducing and plasticizing agents; capable of developing minimum compressive strength of 7000 psi in 28 days. Comply with ASTM C-1107.

D. Joint Filler: ASTM D1751, 1/2 inch thick.

E. Sand Fill: Manufactured "crusher run" sand free of silt, clay, loam, friable or soluble materials or organic matters, all passing the No. 4 sieve and only 5 percent passing the No. 200 sieve.

F. Slip Resistant Aggregate: 95 percent minimum fused homogeneous aluminum oxide.

G. Substitutions: Under provisions of Section 01 6000.

2.7 CONCRETE MIX

A. Mix concrete in accordance with ASTM C94 and CBC, ACI 318 section 26.4.2

B. Footings: Proportion normal-weight concrete mixture as follows:

1. Minimum Compressive Strength: 4,500 psi at 28 days or as noted on the plans.

2. Maximum Water-Cement Materials Ratio: 0.45, unless noted otherwise on plans.

3. Aggregate Size: 1.5 inch maximum.

4. Slump Limit: 4 inch +/- 1 inch.

5. Fly Ash: Maximum 15 percent by weight.

6. Air Content: 1.5 percent, plus or minus 0.5 percent.

C. Slabs-on-grade: Proportion normal-weight concrete mixture as follows:

1. Minimum Compressive Strength: 4,500 psi at 28 days or as noted on the plans.

2. Maximum Water-Cement Materials Ratio: 0.45, unless noted otherwise on plans.

3. Aggregate Size: 1.5 inch maximum.

4. Slump Limit: 4 inch +/- 1 inch.

5. Fly Ash: Maximum 15 percent by weight.

6. Air Content: 2.5 percent, plus or minus 0.5 percent.

PART 3 - EXECUTION

3.1 INSPECTION

A. Verify anchors, seats, plates, reinforcement, and other items to be cast into concrete are accurately placed, held securely, and will not cause difficulty in placing concrete.

3.2 PREPARATION

A. At locations where new concrete is dowelled to existing work, drill holes in existing concrete, insert steel dowels, and pack solid with non-shrink grout.

B. Place 2 inch thick sand fill over subgrade.

3.3 BASE

A. Place 2 inch thick sand fill base over vapor barrier.

B. Compact base materials in accordance with provisions of Section 02 5000.

C. Ensure vapor barrier is not damaged or disturbed during base installation.

3.4 PLACING CONCRETE

A. Notify Architect minimum 48 hours prior to commencement of concreting operations.

B. Place concrete in accordance with ACI 301.

C. Hot and Cold Weather Placement: ACI 301.

1. When average high and low temperature is expected to fall below 40 deg F for three successive days, maintain delivered concrete mixture temperature within the temperature range required by ACI 301.

2. 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.

3. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete in hot weather. Keep subgrade uniformly moist without standing water, soft spots, or dry areas.

4. Ensure reinforcement, inserts, embedded parts and formed joints are not disturbed during concrete placement.

5. Do not disturb or damage vapor barrier while placing concrete. Repair damage as required to maintain integrity of barrier.

6. Place concrete continuously between predetermined construction and control joints. Do not break or interrupt successive pours such that cold joints occur.

7. Excessive honeycomb or embedded debris in concrete is not acceptable.

3.5 JOINTS

A. Saw cut control joints at an optimum time after finishing. Use 3/16 inch thick blade, cutting 1/3 into depth of slab thickness.

B. Provide control joints at 15 feet on center unless otherwise indicated.

C. Separate slabs from vertical surfaces with joint filler. Extend joint filler from bottom of slab to within 1/4 inch of finished slab surface.

3.6 FINISHING OF FORMED SURFACES

A. Rough form finish:

1. Leave surfaces with the texture imparted by forms, except patch tie holes and defects.

2. Remove fins exceeding 1/4 inch in height.

3. Use for below grade foundation walls and concealed spaces.

B. Smooth form finish:

1. Coordinate as necessary to secure form construction using smooth, hard, uniform surfaces, with number of seams kept to a practical minimum and in a uniform and orderly pattern.

2. Patch tie holes and defects.

3. Remove fins completely.

4. Use for exposed finish surfaces to receive paint.

C. Smooth rubbed finish:

1. Produce on newly hardened concrete no later than the day following form removal.

2. Wet the surfaces, and rub with carborundum brick or other abrasive until uniform color and texture are produced.

3. Do not use a cement grout other than the cement paste drawn from the concrete itself by the rubbing process.

4. Use for exposed finish surfaces to receive clear sealer.

D. Grout cleaned finish:

1. Do not start cleaning operations until all contiguous surfaces to be cleaned are completed and accessible.

2. Do not permit cleaning as the work progresses.

3. Mix one part Portland cement and 1-1/2 parts fine sand with sufficient water to produce a grout having the consistency of thick paint.

4. Wet the surface of the concrete sufficiently to prevent absorption of water from the grout and apply the grout uniformly with brushes or spray gun.

5. Immediately after applying the grout, scrub the surface vigorously with a cork float or stone to coat the surface and fill all air bubbles and holes.

6. While the grout is still plastic, remove all excess grout by working the surface with a rubber float, sack, or other means.

7. After the surface whites from drying (about 30 minutes at normal temperatures), rub vigorously with clean burlap.

8. Keep the surface damp for at least 36 hours after final rubbing.

9. Use for repair of exposed finish surfaces to receive paint or clear sealer.

3.7 FINISHING OF UNFORMED SURFACE

A. Per plan.

3.8 PATCHING

A. Notify Architect immediately upon removal of forms to determine areas that will require patching.

B. Surface defects shall include color and texture irregularities, stains, cracks, spalls, air bubbles, honeycombs, rock pockets, fins and other projections and discolorations in the surface that cannot be removed by cleaning.

C. Patch imperfections in accordance with ACI 301.

3.9 DEFECTIVE CONCRETE

A. Modify or replace concrete not conforming to required levels and lines, details, and elevations.

B. Repair or replace concrete not properly placed or of the specified type.

3.10 FIELD QUALITY CONTROL

A. Field inspection and testing will be performed under provisions of Section 01 4000 and Section 01 4100 and as required by the Division of the State Architect and District Inspector.

B. Owner's Inspector will take cylinders and perform slump and air entrainment tests in accordance with ACI 301 and will arrange for pick-up by Testing Laboratory.

C. Samples for strength test 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 or surface area for slabs or walls. Additional samples for seven-day compressive strength test shall be taken for each class of concrete at the beginning of the concrete work or whenever the mix or aggregate is changed – CBC 1905A.1.15.

D. Tests of cement and aggregates will be performed by Testing Laboratory to ensure conformance with requirements stated herein.

E. Maintain records of placed concrete items. Record date, location of pour, quantity, air temperature, and test samples taken.

3.11 PROTECTION

A. Protect finished work under provisions of Section 01 4000.

B. Immediately after placement, protect concrete from premature drying, excessively hot or cold temperatures, and mechanical injury.

C. Maintain concrete with minimal moisture loss at relatively constant temperature for period necessary for hydration of cement and hardening of concrete.

END OF SECTION

SECTION 03 3546
SEALED CONCRETE FINISHING

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Concrete sealer/hardener treatment.

1.2 REFERENCES

A. The publications listed below form a part of this Section to the extent referenced. The publications are referred to in the text by the basic designation only. Refer to Division 01 for definitions, acronyms, and abbreviations.

B. Unless otherwise noted, standards, manuals, and codes refer to the latest edition of such standards, manuals, and codes.

C. Referenced Standards:

1. ASTM C805 – Standard Test Method for Rebound Number of Hardened Concrete.

2. ASTM C1028– Standard Test Method for Determining the Static Coefficient of Friction of Ceramic Tile and Other Like Surfaces by the Horizontal Dynamometer Pull-Meter Method.

3. ASTM G23 – Standard Practice for Operating Light-Exposure Apparatus (Carbon-Arc Type) With and Without Water for Exposure of Nonmetallic Materials.

1.3 PERFORMANCE REQUIREMENTS

A. Portland cement concrete paving shall be stable, firm, and slip resistant and shall comply with CBC Sections 11B-302 and 11B-403.

B. Concrete finish system slip resistance: Comply with CBC and ADAAG – minimum 0.6 coefficient of friction per ASTM C1028. This coefficient of friction shall be achieved under the work of Section 03 30 00.

C. Concrete polishing and sealer/hardener treatment:

1. Impact Strength: Minimum 21 percent increase as tested per ASTM C805.

2. Weathering: No adverse effect to ultraviolet light and water spray as tested per ASTM G23.

1.4 SUBMITTALS

A. General: Submit in accordance with Division 01.

B. Product Data: Submit manufacturer's descriptive literature, product specification, and installation instructions for each product.

C. Sustainable Building Design Submittals:

1. MSDS.

2. VOC content.

D. Closeout Submittals:

1. Maintenance and cleaning data.

1.5 QUALITY ASSURANCE

A. Qualifications:

1. Manufacturer Qualifications: Firm specializing in manufacturing products specified in this Section with a minimum 5 years experience.

2. Applicator Qualifications: Firm specializing in installing work specified in this Section acceptable to manufacturer with experience on at least 5 projects of similar nature in the past 3 years.

B. Products: All products used on this project shall be VOC compliant in the State of California.

C. Concrete Substrate Requirements:

1. Finish: All concrete floor surfaces scheduled to receive a sealed finish shall have a smooth, hard, glazed steel trowel finish. This finish shall be achieved under the work of Section 03 33 00.

2. Cure Time: Prior to application of floor sealer/hardner treatment, concrete shall be cured a minimum of 45 days, or as directed by finish system manufacturer.

3. Protection: Petroleum stains are not allowed at areas where floor finish system is to be applied. Provide the following protective measures:

a. Diaper all hydraulic equipment.

b. Keep all vehicles off concrete slab or provide non-porous drop cloths where vehicles are parked on concrete slab.

c. Do not cut pipe on concrete slab.

d. Do not place steel directly on concrete slab.

e. All equipment shall be equipped with non-marking tires.

f. Cover floor with floor protection product specified in this Section.

D. Pre-Installation Meetings:

1. Conduct pre-installation meeting in accordance with Division 01.

2. Convene pre-installation meeting prior to commencing work of this Section.

3. Coordinate work in this Section with work in related Sections.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Comply with requirements of Division 01.

B. Deliver products in manufacturer's original containers, dry and undamaged, with seals and labels intact.

C. Storage and Protection: Store materials in a dry secure place.

1.7 PROJECT/SITE CONDITIONS

A. Environmental Requirements:

1. Comply with manufacturer’s written instructions for substrate temperature and moisture content, ambient temperature and humidity, ventilation, and other conditions affecting concrete finishing performance.

2. Close areas to traffic during and after floor application as specified in this Section.

1.8 MAINTENANCE

A. Operations and Maintenance Data: Submit in accordance with Division 01. Provide cleaning and maintenance information.

PART 2 PRODUCTS

2.1 MANUFACTURERS AND PRODUCTS

A. Manufacturers and products are the Basis of Design for the sealed concrete finishing system and are listed to establish minimum requirements as to quality and performance. Comply with requirements of Division 01 for substitutions.

B. Concrete Sealer/Hardener Treatment:

1. Ashford Formula by Curecrete Distribution, Inc., Springville, UT; 800-998-5664, www.ashfordformula.com <http://www.ashfordformula.com>.

2. or equal.

C. Floor Protection:

1. The System with EZ Cover as manufactured by McTech group, Inc., Loganville, GA; 866-913-8363, www.mctechgroup.com <http://www.mctechgroup.com>. System shall be breathable and biodegradable.

2. or accepted equal.

2.2 RELATED MATERIALS

A. Water: Potable.

2.3 FINISH

A. Hard steel troweled concrete slab.

2.4 LOCATIONS:

A. Refer to Room Finish Schedule on drawings for rooms to receive sealed concrete floor.

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine substrate in the presence of installer for conditions affecting performance of finish.

3.2 PREPARATION

A. Protect adjacent surfaces such as walls, cabinets, doors, frames, and equipment using 3M Blue Masking Tape and polyethylene sheet.

B. Clean concrete surface, free from oil, grease, and other surface contaminants that may affect surface treatment. Employ methods and procedures that will prevent dust, airborne contaminants, and damage to adjacent surfaces.

3.3 APPLICATION

A. General: Apply products of sealed concrete system strictly in accordance with manufacturer's instructions.

B. Concrete Sealer/Hardener Treatment:

1. Apply penetrating sealer/hardener (Ashford Formula) at coverage rates as recommended by manufacturer. Use a power scrubber with a stiff nylon-bristled brush to work the sealer into the pores of the concrete surface.

3.4 CLEANING

A. Remove protective covering. Repair damage to adjacent surfaces at no cost to Owner.

B. Clean as recommended by manufacturer. Do not use materials or methods which may damage finish surface or surrounding construction.

C. Buff concrete floor surface using a polishing pad.

3.5 PROTECTION

A. At all areas of exposed concrete floor finish, protect finished work in accordance with manufacturer's recommendations using floor protection system specified in this Section.

END OF SECTION

SECTION 04 2200
UNIT MASONRY

PART 1 GENERAL

1.1 DESCRIPTION OF WORK

A. Unit masonry, grout, mortar and related accessories.

1.2 SUBMITTALS

A. Grout mix design signed by a CA licensed engineer.

1. Grout mix designs shall be reviewed by the structural engineer of record and the DSA inspector of record.

2. Color selection for exposed masonry unit.

3. Product data on grout, mortar and accessories.

4. Product data on CMU Block including strengths

1.3 RELATED REQUIREMENTS

A. Section 05 1200 - Structural Steel

B. Section 05 5000 - Metal Fabrications

C. Section 07 1900 - Water Repellent

D. Section 07 6200 - Sheet Metal

1.4 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Storage of Materials: Protect all masonry units with tarpaulins or equal type material.

B. Protection: Keep walls dry during erection by covering at the end of each day or shutdown period with a strong waterproof membrane. Similarly protect, at all times, partially completed walls not being worked on.

1.5 JOB CONDITIONS

A. Environmental Requirements:

1. Freezing Weather. Do not lay masonry when the temperature of the outside air is below 40ºF. (5ºC.).

PART 2 PRODUCTS

2.1 MATERIALS

A. Concrete Masonry Units (CMU):

1. Size: 8 inch by 8 inch by 16 inch.

2. Finish: Precision.

3. Color: Standard gray.

4. Units shall conform to ASTM C90, Grade N.

5. Concrete masonry units shall be modular in size.

6. Special shapes, including end and jamb blocks and U-blocks for beams and lintels, shall be furnished as shown and as required.

B. Concrete Masonry Caps: Color, width and depth to match concrete masonry units.

1. Provide 2-inch high precision masonry cap at top of walls.

C. Grout: Conform to "Standard Specification for Grout for Reinforced and Non-Reinforced Masonry," ASTM C476. The grout shall attain a minimum compressive strength of 2,000 psi.

D. Horizontal Joint Reinforcing: Galvanized, standard grade, truss design, unless otherwise noted. Width of wall reinforcing shall be as required for the wall thickness in which it is used. Minimum wire gauge shall be No. 9. Wall reinforcing in cavity walls shall be ladder type and crimped to provide drip in air space.

E. Masonry Wall Reinforcing: Reinforcing shall be deformed bars, conforming to ASTM A615, Grade 60.

F. Anchors and Ties: Coppercoated, ASTM B227, Grade 30 HS, or zinc-coated steel, ASTM A153 or A116.

PART 3 EXECUTION

3.1 INSTALLATION

A. General Masonry Installation:

1. Exterior grout joints shall be concave grout joint unless noted otherwise, and interior grout joints shall be flush grout joint. For concrete masonry walls to receive plaster finish or masonry veneers, grout joints shall be flush grout joints.

2. Mortar Bedding. Place mortar bedding under the face shells of units, but not extended across the webs, except that full mortar bedding is required under the starting course laid on footings or solid foundation walls and in all load-bearing piers, columns and pilasters, and for securing hollow metal door frames to CMU walls and partitions.

a. Joints: Neatly strike and clean off all joints in the face of walls and partitions.

b. Do all cutting and patching necessary. Build in all bucks and framing work, all anchors, sleeves, metal nailing plugs, anchor bolts, etc., and do all other miscellaneous work occurring in connection with the masonry work.

B. FIELD QUALITY CONTROL

1. Defective Unit Masonry: Chipped, warped or otherwise defective masonry units shall not be used in finished work.

C. ADJUSTMENT AND CLEANING

1. Upon completion of the masonry work, inspect all pointing and repoint imperfections. Clean dirt, mortar, stains, and defacements from masonry exposed to view. Disintegration or discoloration of mortar or adjacent materials shall not be permitted. Clean by the use of wire brushes, strong acids, or other solutions. Begin at top continuing down until cleaning operation is finished.

END OF SECTION

SECTION 04 8200
REINFORCED UNIT MASONRY ASSEMBLIES

PART 1 - 1. PART 1 GENERAL

1.1 SECTION INCLUDES

A. Concrete masonry units.

B. Reinforcement, anchorage, and accessories.

C. Sand blasting

D. Masonry cleaner

E. Water repellant sealer

1.2 REFERENCES

A. ASTM C90 - Load-Bearing Concrete Masonry Units.

B. ASTM C652 - Hollow Brick (Hollow Masonry made from Clay or Shale).

C. ASTM D226 - Asphalt Saturated Organic Felt Used in Roofing and Waterproofing.

D. ASTM D1056 - Flexible Cellular Materials - Sponge or Expanded Rubber.

E. ASTM D2000 - Rubber Properties in Automotive Applications.

F. ASTM D2240 - Rubber Property - Durometer Hardness.

G. UL - Underwriters' Laboratories.

H. MSJC - Masonry Standards Joint Committee (ACI 530/ASCE 5/TMS 402).

I. DSA - Division of the State Architect.

1.3 SUBMITTALS

A. Submit samples under provisions of Section 01330.

B. Submit four 2" x 2" samples of each type of block unit to illustrate color, texture and extremes of color range.

C. Submit manufacturer's certificate under provisions of Section 01330 that products meet or exceed specified requirements.

D. Submit high lift grouting methods to Architect and testing laboratory for review.

E. Submit control joint layout shop drawings for Concrete Unit Masonry. Coordinate with control joint layout for face brick veneer. See section 04813.

1.4 REGULATORY REQUIREMENTS

A. Conform to UL requirements for fire rated masonry construction.

1.5 STORAGE, AND HANDLING

A. Store and protect products under provisions of Section 01600.

1.6 ENVIRONMENTAL REQUIREMENTS

A. Weather Requirements: MSJC - Masonry Standards Joint Committee, Hot and Cold Weather Masonry Construction Manual (ACI 530/ASCE 5/TMS 402).

1.7 SEQUENCING AND SCHEDULING

A. Coordinate work under provisions of Section 01 3113.

PART 2 - PRODUCTS

2.1 MANUFACTURERS - CONCRETE MASONRY UNITS

A. Angelus Block, Co., Inc. www.angelusblock.com.

B. Orco Block Co., Inc., www.orco.com.

C. RCP Block and Brick, Inc., www.rcpblock.com.

D. Accepted equal.

2.2 CONCRETE MASONRY UNITS

A. Hollow Load Bearing Block Units: ASTM C90, medium weight. Masonry units shall be single or double open end units as required for proper installation.

B. All exterior concrete masonry units shall contain Dry Block, an integral water-repellant admixture as manufactured by

1. W.R. Grace and Co., www.graceconsruction.com or Rhoemix Rheoopel as manufactured by Master Builders, Inc., www.masterbuilders.com. Quantity of admixture to be in accordance with manufacturer's recommendations.

C. Provide single, double, and triple faced units as required for all exposed surfaces:

1. Hi-Lite Mark 1 Block (Basis of Design : Angelus Block): Provide 8" x 4" x 16" Hi-Lite Mark 1 block accent at exterior perimeter. Note that accent occurs uniformly throughout the building for the entire height of the walls. However, provide precision accent units in lieu of split faced at interior walls.

2. Precision Units: Provide at all exterior and interior exposed and interior concealed locations where not otherwise indicated. Provide at all structural bearing connection locations, intersection with interior dissimilar partitions, at all electrical cover plates, thermostats, and elsewhere as indicated on drawings.

3. Cap Blocks: Provide 2 inch thick solid units at all top of wall locations unless otherwise indicated on drawings.

4. Lintel Blocks: Provide 8 x 4 x 8 units at door and window heads unless otherwise indicated on drawings.

D. Color: Per architectural drawings.

E. Masonry Units: Nominal modular sizes as indicated on drawings. Provide special units for, bond beams, lintels and other shapes indicated, or make up from saw cut units as indicated.

2.3 REINFORCEMENT AND ANCHORAGE

A. Reinforcing Steel: Type specified in Section 03200; sizes indicated.

B. Anchors: Types and sizes indicated and required for intended use.

2.4 ACCESSORIES

A. Cleaning Solutions: Non-acidic, not harmful to masonry work or adjacent materials.

B. Preformed Expansion Joints: ASTM D2000, designation 2AA-805, rubber material with durometer hardness of 80 when tested in accordance with ASTM D2240. Provide with corner and tee accessories, fused joints.

C. Joint Filler: ASTM D1056, Type 2, Class A, Grade 1, closed cell neoprene oversized 35 percent to joint width.

D. Building Paper: ASTM D226, Type I (No. 15) asphalt saturated felt.

2.5 CONCRETE MANSONRY UNIT AND PENETRATING SEALER

A. Clean all exposed interior and exterior walls to remove concrete splashes, excess mortar, mud, retarders, efflorescence, embedded stains, rust and surface soiling.

B. Provide penetrating sealer at all above and below grade exterior masonry walls including walls to receive face brick veneer per section 04813.

C. Basis of Design: Masonry cleaner: Sure Klean® Custom Masonry Cleaner by Prosoco, Inc. Masonry sealer: Sure Klean® Weather Seal Siloxane WB concentrate by Prosoco, Inc.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that field conditions are acceptable and are ready to receive work.

B. Verify items provided by other Sections of work are properly sized and located.

C. Verify that built-in items are in proper location, and ready for roughing into masonry work.

D. Beginning of installation means installer accepts existing conditions.

3.2 PREPARATION

A. Direct and coordinate placement of metal anchors supplied by other Sections.

B. Provide temporary bracing during installation of masonry work. Maintain in place until building structure provides permanent bracing.

3.3 COURSING

A. Establish lines, levels, and coursing indicated. Protect from displacement.

B. Maintain masonry courses to uniform dimension. Form vertical and horizontal joints of uniform thickness.

C. Lay concrete masonry units using stack bond pattern. Course one unit and one mortar joint to equal 8 inches. Form concave mortar joints.

3.4 PLACING AND BONDING

A. Lay hollow masonry units with face shell bedding on head and bed joints.

B. Buttering corners of joints or excessive furrowing of mortar joints are not permitted.

C. Remove excess mortar as Work progresses.

D. Interlock intersections and external corners.

E. Do not shift or tap masonry units after mortar has achieved initial set. Where adjustment must be made, remove mortar and replace.

F. Perform job site cutting of masonry units with proper tools to provide straight, clean, un-chipped edges. Prevent broken masonry unit corners or edges.

G. Cut mortar joints flush where resilient base is scheduled or waterproofing is applied.

H. Isolate top joint of masonry partitions from horizontal structural framing members and slabs or decks with compressible joint filler.

3.5 REINFORCEMENT

A. Support and secure reinforcing bars from displacement. Maintain position within 1/2 inch of dimensioned position.

3.6 REINFORCED UNIT MASONRY

A. Lay masonry units with core cells vertically aligned clear of mortar and unobstructed.

B. Place mortar in masonry unit bed joints back 1/4 inch from edge of unit grout spaces, bevel back and upward. Permit mortar to cure 3 days before placing grout for high lift grouting and 24 hours for low lift grouting.

C. Reinforce masonry unit cores with reinforcement bars and grout as indicated.

D. Retain vertical reinforcement in position at top and bottom of cells and at intervals not exceeding 160 bar diameters. Do not splice between lateral support unless otherwise indicated.

E. Brace reinforcement and secure in place to allow no movement during grouting.

F. Grouting:

1. Conform to ACI 530-13 section 1-16.1.

2. Use Fine Grout per Section 04051 for filling spaces less than 2 inches in one or both horizontal directions

3. Use Coarse Grout per Section 04051 for filling spaces 2 inches or larger in both horizontal directions.

4. Grouting Technique: Low-lift grouting technique subject to requirements specified below. Optional high lift grouting technique may be used subject to requirements of DSA IR 21-2.10 (rev 03-10-11)

5. Testing of mortar and grout shall conform to the requirements of CBC Section 2105A.2.2.1.4.

G. Low-Lift Grouting:

1. Provide minimum clear dimension of 2.5 inch and clear area of 8 sq. in. in vertical cores to be grouted.

2. Place vertical reinforcement prior to laying of masonry units. Extend above elevation of maximum pour height as required for splicing.

3. Lay masonry units to maximum pour height. Do not exceed 2'-0" height, or if bond beam occurs below this height, stop pour at course below bond beam.

4. Pour grout using chute or container with spout. Rod or vibrate grout during placing. Place grout continuously; do not interrupt pouring of grout for more than 1 hour. Terminate grout pours 1-1/2 inches below top course of pour.

5. Bond Beams: Stop grout in vertical cells 1-1/2 inches below bond beam course. Place horizontal reinforcement in bond beams; lap at corners and intersections as shown. Place grout in bond beam course before filling vertical cores above bond beam.

H. High-Lift Grouting:

1. High lift grouting shall comply with CBC Section 2104A.1.3.1.1.1.2

2. Do not use high-lift grouting technique for grouting unless minimum cavity dimension and area is 3.5 inch and 10 sq.in., respectively

3. Provide cleanout holes at the bottom of every vertical cell for each pour in accordance with CBC Section 2104A.1.3.1.1.1.2 Use units with one face shell removed and provide temporary supports for units above, or use header units with concrete brick supports, or cut openings in one face shell.

4. Construct masonry to full height of maximum grout pour specified, prior to placing grout. Limit grout lifts to a maximum height of 4 feet and grout pour to a maximum height of 12'-0" for 8 inch walls and 16'-0" for 12 inch walls, unless specifically approved otherwise.

5. Place vertical reinforcement before grouting. Place before or after laying masonry units, as required by job conditions. Tie vertical reinforcement to dowels at base of masonry where shown and thread masonry over or around reinforcement.

6. Place horizontal beam reinforcement as the masonry units are laid.

7. Preparation of Grout Spaces: Prior to grouting, inspect and clean grout spaces. Mortar that projects into the grout space more than 1/4" shall be removed. Remove dust, dirt, mortar droppings, loose pieces of masonry and other foreign materials from grout spaces, bearing surface, and reinforcing steel. Clean reinforcement and adjust to proper position. Clean top surface of structural members supporting masonry to ensure bond. After final cleaning and inspection, close cleanout holes and brace closures to resist grout pressures.

8. Do not place grout until entire height of masonry to be grouted has attained sufficient strength to resist displacement of masonry units and breaking of mortar bond. Install shores and bracing, if required, before starting grouting operations.

9. Limit grout pours to sections which can be completed in one working day with not more than one hour interruption of pouring operation. Place grout in lifts which do not exceed 4 feet. Allow not less than 30 minutes, or more than one hour, between lifts of a given pour. Vibrate each grout lift during pouring operation. Place grout in lintels or beams over openings in one continuous pour. No lift shall exceed 4 feet in height without prior written DSA approval.

10. Place the first lift of grout to a uniform height within the pour section and mechanically vibrate thoroughly fill all voids. Vibration shall follow closely behind grout placement and at the same pace as the grouting operation.

11. Where bond beam occurs more than one course below top of pour, fill bond beam course to within 1 inch of vertically reinforced cavities, during construction of masonry.

12. When more than one pour is required to complete a given section of masonry, extend reinforcement beyond masonry as required for splicing. Pour grout to within 1-1/2 inches of top course of first pour. After grouted masonry is cured, lay masonry units and place reinforcement for second pour section before grouting. Repeat sequence if more pours are required.

3.7 BUILT-IN WORK

A. As work progresses, build in metal door frames window frames, wood nailing strips, anchor bolts, plates and other items furnished by other Sections.

B. Build in items plumb and level.

C. Bed anchors of metal door and glazed frames in adjacent mortar joints. Fill frame voids solid with grout.

D. Do not build in organic materials subject to deterioration.

3.8 TOLERANCES

A. Maximum Variation From Alignment of Columns and Pilasters: 1/4 inch.

B. Maximum Variation From Unit to Adjacent Unit: 1/16 inch.

C. Maximum Variation From Plane of Wall: 1/4 inch in 10 feet and 1/2 inch in 20 feet or more.

D. Maximum Variation From Plumb: 1/4 inch per story non-cumulative; 1/2 inch in two stories or more.

E. Maximum Variation From Level Coursing: 1/8 inch in 4 feet and 1/4 inch in 12 feet maximum.

F. Maximum Variation of Joint Thickness: 1/8 inch in 4 feet.

G. Maximum Variation From Cross Sectional Thickness of Walls: 1/4 inch.

3.9 CUTTING AND FITTING

A. Cut and fit for chases, pipes, conduit, sleeves and grounds. Coordinate with other Sections of work to provide correct size, shape, and location.

B. Obtain Architect's approval prior to cutting or fitting masonry work not indicated or where appearance or strength of masonry work may be impaired.

3.10 PARGING

A. Dampen masonry walls prior to parging.

B. Parge masonry walls in one uniform coat of mortar to a total thickness of 1/2 inch.

C. Steel trowel surface smooth and flat with a maximum surface variation of 1/8 inch per foot.

3.11 FIELD QUALITY CONTROL

A. Field inspection and testing will be performed under provisions of Section 01 4523.

3.12 CLEANING & SEALING

A. Clean work under provisions of Section 01 7000.

B. Remove excess mortar and mortar smears as work progresses.

C. Replace defective mortar. Match adjacent work.

D. Clean soiled surfaces with non-acid cleaning solution.

E. Use non-metallic tools in cleaning operations.

F. Lightly and uniformly sand blast all exposed masonry surfaces to remove efflorescence prior to applying penetrating sealer.

3.13 RECYCLING CONSTRUCTION WASTE

A. Recycle masonry waste under the provisions of Section 01 7519.

3.14 PROTECTION OF FINISHED WORK

A. Protect finished installation under provisions of Section 01 4000.

B. At the end of each days work and during times of inclement weather cover top of masonry wall with polyethylene sheeting. Extend covering down each side of wall for a distance of 2 feet minimum. Secure in place to avoid displacement.

C. Without damaging completed work, provide protective boards at exposed external corners which may be damaged by construction activities.

END OF SECTION

SECTION 05 1200
STRUCTURAL STEEL

PART 1 – GENERAL

1.1 SUMMARY

A. Section includes: Furnishment and Installation of structural steel framing members, complete in place with required bracing, weld washers, nuts, shims, anchor bolts, and baseplates as indicated on the Drawings and specified herein.

B. Related Sections: Miscellaneous metals, refer to Section 05 5000

1.2 REFERENCE STANDARDS - (LATEST EDITIONS UNLESS NOTED OTHERWISE)

A. Refer to the following for information regarding materials and installation methods necessary:

1. California Building Code (CBC), Chapters 22A and 35, as adopted by Title 24, and Chapter 7, Section 704 Protection of Structural Members.

2. Refer to Drawings for details, design numbers, and ratings.

3. On-Site Welding Requirements, Title 24, Part 9, Chapter 35.

4. American Society for Testing and Materials: Specifications A36, A123, A307, A370, A501, A572 and A992.

5. American Institute of Steel Construction (AISC).

6. American Welding Society: AWS D1.1, AWS D1.4, and AWS D1.8.

7. Steel Structures Painting Council (SSPC).

1.3 SUBMITTALS

A. Submit Shop and Erection Drawings Prior to Fabrication: Prepare erection drawings by State registered Structural Engineer. Show welded connections, lengths of welds, profiles, sizes, spacing and locations of members, attachments, anchorages, framed openings, size and type of fasteners, cambers and live loads. Contractor shall be responsible for reviewing and verifying all dimensions on shop Drawings.

1. Splices and Deviations: Splices will be permitted only where and as shown on Drawings. Deviations from design drawings desired or required by fabricator are to be indicated on shop drawings by providing a heavy line around the feature on which deviation approval is being requested, showing complete detail and describing deviation proposed. Provide detail with a note specifically requesting approval of deviation by fabricator. Deviations or changes shall not be made without the approval of the Division of the State Architect, as a Construction Change Document (CCD).

B. Erection and Bracing Plan and Procedure: Refer to Section 1710, Title 8, California Code of Regulations. Employ a California State licensed Civil Engineer to prepare erection and bracing plan and erection procedure for structural steel including columns, beams, and girders, who will be responsible for compliance. Follow plan and procedure exactly. Maintain a copy at project site. Pay for costs involved.

C. Scrap collection and recycling plan: Contractor shall prepare and submit a scrap collection and recycling plan for all miscellaneous and structural steel.

1.4 QUALITY ASSURANCE

A. Tests and Inspections: Testing for steel shall be done in accordance with Title 24, Part 2, Section 1705A.3. Inspection shall be in accordance with Title 24, Part 2, Section Table 1705A.3 and DSA Form 103 "List of Required Structural Tests and Special Inspections."

B. If structural steel can be identified by heat or melt numbers and is accompanied by mill analysis and test reports (identified stock shall not be tested), testing shall be in accordance with Title 24, Part 2, Section 2202A.1

1. If structural steel cannot be identified or its source is questionable, make not less than one tension and one bend test for each 5 tons or fraction thereof. Also, it shall be tested to meet minimum chemical and mechanical requirements of the ASTM standard appropriate for the steel specified for the structure, per Title 24, Part 2, Section 2202A.1.

2. Furnish test specimens from steel fabricator and take them under the direction of the Testing Agency. Machine each test specimen by Testing Agency to dimensions required by ASTM A370.

C. Have testing agency pick up test specimens and make required tests.

1. Costs of tests of identified stock will be paid for by Owner, unless tests fail to comply with the specifications, in which case the Owner will pay for testing, but backcharge the Contractor.

2. Complete a 4-sided inspection of steel. Such inspection shall be paid for by the Owner. The Inspector of structural steel which is not fabricated within 25 miles of the project site, shall also be paid for by the Owner, but the Contractor shall pay for travel expenses.

3. After fabrication and inspection, costs associated with re-inspection of defective or replaced materials shall be paid for by the Owner, but backcharged to the Contractor.

4. Provide labor, equipment and facilities necessary for moving and handling materials to be inspected.

5. Provide and pay for supervision by a registered Inspector of welding operations of frames with joints, including inspection for quality, penetration, and conformity of Drawings, and a report verifying that welding is adequate and was done in conformity of project requirements.

a. Visually inspect welds, and have inspector present to approve welding and high strength bolting whether performed in fabricator's shop or at project site, and inspect erection. Ensure testing laboratory compliance with regulations of the Division of the State Architect and certify in writing, upon completion of work, that welding and high strength bolting has been performed in accordance with Drawings and these Specifications. Inspect grouting of column base plates.

b. Have testing laboratory check bolt tightness on not less than 10 percent of bolts selected at random in each high strength bolt connection. Follow procedures of ASTM A325 and A490.

c. Inspect all complete penetration welds and partial penetration welds by ultrasonic or other approved nondestructive tests. Inspect first pass of multi-pass welds and groove welds.

d. Perform ultrasonic testing by specially trained, qualified technicians who operate equipment, examine welds and maintain a record of welds examined, defects found and disposition of each defect. Repair defective welds and retest.

e. Ultrasonically test welds at rate of 100 percent to establish welder qualifications. If rejectable defect rate is less than 5 percent, frequency may be reduced to 25 percent. If rate increases above 5 percent, continue 100 percent testing until rejectable defect rate again drops below 5 percent. Calculate percentages by individual welder.

f. Submit all preliminary, working and final documents required by subsection 1.4K.

g. Inspect all seam welds at HSS steel member.

D. Comply with California Building Code (CBC) Title 24, Part 2, Sections 1705A.3, 2202A, and 2213A.

1. Results of tests, together with identified copies of the Mill Analysis and inspection reports shall be submitted to the Division of the State Architect, and to the Architect and Structural Engineer. Arrange for continuous

inspection of Shop and field welding in accordance with Title 24, Part 2 Section 1704A, 1705A AND Table 1705A.3.

1.5 PROJECT CONDITIONS

A. Verify measurements, lines, grades, locations and details at project site. Conform to existing field conditions.

PART 2 – PRODUCTS

2.1 MATERIALS AND COMPONENTS

A. Structural Steel Members : Shall conform to the requirements of ASTM A6 and shall be fabricated according to AISC Practice and Specifications for Building.

B. Structural plates, bars, etc., shall conform to ASTM 36 and ASTM 572 as indicated on drawings. Structural wide flange beams and columns shall conform to ASTM A992, Grade 50.

C. Pipe columns shall conform to ASTM A53, Grade B

D. Tube members shall conform to ASTM A500, Grade B.

E. All welding shall be done using the shielded electric arc process by AWS certified welders using AWS D 5.1, E70XX electrodes.

F. All welds used in primary members and connections in the lateral force systems shall be made with a filler metal that has a minimum Charpy V-notch toughness of 20 ft.-lbs. at minus 20 degrees F., as determined by AWS classification.

G. Continuous inspection is required for all field and shop welding by an Inspector approved by the Division of the State Architect.

H. Bolts shall conform to ASTM A325, unless noted otherwise.

I. Structural Steel Shop Drawings shall be reviewed by the Structural Engineer prior to fabrication.

J. Light gauge steel members shall conform to structural drawings.

K. Recycled Content – Provide products with an average recycled content of steel so postconsumer recycled content plus one- half of postconsumer content is not less than 50%.

2.2 LIGHT STRUCTURAL STEEL

A. Standard specifications for Hot-Formed Welded and seamless Carbon Steel Structural Tubing, ASTM A500 Grade B.

2.3 WELDING ELECTRODES

A. Conform to AWS, Latest Edition, AWS D1.1.

1. Use E70XX electrodes.

2.4 GALVANIZING - Galvanize all structural steel exposed to weather, unless otherwise noted on plans.

A. Provide hot-dip galvanizing in accordance with ASTM A123, Grade 90.

B. Field Galvanizing: Provide ZRC, or other approved.

2.5 PRIMER

A. Exterior Primer - Provide Tnemec 10-99, a zinc-chromate, or other approved. Primer shall have a VOC content of 100 g/l (0.83 lb/gal) or less when calculated according to 40 CRF 59, Subpart D (EPA method 24).

B. Interior Primer – Provide interior primer 734149X red oxide by Rodda Co., or equal. Primer shall have a VOC content of 100 g/l (0.83 lb/gal) or less when calculated according to 40 CRF 59, Subpart D (EPA method 24).

1. Clean, prepare and shop prime exterior members in accordance with SSPC-Paint 20 or SSPC-Paint 29 and compatible with top coats indicated on plans. Do not prime specific surfaces to be welded or which will be in direct contact with concrete or other cementitious materials.

2. Clean, prepare and shop prime interior members in accordance with SSPC-Paint 23 and compatible with top coats indicated on plans. Do not prime specific surfaces to be welded or which will be in direct contact with concrete or other cementitious materials.

2.6 WELDED STUDS

A. All welded studs shall be Nelson shear connector studs (ICC ER-2614) or equal.

B. See Drawings for welded stud locations.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Surface Conditions: Prior to commencing work of this section, inspect the work of others and verify that such work has been properly completed and installed to allow for proper installation of materials and methods required of this section.

3.2 FABRICATION AND ERECTION

A. Fabricate and assemble work by skilled workers using sizes and weights shown. Connections are to develop at least strengths shown, unless approved otherwise beforehand. Allow no splices except where shown.

1. Ultrasonic material inspection - ultrasonically test column materials thicker that 1-1/2 inch for laminations within 1 foot (6 inches either side) of a direct groove weld from girder flange connections and column splices.

B. Drilling, Punching and Reaming: Hole burning to make or enlarge previous holes is not allowed. Prepare required holes in structural steel members for attachment or passage of work of other trades. Where allowed, steel may be punched 1/16-inch larger than the nominal diameter of the bolt when thickness of the steel is equal to or less than the diameter of the bolt plus 1/8-inch. Where the steel is thicker than the diameter of the bolt plus 1/8-inch, the holes must be drilled or sub-punched and reamed. Diameter of the sub-punched holes, and the drill for sub-drilled holes, is to be 1/16-inch smaller than the nominal diameter of bolt to be installed. Precisely locate finished holes to ensure passage of bolts through steel assemblies without drifting. Enlarge holes only by reaming. Poor matching of holes is cause for rejection of work.

C. Welding: Comply with the requirements of Title 24, Part 2, Sections 1705A.3 and 2204A.1. Perform welding by the electric shielded arc process. Cut out defective welds with a chisel. Clamp or hold materials securely in position for welding. Upon completion, remove slag and clean welds for inspections and painting. Groove and multi-pass welds are required to be continuously inspected.

1. Storage and Care of Electrodes: Ensure that coatings of low hydrogen type electrodes are thoroughly dry when used. Use electrodes taken from hermetically sealed packages within four hours of the time the package is opened. Electrodes not used within this time period, and electrodes which have been exposed more than one hour to air having a relative humidity of 75 percent or greater, are to be dried for at least two (2) hours at 200 to 250 degrees F. before used, or are to be reconditioned according to manufacturer's printed recommendations. Electrodes dried or reconditioned, which are not used within four hours after drying is completed, are to be re- dried before use. Electrodes of any classifications that have been wet are not to be used under any conditions.

2. Preparation: Clean surfaces to be welded of paint, grease, scale, and foreign matter. Clean welds each time electrode is changed. Chip entire area of hand guided and controlled flame cut edges before welds are deposited. In general, surfaces made by automatic or mechanically guided and controlled equipment need not be ground or chipped before welded.

3. Procedures: During assembling and welding, hold components of a built-up member with sufficient clamps or other adequate means to keep parts straight and in close contact. Do no welding in wind until adequate protective screening has been set up.

4. Characteristics of Welds: After being deposited, brush welds and ensure they exhibit uniform section, smoothness of weld metal, feather edges without undercuts or overlays, and freedom from porosity and clinkers. Ensure through visual inspection at edges and ends of fillet welds there is good fusion and penetration into base metal.

D. Bolting:

1. Common Bolts: Make connections with common bolts only where indicated.

2. High Strength Steel Bolting: Where structural joints are made using high strength bolts, load indicator washers, and nuts tightened to a high tension, the materials, method of installation and tension control, types of wrenches to be used, and inspection methods are to conform to specifications for structural jointing using ASTM A325 or A490 bolts established by the Research Council on Riveted and Bolted Structural Joints of the Engineering Foundation and the following requirements:

   a. Provide high strength bolts with a suitable identifying mark placed on top of the head before leaving factory.

   b. Do tightening of nuts with properly calibrated wrenches, load indicator washers, or turn of nut method; the minimum bolt tension for the size of bolt used is to be in accordance with tables listed in the above standards.

   c. Check calibrated wrenches individually for accuracy at least twice daily for actual conditions of application.

   d. Mark bolts that have been completely tightened with identifying symbol.

   e. Install load indicator washers in accordance with AISC specifications and Contract Drawings.

   f. Ensure that contact bearing surfaces and threads of bolted parts are free of scale, slag, and burrs which could prevent solid seating of parts.

   g. Bolt lengths are to be grip plus 1-1/4 inch.

   h. At moment connections perform welding prior to high-strength bolt tightening.

3. Load Indicator Washers: Provide as manufactured/ licensed by Cooper and Turner, or Bethlehem Steel. They may be used for field installation of high-strength bolts. These washers may not be substituted for any required washer, but may be used in conjunction with required washers. Tightening is to be in accordance with these specifications using high strength bolts. After sufficient bolts in a joint are snugged to draw the members into close contact, tightening should progress from the most rigid part to the free edges until the load indicators on bolts are closed to the required gap of 0.015 inches under bolt heads or 0.010 inches under the nuts. To prevent overtightening and damage to the bolts, do not completely close the gap.

4. Tension Set Bolts, Nuts, and Washers: Series F9t as manufactured by Cold Form Specialties or Bethlehem Steel, may also be used for field installation of high strength bolts. In multi-bolt joints, tighten nuts in stages, a little at a time, without breaking the spline in any one of them until the final stage, to minimize slackening of the installed bolts.

5. Inspection of high strength bolting shall comply with Title 24, Part 2, Sections 2213A.1, 1705A.2.6, and 1705A.3.

6. Erector to touch-up all welds and bolts after inspection.

E. Erection:

1. Erect structural steel by professional riggers, using proper hoists and equipment, carefully planned and laid out so that cutting shall not be necessary. Erect the work plumb, square and true to line. Provide temporary bracing and guys where necessary to provide for loads and stresses to which the structure may be subjected, including those due to erection equipment and its operation, and leave in place as long as necessary to safeguard parts of the work.

2. Temporary Connections: Securely bolt work to maintain the steel in proper position while bolting and welding is being performed. Align, plumb and level work prior to welding and final bolting.

3. Set column base plates in exact position as to alignment, level and elevation and support on steel wedges or equivalent until grout has properly set. Center of each base is to be true to the column center within 1/16-inch and adjusted to its elevation to 1/32-inch. Exactly level plates on both axes.

4. Sequence: Carry out the erection of steel in the proper sequence with the work of others. Frame, bed and anchor to concrete and related work in accordance with detailed drawings and setting diagrams.

5. Erection Tolerance: Follow AISC except as follows, but not to be more lenient than AISC:

a. Vertical dimensions measured from top of beams at their connections at any one column, not varying more than 1/4-inch plus or minus per story or, when accumulative from floor to floor, not exceeding 3/8-inch per story exclusive of column shortening due to dead load.

b. Floor level is considered level if floor framing members on any one floor measured from top of column connections do not vary by more than 1-1/2 inch plus or minus.

c. Plumb displacement center line of columns from established column line, no more than 1 inch toward or away from established center line.

d. Horizontal dimension variances governed by column displacement.

6. Perform erection with suitable equipment, of adequate capacity and design with due regard for personnel and public safety and as not to deflect or stress members beyond reasonable limits. Maintain erection and temporary bracing plan at project site in accordance with Title 8, California Code of Regulations.

7. Damaged Members During Erection: Straighten or replace members which are bent, twisted or damaged as directed. If heating is required in straightening, perform heating by methods which ensure uniform temperatures throughout entire member. When directed, remove members which are damaged to an extent impairing their appearance, strength or serviceability and replace with new members at no additional cost to Owner.

8. Anchor Bolts: Provide with setting drawings and instructions. Verify position of bolts prior to delivery of steel; report errors or deviations for adjustment.

F. Erection Bracing: Provide erection bracing immediately upon erection of members and leave in place until members are braced by balance of building.

3.3 PROTECTION

A. Protection of Floors and Temporary Flooring:

1. Exercise caution to protect floor surfaces and adjacent work from damages. Do not overload floors. Provide only pneumatic mobile equipment with tires, for moving steel. Do not place steel members directly on concrete floors. Pads, timbers, or other materials for cushioning shall be used.

2. Provide necessary planking, scaffolding and temporary flooring in connection with erection of steel or support of erection machinery as part of the work. Conform use of temporary floors or steel deck to governing codes and regulations.

3. Temporarily tack weld steel deck to supports where used as a working platform. Distribute concentrated loads from welding machines or other heavy machinery by planking or other equivalent means. Replace steel deck damaged in using as working platform at no additional cost to Owner.

3.4 CLEANING

A. Shop Priming:

1. Clean surfaces according to SSPC and AISC recommendations, and apply specified primer to minimum 1.0 dry mil thickness. Ensure that primer is worked into joints.

2. Steel to be embedded into cementitious materials, permanently concealed steel surfaces, contact surfaces of high-strength bolted connections, and surfaces to receive fireproofing are not to be primed.

END OF SECTION

SECTION 05 3000
METAL DECKING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Floor and roof metal decking.
2. Shear connector studs for composite decking construction.
3. Edge strips, closure strips and decking accessories.

B. Related Requirements:

1. Division 01 - General Requirements.
2. Section 01 4523 - Testing and Inspection.
3. Section 03 3000 – Cast-In-Place Concrete.
4. Section 05 1200 - Structural Steel Framing.
5. Section 07 6000 - Flashing and Sheet Metal.

1.2 REFERENCES

A. ASTM International (ASTM):

1. ASTM A108 – Standard Specification for Steel Bar, Carbon and Alloy, Cold-Finished.
2. ASTM A653 - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy- Coated (Galvannealed) by the Hot-Dip Process.
3. ASTM A780 – Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings.
4. ASTM D746 - Standard Test Method for Brittleness Temperature of Plastics and Elastomers by Impact.
5. ASTM D1056 - Standard Specification for Flexible Cellular Materials—Sponge or Expanded Rubber.

B. American Welding Society (AWS):

1. AWS D1.1 - Structural Welding Code Sheet – Steel.
2. AWS D1.3 – Structural Welding Code Sheet – Sheet Steel.

C. American Iron and Steel Construction (AISI):

1. AISI – Specifications for the Design of Cold-Formed Steel Structural Members.

D. Underwriters Laboratory (UL):

1. UL – Fire Resistance Directory.

1.3 PERFORMANCE REQUIREMENTS

A. Compute properties of deck sections on basis of effective design width as limited by provisions of the AISI specifications. Provide no less than deck section properties specified, including section modulus and moment of inertia per foot of width.

B. Regulatory Requirements:

1. Decking installed as part of a fire rated assembly shall meet the requirements of the applicable UL Fire Resistance Directory design number.

2. Work of this section shall be in accordance with CBC.

1.4 SUBMITTALS

A. Shop Drawings: Drawings, sections and details indicate type of decking, location, finish, gage of metal, arrangement of sheets, necessary fabrication to incorporate decking into the Work, and relationship to openings and flashing.

B. Product Data: For each type of decking specified, including structural properties, dimensions, profiles and finishes.

C. Welder Certificates: Signed by CONTRACTOR certifying that welders comply with the requirements specified under Article “Quality Assurance”.

1.5 QUALITY ASSURANCE

A. General: Metal decking steel shall conform to requirements of strengths and properties of standards specified.

B. Qualifications of Welders: Properly certified for the type of Work involved in compliance with CBC requirements.

C. Continuous inspection of welding will be performed by a special inspector, approved by DSA to inspect the Work of this section. Refer to Section 01 4523 - Testing and Inspection. The Project Inspector will be responsible for monitoring the work of the special inspector to ensure that the inspection program is satisfactorily completed.

D. Identification of metal decking steel shall conform to the standards specified in this section and the Drawings.

1. Fabricator shall furnish sufficient evidence to the ARCHITECT attesting compliance with specified requirements.

2. Conform to CBC requirements. Unclassified or unidentified decking is not permitted. Furnish deck manufacturer's certified mill analyses and test reports for each heat covering decking having a minimum Fy of 33 Ksi. In addition, for decking having Fy greater than 33 Ksi, testing laboratory shall perform one tension and elongation test and one bend or flattening test for each gage.

E. Unidentifiable Steel: Steel which is not readily identifiable as to grade from markings and test records is not permitted to be provided as part of the Work of this section.

F. Manufacturers shall be members of Steel Deck Institute (SDI).

1.6 DELIVERY, STORAGE AND HANDLING

A. Protect steel deck from corrosion, deformation and other damage during delivery, storage and handling.

B. Deck bundles shall be stored off the ground, with one end elevated to provide drainage. Bundles shall be protected against condensation with a ventilated waterproof covering.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. ASC Steel Deck.

B. Verco Manufacturing Co.

C. Epic Metals Corporation.

D. Equal.

2.2 MATERIALS

A. Metal Decking:

1. Roll-formed sheets conforming to ASTM A653, with G90 zinc coating.

2. Section properties conforming to applicable provisions of latest edition of AISI - Specification for the Design of Cold-Formed Steel Structural Members.

B. Flexible Closure Strips for Deck: Vulcanized, closed-cell, expanded chloroprene elastomer, complying with ASTM D1056, Grade SCE #41.

1. Brittleness Temperature: Minus 40 degrees F, ASTM D746.

2. Flammability Resistance: Self-extinguishing,

C. Decking Accessories: Metal cover plates, sheet metal edging, metal closure strips, valley and ridge strips, seat angles, sump pans, flashings: 22 gage minimum, with ASTM A653, G90 zinc coating.

D. Shear Connectors: Headed stud type, ASTM A108 Grade 1015, cold-finished carbon steel complying with AISC specifications.

E. Galvanizing Repair Paint: Mil. Spec. MIL-P-21035B and approved by the OWNER's Office of Environmental Health and Safety (OEHS).

2.3 FABRICATION

A. Corrugated sheets or sections shall be designed to support required live load between supporting members.

B. Provide decking in lengths to span over three or more supports.

C. Except as detailed otherwise, provide decking with interlocking side laps, 2 ½-inch minimum end bearing, and 1 ½-inch minimum side bearing.

D. Welding: Provide materials and methods in accordance with recommendations of steel decking manufacturer and reviewed submittals. Hold decking tight to the supporting elements with screws or other means for proper welding or crimping of the decking edges. Conform to AWS D1.3, and to the patterns and weld types indicated, with welds free from sharp edges and protrusions. Field coat welds and abraded surfaces at completion with an anodic type galvanizing repair paint. Omit the field paint coating where welds or abrasions are covered by concrete fill or sprayed fireproofing.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify supporting structure and existing conditions prior to starting work.

B. Remove oil, dirt, paint, and rust from steel surfaces to which metal decking will be welded.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 OPENINGS

A. Cut and reinforce units to provide openings which are located and dimensioned on the structural and mechanical Drawings.

B. Provide openings, or other Work not indicated on the Drawings.

3.3 INSTALLATION

A. Install metal decking in accordance with decking manufacturers' recommendations, requirements of Drawings, Shop Drawings, and Specifications.

B. Install metal decking on supporting steel framework and adjust to final position before permanently fastening in place.

1. Install each unit to proper bearing on supports.

2. Install units in straight alignment for entire length of run of cells with close registration of cells of one unit with those of abutting unit.

C. Fasten decking to steel framework at ends of units and at intermediate supports. Welding shall be as indicated on Drawings.

D. Fasten side laps between supports as indicated on Drawings.

E. Perform field cutting parallel with cells in area between cells, leaving sufficient horizontal material to permit welding to support steel.

F. Weld shear connectors to supports thru decking units as required by Drawings. Weld only on clean, dry surfaces. Do not weld shear connectors thru two layers of decking units.

3.4 METAL FLASHINGS AND CLOSURES

A. Furnish, install, and weld in position, sheet metal closure flashing, closure angles, closure plates, profile plates, and shear plates.

B. Close open ends of cell runs at columns, openings, walls, similar interruptions and termination.

3.5 FIELD QUALITY CONTROL

A. Install steel decking under continuous inspection according to CBC Section 1704A.

B. Welding inspection for steel deck diaphragms shall conform to CBC Section 2204A.1.

3.6 CLEAN UP

A. Remove rubbish, debris, and waste materials and legally dispose of off the Project site.

3.7 PROTECTION

A. Protect the Work of this section until Substantial Completion.

END OF SECTION

SECTION 05 5000
MISCELLANEOUS METAL FABRICATIONS

PART 1 - GENERAL

1.1 SUMMARY

1.2 Section includes: Completion of miscellaneous metal fabrications such as angles, plates, sheet goods, castings, railings, nosings, ladders, and stairs as indicated on the drawings and specified herein.

1.3 Substrates to which fabrications are to be attached or embedded.

1.4 Related Sections:

A. Exterior Painting, Section 09 9113.

B. Interior Painting, Section 09 9123.

C. REFERENCE STANDARDS (LATEST EDITION UNLESS NOTED OTHERWISE)

1. In addition to mandatory compliance with governing bodies and codes having jurisdiction over the project, provide materials complying with the following standards and industry recommendations: ASTM A36, A47, A48, A53, A108, A223, A283, A296, A307, A312, A314, A325, A366, A475, A500, A525, A526, A554, A569, B108, B209, B221, SSPC, NAAMM, AND AA.

2. Materials shall conform to California Building Code (CBC), Title 24, Part 2, Chapter 22A.

1.5 SUBMITTALS

A. Submit fabrication shop drawings on items to be provided.

B. Where other than mill finishes are specified, provide samples of required finish which will be reviewed for color, texture, style, and finish.

C. Submit mill test reports and chemical analyses of materials bearing heat numbers not required to be tested, in accordance with other sections of these specifications.

D. Submit testing results in accordance with other sections of these specifications.

1. Provide one tensile, and elongation test, and one bend or flattening test for each five tons or fraction, of each shape and size, for unidentified material.

2. The Owner reserves the right to reject materials, installed or not, which exhibit defects or do not pass inspections or tests.

E. Scrap collection and recycling plan: Contractor shall prepare and submit a scrap collection and recycling plan for all miscellaneous and structural steel.

1.6 SOURCE QUALITY CONTROL

A. Inspection and Testing:

1. Testing for steel, welding and fabrication shall be in accordance with California Building Code (CBC), Title 24, Part 2, Section 1705A.2.

2. Welding inspection shall be in accordance with Title 24, Part 2, Section 1705A.2.5.

3. Shop Welding: Ensure that shop welding is performed in an approved, licensed shop. Continuous inspection shall be required as noted in DSA 103.

4. Field Welding: Stress-carrying welds are to be inspected by a qualified welding inspector. Inspections will be paid for by Owner.

PART 2 - PRODUCTS

2.1 MATERIALS

A. General: Structural steel shall comply with ASTM A6 and requirements of Title 24, Part 2, Chapter 22A.

B. Steel Plates, Shapes and Bars: ASTM A36.

C. Steel Plates to be Bent or Cold-Formed: ASTM A283, Grade C.

D. Steel Bars and Bar-Sized Shapes: ASTM A36.

E. Steel Tubing (Cold-Formed, Welded or Seamless): ASTM A500, Grade B.

F. Cold-Finished Steel Bars: ASTM A108, grade selected by fabricator.

G. Cold-Rolled Carbon Steel Sheets: ASTM A569.

H. Galvanized Carbon Steel Sheets: ASTM A526, with ASTM A525, G90 zinc coating.

I. Gray Iron Castings: ASTM A48, Class 30.

J. Malleable Iron Castings: ASTM A47, grade as selected.

K. Steel Pipe: ASTM A53, type as selected, Grade B, black finish, standard weight Schedule 40.

L. Steel Wire Rope: ASTM A475, zinc coated steel wire strand, size and number of wires required, common grade with Class B zinc coating.

M. Expanded Aluminum Grating: ASTM B209, alloy 5052.

N. Aluminum Extrusions: ASTM B221, alloy 6063-T5 except alloy 6063-T6 for pipe.

O. Aluminum Sheet or Plate: ASTM B209, alloy 6061-T6, mill finish.

P. Aluminum Castings: ASTM B108, alloy 214.

Q. Stainless Steel Castings: ASTM A296, CF8 or CF20.

R. Stainless Steel Pipe: ASTM A312.

S. Stainless Steel Tube: ASTM A554, Type 302/304.

T. Stainless Steel Bars: ASTM A314, Type 302/304.

U. Shop Primer: Tnemec 10-99, or other approved.

V. Field Galvanizing: Provide ZRC Chemical, or other approved.

W. Arc Welding Electrodes: ASTM A233 or 3-70

X. Bolts and Nuts: ASTM A307

2.2 FABRICATION

A. Verify actual field dimensions prior to fabrication.

B. Fabricate items with joints neatly fitted and properly secured.

C. Fit and shop assemble in largest practical sections for delivery to site.

D. Welding shall comply with California Building Code (CBC) Title 24, Part 2, Section 1704A.3. Employ certified welders in accordance with UBC Std. 27-6. Grind exposed welds smooth and flush with adjacent finished surfaces. Defective welds must be cut out and replaced per AWS D1.1.

E. Exposed Mechanical Fastenings: Flush countersunk screws or bolts unobtrusively located, consistent with design of structure, except where specifically noted otherwise.

F. Make exposed joints flush butt type hair-line joints where mechanically fastened.

G. Supply components required for proper anchorage of metal fabrications. Fabricate anchorage and related components of same material and finish as metal fabrication, unless otherwise specified or shown.

H. Thoroughly clean surfaces of rust, scale, grease and foreign matter prior to prime painting and galvanizing.

I. Galvanize miscellaneous ferrous metal fabrications exposed to view and prime paint other items. Do not shop prime surfaces in direct contact with concrete or other cementitious materials, or requiring field welding. Shop prime in two coats. Provide minimum G90 galvanized coating where galvanizing is required.

2.3 MANUFACTURED UNITS

A. Ladders: Meet or exceed State Industrial Construction Safety Orders and OSHA.

1. Steel: As Detailed on Drawings - 2 1/2-inches by 3/8-inch side rails and braces; 3/4-inch round rungs. Galvanized after fabrication.

B. Galvanized Railings for Stairs and Ramps: Provide nominal diameter extra strong steel, galvanized 1-1/4" inch diameter with actual 1.66" inch outside diameter unless otherwise noted per American Institute of Steel Construction. (Wall handrail and guardrail mounted 1-1/2" clear from side walls.)

1. All welded joints and surfaces shall be ground smooth, no sharp or abrasive corners, edges or surfaces. Wall surfaces adjacent to handrail shall be smooth.

2. Handrail brackets shall mount to the bottom of the handrail. The vertical arm of the bracket shall provide a minimum 1-1/2 inches (38 mm) clearance from the top surface of the horizontal surface of the bracket that attaches to the wall.

C. Bollards: Galvanized extra heavy weight (Schedule 80) steel pipe set in a concrete foundation and filled solid with 2000 psi concrete.

D. Stair Nosing:

1. Design is based on Spectra Safety Treads manufactured by Wooster Products, Inc., or equal. Profiles and types shall be as detailed, or as follows:

a. Solid Concrete Stair: Type WP3C with blanked-out anchor Steel Pan Concrete Filled Stairs: Type WP3J, or, other Architect approved product for type of construction.

2. Provide at exterior stairs not scheduled to receive other finish.

3. Treads and Nosings: Provide 2 inch contrasting color warning stripe 1 inch maximum from edge of nosing of each exterior stair and top and bottom nosing only at interior stairs. Color shall be as selected by the Architect.

4. Install nosings flush with top of traffic surface. Nosings shall terminate no more than 4-inches from ends of steps for poured concrete stairs and full length of steps less 1/8-inch clearance at concrete filled steel pan stairs.

E. Trench Covers, Expansion and Seismic Joint Covers:

1. Acceptable Manufacturers:

a. Construction Specialties, Inc., a member of the C/S Group, Los Angeles.

b. MM Systems Corporation, Tucker, Georgia.

c. Balco/Metalines, Inc., Wichita, Kansas

2. Joint Covers: Equal to C/S AFW Series extruded aluminum finished to match predominant adjacent material. Provide compatible shapes and configurations at intersecting floor, wall, and ceiling conditions where required.

3. Trench Cover: Equal to MM Systems, Model No. TF-2812(R). Trench cover plate recessed for VCT Flooring.

4. Install work in accordance with manufacturer's recommendations. Runs shall be in continuous lengths without butt joints.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Surface Conditions: Inspect surfaces and work in place by others, and verify that such work is in a condition appropriate to receive work of this section. Do not apply or install work of this section until unsatisfactory work of others is in a condition which will ensure the correct installation of materials and products of this section.

3.2 INSTALLATION

A. Obtain approval of Architect prior to site cutting or making adjustments which are not part of intended work, or are not shown on shop drawings.

B. Install items square and level, accurately fitted and free from distortion and defects.

C. Make provisions for erection stresses by temporary bracing. Keep work in alignment.

D. Replace items damaged during installation.

E. Perform field welding in accordance with AWS D1.1.

F. After installation, touch-up field welds and scratched and damaged paint, or coated surfaces. Use primer and paint consistent with shop finish.

G. Supply and assist with setting items requiring to be cast into concrete, or embedded in masonry, complete with necessary setting templates.

H. Stairs:

1. Ensure that stair stringer supports are square or rectangular steel tubing or steel channels.

2. Unless shown otherwise, treads are to be pan type, with galvanized coating.

3. Where required, provide support sleeves for handrails.

4. Provide adequate strength and stiffness to limit deflection on every stair tread and landing such that when a 300-pound person places entire weight on stair tread or landing, deflection is limited to 1/8-inch maximum at point.

5. Prime paint surfaces of stair assembly after fabrication, and grind smooth welds as specified.

6. Secure handrails to stair and steel supports where shown, at top or bottom with screws or welds, and achieve a lateral resistance as required by California Building Code (CBC).

3.3 CLEANING

A. Clean site after work of this section.

B. Remove weld splatters.

C. Use galvanizing repair coating specified, then re-prime areas of materials damaged during installation and other construction activities, and leave in condition for subsequent finish painting or application of additional finish materials provided by others.

END OF SECTION

SECTION 05 5150
ALUMINUM LADDERS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Aluminum cage ladders.

1.2 RELATED SECTIONS

A. The following Sections contain requirements that relate to this Section:

1. Section 05 4000 - Cold-Formed Metal Framing
2. Section 07 5419 - Single Ply Membrane Roofing
3. Section 07 6200 - Sheet Metal Flashing and Trim
4. Section 09 2400 - Portland Cement Plastering

1.3 REFERENCES

A. AA – Aluminum Association.

B. ASTM B 209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.

C. ASTM B 221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.

D. OSHA 1910.27 – Fixed Ladders.

1.4 SUBMITTALS

A. Product Data: Manufacturer's data sheets on each product.

B. Shop Drawings:

1. Detail fabrication and erection of each ladder indicated. Include plans, elevations, sections, and details of metal fabrications and their connections.
2. Provide templates for anchors and bolts specified for installation under other Sections.
3. Provide reaction loads for each hanger and bracket.
4. Qualification Data:
5. Refer to Quality Assurance provisions for submittal requirements evidencing experience, certifications and resources.
6. Selection Samples: For each finish specified, two complete sets of color chips representing manufacturer's full range of available colors.
7. Verification Samples: For each finish specified, two samples, minimum size 6 inches (150 mm) square, represent actual product color.

1.5 QUALITY ASSURANCE

A. Manufacturer Qualifications: A firm experienced in producing aluminum metal ladders similar to those indicated for this Project.

1. Record of successful in-service performance.
2. Sufficient production capacity to produce required units.
3. Professional engineering competent in design and structural analysis to fabricate ladders in compliance with industry standards and local codes.
4. Installer Qualifications: Competent and experienced firm capable of selecting fasteners and installing ladders to attain designed operational and structural performance.
5. Product Qualification: Product design shall comply with OSHA 1910.27 minimum standards for ladders.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Store products in manufacturer's unopened packaging until ready for installation.

1.7 PROJECT CONDITIONS

A. Field Measurements: Verify dimensions by field measurement before fabrication.
1. Established Dimensions: Where field measurements cannot be made without delaying the Work, indicate established dimensions on shop drawing submittal and proceed with fabrication.

1.8 WARRANTY

A. Manufacturer Warranty: Provide 5 years manufacturer standard warranty from date of Notice of Completion against all the conditions indicated below:
1. Defects in materials and workmanship.
2. Deterioration of material and surface performance below minimum OSHA standards as certified by independent third party testing laboratory.

1.9 EXTRA MATERIALS

A. Furnish touchup kit for each type and color of paint finish provided.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis-of-Design: O'Keeffe's, Inc or equal.

2.2 ALUMINUM LADDERS

A. Fixed and Cage Ladder Design:
1. Tubular Rail High Parapet Access Ladder with Platform and Return, with safety cage and security door.
2. Model 533

2.3 FINISHES

A. Clear Anodic Finish: AA-M10C22A41 Mechanical finish as fabricated. Architectural Class I, clear coating 0.018 mm or thicker.

2.4 MATERIALS

A. Aluminum Sheet: Alloy 5005-H34 to comply with ASTM B209.
B. Aluminum Extrusions: Alloy 6063-T6 to comply with ASTM B221.

2.5 FABRICATION

A. Rungs: Not less than 1-1/4 inches (32 mm) in section and 18–3/8 inches (467mm) long, formed from tubular aluminum extrusions. Squared and deeply serrated on all sides.

B. Rungs shall withstand a 1,500 pound (454 kg) load without deformation or failure.

C. Channel Side Rails: Not less than 1/8 inch (3 mm) wall thickness by 3 inches (76 mm) wide.

D. Heavy Duty Tubular Side Rails: Assembled from two interlocking aluminum extrusions no less than 1/8 inch (3 mm) wall thickness by 3 inches (76 mm) wide. Construction shall be self-locking stainless steel fasteners, full penetration TIG welds and clean, smooth and burr-free surfaces.

E. Floor and wall support brackets: Provide fixed support brackets as shown on drawings.

F. Walk-Through Rail and Roof Rail Extension: Not less than 3 feet 6 inches (1067 mm) above the landing and shall be fitted with deeply serrated, square, tubular grab rails.

G. Landing Platform: 1-1/2 inches (38 mm) or greater diameter, tubular aluminum guardrails and decks of serrated aluminum treads.

H. Security Doors: Formed 1/8 inch (3 mm) thick aluminum sheet. Security panels shall extend on both sides, perpendicular to the door face, to within 2 inches (51 mm) of the wall. Security door shall be furnished with continuous aluminum piano hinge and heavy duty forged steel locking hasps.

I. Safety Cages:

1. Fabricate ladder safety cages to comply with authority having jurisdiction. Assemble by welding. Spacing of primary hoops, secondary hoops and vertical bars shall not exceed that required by code.

2. Safety cage hoops and vertical bars: 3/16 inch (5 mm) by 2 inches (51 mm) aluminum bar.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Coordinate anchorages. Furnish setting drawings, templates, and anchorage structural loads for fastener resistance. Field verify all existing dimensions.

B. Do not begin installation until supporting structure is complete and ladder installation will not interfere with supporting structure work.

C. If supporting structure is the responsibility of another installer, notify Architect of unsatisfactory supporting work before proceeding.

3.2 INSTALLATION

A. Install in accordance with manufacturer's instructions and in proper relationship with adjacent construction.

3.3 PROTECTION

A. Protect installed products until completion of project.

B. Touch-up, repair or replace damaged products before Final Completion.

END OF SECTION

SECTION 05 5213
METAL GUARDS AND HANDRAILS

PART 1 GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Steel pipe and tube metal guards and handrails, galvanized.

1.2 RELATED REQUIREMENTS

A. Section 03 3000 - Cast-in-Place Concrete: Placement of anchors in concrete.

B. Section 05 1200 - Structural Steel

C. Section 05 3000 - Metal Decking

D. Section 05 5000 - Metal Fabrications

E. Section 09 9113 - Exterior Painting: Paint finish.

1.3 PERFORMANCE REQUIREMENTS

A. General: In engineering handrails and railings to withstand structural loads indicated, determine allowable design working stresses of handrail and railing materials.

B. Thermal Movements: Provide handrails and railings 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.

1. Temperature Change (Range): 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.

2. Control of Corrosion: Prevent galvanic action and other forms of corrosion by insulating metals and other materials from direct contact with incompatible materials.

1.4 SUBMITTALS

A. Product Data: For the following:

1. Manufacturer's product lines of mechanically connected handrails and railings.

2. Grout, anchoring cement, and paint products.

3. Shop Drawings: Show fabrication and installation of handrails and railings. Include plans, elevations, sections, component details, and attachments to other Work.

a. For installed handrails and railings indicated to comply with design loads, include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

4. Qualification Data: For firms and persons specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.

5. Product Test Reports: From a qualified testing agency indicating products comply with requirements, based on comprehensive testing of current products.

1.5 REGULATORY REQUIREMENT

A. The top of handrail grasping surface shall be mounted between 34: to 38" above the nosing of the treads or the ramp surface.

B. The handgrip portion of the handrails for stairs and ramps shall not be less than 1 ¼" nor more than 1 ½" in

1. cross-sectional nominal dimension or a shape providing an equivalent gripping surface. Handrail projecting from a wall shall have a space of 1 ½" between the wall and the handrail. The maximum projection of handrails into the required clear width of a ramp at the handrail height shall be 3 ½" on each side. CBC Section 1133B.4.2.6 and 1133B.5.5.1.

2. All surfaces and welded joints of the grip portion of the handrails shall be ground smooth with no sharp corners. Gripping surfaces (top or sides) shall be uninterrupted by newel posts, other construction elements or obstructions. Edges shall have a minimum radius of 1/8"

3. Any wall or other surface adjacent to handrail shall be free of sharp or abrasive elements. CBC Section 1133B.4.2.6 and 1133B.5.5.1.

4. Wheel guide rails or guide curbs shall provide continuous and uninterrupted barrier along the length of a ramp. CBC Section 1133B.5.6 and Figure 11B-27

1.6 QUALITY ASSURANCE

A. Testing Agency Qualifications: An independent testing agency with the experience and capability to conduct the testing indicated, as documented according to ASTM E 548.

B. Source Limitations: Obtain each type of handrail and railing through one source from a single manufacturer.

1.7 STORAGE

A. Store handrails and railings in a dry, well-ventilated, weathertight place.

1.8 PROJECT CONDITIONS

A. Field Measurements: Verify handrail and railing dimensions by field measurements before fabrication and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

1. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish dimensions and proceed with fabricating handrails and railings without field measurements. Coordinate construction to ensure that actual dimensions correspond to established dimensions.

1.9 COORDINATION

A. Coordinate installation of anchorages for handrails and railings. 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.

1.10 SCHEDULING

A. Schedule installation so handrails and railings are mounted only on completed walls. Do not support temporarily by any means that does not satisfy structural performance requirements.

PART 2 PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes acting on exterior metal fabrications by preventing buckling, opening of joints, overstressing of components, failure of connections, and other detrimental effects.

B. Temperature Change: 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.

2.2 METALS

A. Metal Surfaces, General: 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.

1. Recycled Content of Steel Products: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 50 percent.

2. All metal fabrication components exposed to weather or in contact with soil shall be galvanized.

3. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.

4. Steel Tubing: ASTM A 500/A 500M, cold-formed steel tubing.

5. Steel Pipe: ASTM A 53/A 53M, Standard Weight (Schedule 40) unless otherwise indicated.

2.3 FASTENERS

A. General: Unless otherwise indicated, provide Type 304 stainless-steel fasteners for exterior use and zinc-plated fasteners with coating complying with ASTM B 633 or ASTM F 1941 (ASTM F 1941M), Class Fe/Zn 5, at exterior walls. Select fasteners for type, grade, and class required.

1. Provide stainless-steel fasteners for fastening aluminum.

2. Steel Bolts and Nuts: Regular hexagon-head bolts, ASTM A 307, Grade A (ASTM F 568M, Property Class 4.6); with hex nuts, ASTM A 563 (ASTM A 563M); and, where indicated, flat washers.

3. Steel Bolts and Nuts: Regular hexagon-head bolts, ASTM A 325, Type 3 (ASTM A 325M, Type 3); with hex nuts, ASTM A 563, Grade C3 (ASTM A 563M, Class 8S3); and, where indicated, flat washers.

4. Stainless-Steel Bolts and Nuts: Regular hexagon-head annealed stainless-steel bolts, ASTM F 593 (ASTM F 738M); with hex nuts, ASTM F 594 (ASTM F 836M); and, where indicated, flat washers; Alloy [Group 1 (A1)] [Group 2 (A4)].

5. Anchor Bolts: ASTM F 1554, Grade 36, of dimensions indicated; with nuts, ASTM A 563 (ASTM A 563M); and, where indicated, flat washers.

a. Hot-dip galvanize or provide mechanically deposited, zinc coating where item being fastened is indicated to be galvanized.

6. Anchors, General: 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 E 488/E 488M, conducted by a qualified independent testing agency.

7. Cast-in-Place Anchors in Concrete: Either threaded type or wedge type unless otherwise indicated; galvanized ferrous castings, either ASTM A 47/A 47M malleable iron or ASTM A 27/A 27M cast steel. Provide bolts, washers, and shims as needed, all hot-dip galvanized per ASTM F 2329.

8. Post-Installed Anchors: Torque-controlled expansion anchors.

    a. 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.

9. Slotted-Channel Inserts: Cold-formed, hot-dip galvanized-steel box channels (struts) complying with MFMA-4, 1-5/8 by 7/8 inches (41 by 22 mm) by length indicated with anchor straps or studs not less than 3 inches (75 mm) long at not more than 8 inches (200 mm) o.c. Provide with temporary filler and tee-head bolts, complete with washers and nuts, all zinc-plated to comply with ASTM B 633, Class Fe/Zn 5, as needed for fastening to inserts.

2.4 MISCELLANEOUS MATERIALS

A. Low-Emitting Materials: Paints and coatings shall comply with the testing and product requirements of the California Department of Public Health's (formerly, the California Department of Health Services') "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

1. Steel Shop and Touch-Up Primer:

    a. For interior exposed steel, apply ferrous metal primers as specified in Section 09 91 23 or accepted equal.

        1) For exterior exposed steel, apply high performance zinc-rich Tnemec 90-97 epoxy primer or equal.

2. Galvanizing Repair Paint: High-zinc-dust-content paint complying with SSPC-Paint 20 and compatible with paints specified to be used over it.

3. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187/D 1187M.

4. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107/C 1107M. Provide grout specifically recommended by manufacturer for interior and exterior applications.

5. Concrete: Comply with requirements in Section 033000 "Cast-in-Place Concrete" for normal-weight, air-entrained, concrete with a minimum 28-day compressive strength of 3000 psi (20 MPa).

2.5 FABRICATION, GENERAL

A. Shop Assembly: 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.

1. Fabricate screens to comply with design, dimensions, and details indicated. Use materials of size and thickness shown, or, if not shown, of required size, grade and thickness to produce strength and durability in finished product.

    a. Welded Connections: Cope components at connections to provide close fit, or use fittings designed for this purpose. Weld all around at connections.

2. 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.

3. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.

4. Form exposed work with accurate angles and surfaces and straight edges.

5. Weld corners and seams continuously to comply with the following:

    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.

6. 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.

7. Fabricate seams and other connections that are exposed to weather in a manner to exclude water. Provide weep holes where water may accumulate.

8. Cut, reinforce, drill, and tap metal fabrications as indicated to receive finish hardware, screws, and similar items.

9. 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.

10. Where units are indicated to be cast into concrete or built into masonry, equip with integrally welded steel strap anchors, 1/8 by 1-1/2 inches (3.2 by 38 mm), with a minimum 6-inch (150-mm) embedment and 2-inch (50-mm) hook, not less than 8 inches (200 mm) from ends and corners of units and 24 inches (600 mm) o.c., unless otherwise indicated.

2.6 MISCELLANEOUS FRAMING AND SUPPORTS

A. General: Provide steel framing and supports not specified in other Sections as needed to complete the Work.

1. 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.

    a. Fabricate units from slotted channel framing where indicated.

    b. Furnish inserts for units installed after concrete is placed.

    c. Fabricate supports for operable partitions from continuous steel beams of sizes indicated with attached bearing plates, anchors, and braces as indicated Drill or punch bottom flanges of beams to receive partition track hanger rods; locate holes where indicated on operable partition Shop Drawings.

    d. Galvanize miscellaneous framing and supports where indicated.

    e. Prime miscellaneous framing and supports with zinc-rich primer where indicated.

2.7 SERVICE YARD GATE

A. Components, unless noted otherwise:

1. Shop primed steel plates and sections after fabrication.

2. Fiber Cement Siding: Refer to section 07 4646.

3. Tension Rods and Turnbuckles: 1/2 inch diameter.

4. Hardware: Refer to Section 08 7100.

5. Finish in accordance with Section 09 9123.

2.8 HANDRAIL AND GUARDRAIL ASSEMBLIES

A. Steel Handrail and Guardrail Assemblies: Fabricated from steel pipe, steel plates and sections; sizes as shown on Drawings.

1. Shop primed handrails, guardrail supports and frames, and brackets after fabrication.

2. Steel Pipe: ASTM A53/A53M, Grade A, Schedule 40.

3. Handrail Wall Brackets: Steel plate as shown on drawings.

4. Finish: Field painted in accordance with Section 09 9123.

2.9 PERFORATED PANELS (for Guardrails)

A. Exterior Application: Perforated Aluminum Metal Panels: Round Holes, .16 Gauge, Class 1 Clear Anodized Finish, 3/16" Holes on 5/16" Centers, Staggered Pattern, 32% Open Area. Manufacturer: McNICHOLS Co. or equal.

B. Interior Application: Perforated Steel Metal Panels: Round Holes, .16 Gauge, Galvanized G90, Mill Finish, 3/16" Holes on 5/16" Centers, Staggered Pattern, 32% Open Area. Manufacturer: McNICHOLS Co. or equal.

C. Fasteners: Secure panels to steel supports using carriage bolts and washers. Provide gasket between aluminum panels and dissimilar metal for metal protection.

2.10 PAINT

A. Shop Primer for Ferrous Metal: Fast-curing, lead- and chromate-free, universal modified-alkyd primer complying with performance requirements in FS TT-P-664; selected for good resistance to normal atmospheric corrosion, compatibility with finish paint systems indicated, and capability to provide a sound foundation for field-applied topcoats despite prolonged exposure.

B. Shop Primer for Galvanized Steel: Zinc-dust, zinc-oxide primer formulated for priming zinc-coated steel and for compatibility with finish paint systems indicated, and complying with SSPC-Paint 5.

C. Bituminous Paint: Cold-applied asphalt mastic complying with SSPC-Paint 12, except containing no asbestos fibers, or cold-applied asphalt emulsion complying with ASTM D 1187.

2.11 GROUT AND ANCHORING CEMENT

A. Nonshrink, Nonmetallic Grout: Premixed, factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107. Provide grout specifically recommended by manufacturer for interior and exterior applications.

B. Erosion-Resistant Anchoring Cement: Factory-packaged, nonshrink, nonstaining, hydraulic-controlled expansion cement formulation for mixing with water at Project site to create pourable anchoring, patching, and grouting compound. Provide formulation that is resistant to erosion from water exposure without needing protection by a sealer or waterproof coating and that is recommended by manufacturer for exterior use.

2.12 FABRICATION

A. General: Fabricate handrails and railings to comply with requirements indicated for design, dimensions, member sizes and spacing, details, finish, and anchorage, but not less than that required to support structural loads.

B. Assemble handrails and railings in the shop to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation. Use connections that maintain structural value of joined pieces.

C. Form changes in direction of railing members as follows:

1. By bending.

D. Form simple and compound curves by bending members in jigs to produce uniform curvature for each repetitive configuration required; maintain cylindrical cross section of member throughout entire bend without buckling, twisting, cracking, or otherwise deforming exposed surfaces of handrail and railing components.

E. Welded Connections: Fabricate handrails and railings for connecting members by welding. Cope components at perpendicular and skew connections to provide close fit, or use fittings designed for this purpose. Weld connections 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 flux immediately.

4. At exposed connections, finish exposed surfaces smooth and blended so no roughness shows after finishing and welded surface matches contours of adjoining surfaces.

F. For railing posts set in concrete, provide preset sleeves of steel not less than 6 inches (150 mm) long with inside dimensions not less than 1/2 inch (12 mm) greater than outside dimensions of post, and steel plate forming bottom closure.

G. Shear and punch metals cleanly and accurately. Remove burrs from exposed cut edges.

H. Ease exposed edges to a radius of 1/8 inch (1 mm) minimum. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing the Work.

I. Cut, reinforce, drill, and tap components, as indicated, to receive finish hardware, screws, and similar items.

J. Provide weep holes or another means to drain entrapped water in hollow sections of handrail and railing members that are exposed to exterior or to moisture from condensation or other sources.

K. Fabricate joints that will be exposed to weather in a watertight manner.

L. Close exposed ends of handrail and railing members with prefabricated end fittings.

M. Provide wall returns at ends of wall-mounted handrails, unless otherwise indicated. Close ends of returns, unless clearance between end of railing and wall is 1/4 inch (6 mm) or less.

N. Toe Boards: Where indicated, provide toe boards at railings around openings and at edge of open-sided floors and platforms. Fabricate to dimensions and details indicated.

O. Fillers: Provide fillers made from steel plate, or other suitably crush-resistant material, where needed to transfer wall bracket loads through wall finishes to structural supports. Size fillers to suit wall finish thicknesses and to produce adequate bearing area to prevent bracket rotation and overstressing of substrate.

2.13 FINISHES, GENERAL

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

2.14 STEEL FINISHES

A. Galvanized handrails and railings:

1. Hot-dip galvanize indicated steel and iron railings, including hardware, after fabrication.

2. Comply with ASTM A 123/A 123M for hot-dip galvanized railings.

3. Comply with ASTM A 153/A 153M for hot-dip galvanized hardware.

4. Do not quench or apply post galvanizing treatments that might interfere with paint adhesion.

5. Fill vent and drain holes that will be exposed in the finished Work, unless indicated to remain as weep holes, by plugging with zinc solder and filing off smooth.

B. For galvanized handrails and railings, provide galvanized fittings, brackets, fasteners, sleeves, and other ferrous components.

C. Preparation for Shop Priming: After galvanizing, thoroughly clean handrails and railings of grease, dirt, oil, flux, and other foreign matter, and treat with metallic-phosphate process.

1. Exteriors (SSPC Zone 1B): SSPC-SP 6, "Commercial Blast Cleaning."

2. Interiors (SSPC Zone 1A): SSPC-SP 7, "Brush-off Blast Cleaning."

D. Apply shop primer to prepared surfaces of handrail and railing components, unless otherwise indicated. Comply with requirements in SSPC-PA 1, "Paint Application Specification No. 1," for shop painting. Primer need not be applied to surfaces to be embedded in concrete or masonry.

1. Stripe paint edges, corners, crevices, bolts, and welds.

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine plaster and gypsum board assemblies, where reinforced to receive anchors, to verify that locations of concealed reinforcements have been clearly marked for Installer. Locate reinforcements and mark locations if not already done.

3.2 INSTALLATION, GENERAL

A. Fit exposed connections together to form tight, hairline joints.

B. Perform cutting, drilling, and fitting required to install handrails and railings. Set handrails and railings accurately in location, alignment, and elevation; measured from established lines and levels and free from rack.

1. Do not weld, cut, or abrade surfaces of handrail and railing components that have been coated or finished after fabrication and that are intended for field connection by mechanical or other means without further cutting or fitting.

2. Set posts plumb within a tolerance of 1/16 inch in 3 feet (2 mm in 1 m).

3. Align rails so variations from level for horizontal members and from parallel with rake of steps and ramps for sloping members do not exceed 1/4 inch in 12 feet (5 mm in 3 m).

C. Adjust handrails and railings before anchoring to ensure matching alignment at abutting joints. Space posts at interval indicated, but not less than that required by structural loads.

D. Fastening to In-Place Construction: Use anchorage devices and fasteners where necessary for securing handrails and railings and for properly transferring loads to in-place construction.

3.3 METAL GUARD RAILING CONNECTIONS

A. Welded Connections: Use fully welded joints for permanently connecting railing components. Comply with requirements for welded connections in "Fabrication" Article whether welding is performed in the shop or in the field.

B. Expansion Joints: Install expansion joints at locations indicated but not farther apart than required to accommodate thermal movement. Provide slip-joint internal sleeve extending 2 inches (50 mm) beyond joint on either side, fasten internal sleeve securely to one side, and locate joint within 6 inches (150 mm) of post.

3.4 ANCHORING POSTS

A. Use steel pipe sleeves preset and anchored into concrete for installing posts. After posts have been inserted into sleeves, fill annular space between post and sleeve with the following anchoring material, mixed and placed to comply with anchoring material manufacturer's written instructions:

1. Nonshrink, nonmetallic grout or anchoring cement.

2. Leave anchorage joint exposed; wipe off surplus anchoring material; and leave 1/8-inch (3-mm) build-up, sloped away from post.

3. Install removable railing sections, where indicated, in slip-fit metal sockets cast in concrete.

3.5 ANCHORING RAILING ENDS

A. Anchor railing ends into concrete and masonry with round flanges connected to railing ends and anchored into wall construction with post-installed anchors and bolts.

B. Anchor railing ends to metal surfaces with flanges bolted to metal surfaces.

1. Weld flanges to railing ends.

3.6 ATTACHING HANDRAILS TO WALLS

A. Attach handrails to wall with wall brackets. Provide bracket with 1-1/2-inch (38-mm) clearance from inside face of handrail and finished wall surface.

B. Locate brackets as indicated or, if not indicated, at spacing required to support structural loads.

C. Secure wall brackets to building construction as follows:

1. For concrete and solid masonry anchorage, use drilled-in expansion shields and hanger or lag bolts.

2. For steel-framed plaster and/or gypsum board assemblies, fasten brackets directly to steel framing or concealed reinforcements using self-tapping screws of size and type required to support structural loads.

3.7 CLEANING

A. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with same material.

B. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A 780.

3.8 PROTECTION

A. Protect finishes of handrails and railings from damage during construction period with temporary protective coverings approved by railing manufacturer. Remove protective coverings at the time of Substantial Completion.

B. Restore finishes damaged during installation and construction period so no evidence remains of correction work. Return items that cannot be refinished in the field to the shop; make required alterations and refinish entire unit, or provide new units.

END OF SECTION

SECTION 06 1000
ROUGH CARPENTRY

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Structural dimension lumber framing.

B. Structural composite lumber framing.

C. Non-structural dimension lumber framing.

D. Rough opening framing for doors, windows, and roof openings.

E. Sheathing.

F. Subflooring.

G. Roof-mounted curbs.

H. Roofing nailers.

I. Roofing cant strips.

J. Preservative treated wood materials.

K. Miscellaneous framing and sheathing.

L. Communications and electrical room mounting boards.

M. Concealed wood blocking, nailers, and supports.

N. Miscellaneous wood nailers, furring, and grounds.

1.2 RELATED REQUIREMENTS

A. Section 03 3000 - Cast-in-Place Concrete: Setting anchors in concrete.

B. Section 05 1200 - Structural Steel Framing: Prefabricated beams and columns for support of wood framing.

C. Section 05 5000 - Metal Fabrications: Miscellaneous steel connectors and support angles for wood framing.

D. Section 06 1733 - Wood I-Joists.

E. Section 07 6200 - Sheet Metal Flashing and Trim: Sill flashings.

F. Section 09 2116 - Gypsum Board Assemblies: Gypsum-based sheathing.

1.3 REFERENCE STANDARDS

A. AWC (WFCM) - Wood Frame Construction Manual for One- and Two-Family Dwellings; 2015.

B. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2009.

C. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2015.

D. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2015a.

E. AWPA U1 - Use Category System: User Specification for Treated Wood; 2012.

F. PS 1 - Structural Plywood; 2009.

G. PS 2 - Performance Standard for Wood-Based Structural-Use Panels; 2010.

H. PS 20 - American Softwood Lumber Standard; 2010.

I. WWPA G-5 - Western Lumber Grading Rules; 2011.

1.4 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Structural Composite Lumber: Submit manufacturer's published structural data, marked to indicate which sizes and grades are being used; if structural composite lumber is being substituted for dimension lumber or timbers, submit grading agency structural tables marked for comparison.

C. Manufacturer's Certificate: Certify that wood products supplied for rough carpentry meet or exceed specified requirements.

1.5 DELIVERY, STORAGE, AND HANDLING

A. General: Cover wood products to protect against moisture. Support stacked products to prevent deformation and to allow air circulation.

PART 2 PRODUCTS

2.1 GENERAL REQUIREMENTS

A. Dimension Lumber: Comply with PS 20 and requirements of specified grading agencies.

B. Species: Douglas Fir-Larch, unless otherwise indicated.

C. Grading Agency: Any grading agency whose rules are approved by the Board of Review, American Lumber Standard Committee (www.alsc.org) and who provides grading service for the species and grade specified; provide lumber stamped with grade mark unless otherwise indicated. D. Lumber fabricated from old growth timber is not permitted.

2.2 DIMENSION LUMBER FOR CONCEALED APPLICATIONS

A. Sizes: Nominal sizes as indicated on drawings, S4S.

B. Moisture Content: S-dry or MC19.

C. Stud Framing (2 by 2 through 2 by 6):

D. Species: Douglas Fir-Larch.

E. Grade: as indicated on structural drawings.

F. Joist, Rafter, and Small Beam Framing (2 by 6 through 4 by 16):

G. Species: Douglas Fir-Larch.

H. Grade: as indicated on structural drawings.

I. Miscellaneous Framing, Blocking, Nailers, Grounds, and Furring:

J. Lumber: S4S, as indicated on structural drawings.

2.3 TIMBERS FOR CONCEALED APPLICATIONS

A. Sizes: Nominal sizes as indicated on drawings.

B. Moisture Content: S-dry (19 percent maximum).

C. Beams and Posts 5 inches and over in thickness:

D. Species: Douglas Fir-Larch.

E. Grade: As indicated on structural drawings.

2.4 STRUCTURAL COMPOSITE LUMBER

A. Structural Composite Lumber: Factory fabricated beams, headers, and columns, of sizes and types indicated on drawings; structural capacity as published by manufacturer.

2.5 CONSTRUCTION PANELS

A. Roof Sheathing: Any PS 1-09 type, rated Structural I Sheathing.

B. Bond Classification: Exterior.

C. Span Rating: 48.

D. Performance Category: 1/2 PERF CAT.

E. Wall Sheathing: Any PS 1-09 type.

F. Bond Classification: Exterior.

G. Grade: Structural I Sheathing.

H. Span Rating: 24.

I. Performance Category: 15/32 PERF CAT.

J. Edge Profile: Square edge.

K. Communications and Electrical Room Mounting Boards: PS 1 A-D plywood, or medium density fiberboard; 3/4 inch thick; flame spread index of 25 or less, smoke developed index of 450 or less, when tested in accordance with ASTM E84.

2.6 ACCESSORIES

A. Fasteners and Anchors:

B. Metal and Finish: Hot-dipped galvanized steel complying with ASTM A153/A153M for high humidity and preservative-treated wood locations, unfinished steel elsewhere.

C. Die-Stamped Connectors: Hot dipped galvanized steel, sized to suit framing conditions.

D. For contact with preservative treated wood in exposed locations, provide minimum G185 galvanizing complying with ASTM A653/A653M.

E. Joist Hangers: Hot dipped galvanized steel, sized to suit framing conditions.

F. For contact with preservative treated wood in exposed locations, provide minimum G185 galvanizing complying with ASTM A653/A653M.

G. Sill Gasket on Top of Foundation Wall: 1/4 inch thick, plate width, closed cell plastic foam from continuous rolls.

2.7 FACTORY WOOD TREAMENT

A. Treated Lumber and Plywood: Comply with requirements of AWPA U1 - Use Category System for wood treatments determined by use categories, expected service conditions, and specific applications.

B. Preservative-Treated Wood: Provide lumber and plywood marked or stamped by an ALSC-accredited testing agency, certifying level and type of treatment in accordance with AWPA standards.

C. Preservative Treament:

D. Preservative Pressure Treatment of Lumber Above Grade: AWPA U1, Use Category UC3B, Commodity Specification A using waterborne preservative.

1. Kiln dry lumber after treatment to maximum moisture content of 19 percent.

2. Treat lumber exposed to weather.

3. Treat lumber in contact with masonry or concrete.

PART 3 EXECUTION

3.1 PREPARATION

A. Install sill gasket under sill plate of framed walls bearing on foundations; puncture gasket cleanly to fit tightly around protruding anchor bolts.

B. Coordinate installation of rough carpentry members specified in other sections.

3.2 INSTALLATION - GENERAL

A. Select material sizes to minimize waste.

B. Reuse scrap to the greatest extent possible; clearly separate scrap for use on site as accessory components, including: shims, bracing, and blocking.

C. Where treated wood is used on interior, provide temporary ventilation during and immediately after installation sufficient to remove indoor air contaminants.

3.3 FRAMING INTALLATION

A. Set structural members level, plumb, and true to line. Discard pieces with defects that would lower required strength or result in unacceptable appearance of exposed members.

B. Make provisions for temporary construction loads, and provide temporary bracing sufficient to maintain structure in true alignment and safe condition until completion of erection and installation of permanent bracing.

C. Install structural members full length without splices unless otherwise specifically detailed.

D. Comply with member sizes, spacing, and configurations indicated, and fastener size and spacing indicated, but not less than required by applicable codes and AWI (WFCM) Wood Frame Construction Manual.

E. Install horizontal spanning members with crown edge up and not less than 1-1/2 inches of bearing at each end.

F. Construct double joist headers at floor and ceiling openings and under wall stud partitions that are parallel to floor joists; use metal joist hangers unless otherwise detailed.

G. Provide bridging at joists in excess of 8 feet span as detailed. Fit solid blocking at ends of members.

H. Frame wall openings with two or more studs at each jamb; support headers on cripple studs.

3.4 BLOCKING, NAILERS, AND SUPPORTS

A. Provide framing and blocking members as indicated or as required to support finishes, fixtures, specialty items, and trim.

B. In framed assemblies that have concealed spaces, provide solid wood fireblocking as required by applicable local code, to close concealed draft openings between floors and between top story and roof/attic space; other material acceptable to code authorities may be used in lieu of solid wood blocking.

C. In walls, provide blocking attached to studs as backing and support for wall-mounted items, unless item can be securely fastened to two or more studs or other method of support is explicitly indicated.

D. Where ceiling-mounting is indicated, provide blocking and supplementary supports above ceiling, unless other method of support is explicitly indicated.

E. Provide the following specific non-structural framing and blocking:

1. Cabinets and shelf supports.
2. Wall brackets.
3. Handrails.
4. Grab bars.
5. Towel and bath accessories.
6. Wall-mounted door stops.
7. Wall paneling and trim.
8. Joints of rigid wall coverings that occur between studs.

3.5 ROOF-RELATED CARPENTRY

A. Coordinate installation of roofing carpentry with deck construction, framing of roof openings, and roofing assembly installation.

B. Provide wood curb at all roof openings except where specifically indicated otherwise. Form corners by alternating lapping side members.

3.6 INSTALLATION OF CONSTRUCTION PANELS

A. Roof Sheathing: Secure panels with long dimension perpendicular to framing members, with ends staggered and over firm bearing.

B. Nail panels to framing; staples are not permitted.

C. Wall Sheathing: Secure with long dimension perpendicular to wall studs, with ends over firm bearing and staggered, using nails.

D. Communications and Electrical Room Mounting Boards: Secure with screws to studs with edges over firm bearing; space fasteners at maximum 24 inches on center on all edges and into studs in field of board.

E. At fire-rated walls, install board over wall board indicated as part of the fire-rated assembly.

F. Where boards are indicated as full floor-to-ceiling height, install with long edge of board parallel to studs.

G. Install adjacent boards without gaps.

H. Size and Location: As indicated on drawings.

3.7 TOLERANCES

A. A. Framing Members: 1/4 inch from true position, maximum.

B. B. Surface Flatness of Floor: 1/8 inch in 10 feet maximum, and 1/4 inch in 30 feet maximum.

C. C. Variation from Plane (Other than Floors): 1/4 inch in 10 feet maximum, and 1/4 inch in 30 feet maximum.

3.8 FIELD QUALITY CONTROL

A. See Section 01 4000 - Quality Requirements, for additional requirements.

3.9 CLEANING

A. Waste Disposal: Comply with the requirements of Section 01 7419 - Construction Waste Management and Disposal.

B. Comply with applicable regulations.

C. Do not burn scrap on project site.

D. Do not burn scraps that have been pressure treated.

E. Do not send materials treated with pentachlorophenol, CCA, or ACA to co-generation facilities or “waste-to-energy” facilities.

F. Do not leave any wood, shavings, sawdust, etc. on the ground or buried in fill.

G. Prevent sawdust and wood shavings from entering the storm drainage system.

END OF SECTION

SECTION 06 1753
SHOP-FABRICATED WOOD TRUSSES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Shop-fabricated wood trusses for:

a. Roof framing.

b. Bridging, bracing, and anchorage.

2. Related Requirements:

a. Section 06 1000 – Rough Carpentry.

b. Section 06 1120 – Framing & Sheathing.

1.2 REFERENCE STANDARDS

A. American Wood Protection Association:

1. AWPA M4 - Standard for the Care of Preservative-Treated Wood Products.

2. AWPA U1 - Use Category System: User Specification for Treated Wood.

B. APA - The Engineered Wood Association:

1. APA/EWA Plywood Design Specification.

C. ASTM International:

1. ASTM A153 - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.

2. ASTM A240 - Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications.

3. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar.

4. ASTM B695 - Standard Specification for Coatings of Zinc Mechanically Deposited on Iron and Steel.

5. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.

6. ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials.

7. ASTM F1667 - Standard Specification for Driven Fasteners: Nails, Spikes, and Staples.

D. California Department of Public Health:

1. CA/DHS/EHLB/R-174 - Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers (includes Addendum 2004).

E. Forest Stewardship Council:

1. FSC Guidelines.

F. National Particleboard Association:

1. NPA A208.1 - Particleboard.

G. Redwood Inspection Service:

1. RIS - Standard Specifications for Grades of California Redwood Lumber.

H. Southern Pine Inspection Bureau:

1. SPIB - Standard Grading Rules for Southern Pine Lumber.

I. Truss Plate Institute:

1. TPI - Building Component Safety Information (BCSI): Guide to Good Practice for Handling, Installing, Restraining & Bracing of Metal Plate Connected Wood Trusses.

2. TPI DSB - Recommended Design Specification for Temporary Bracing of Metal Plate Connected Wood Trusses.

3. TPI 1 - National Design Standard for Metal Plate Connected Wood Truss Construction.

J. U.S. Department of Commerce - National Institute of Standards and Technology:

1. Voluntary Product Standard PS 1 - Structural Plywood.

2. Voluntary Product Standard PS 2 - Performance Standard for Wood-Based Structural-Use Panels.

3. Voluntary Product Standard PS 20 - American Softwood Lumber Standard.

K. West Coast Lumber Inspection Bureau:

1. WCLIB Standard 17 - Grading Rules for West Coast Lumber.

L. Western Wood Products Association:

1. WWPA G-5 - Western Lumber Grading Rules.

1.3 COORDINATION

A. Section 01 1400: Requirements for coordination.

B. Coordinate placement of sheathing with Work of this Section.

1.4 SUBMITTALS

A. Section 01 3300 - Submittal Procedures: Requirements for submittals.

B. Product Data: Submit truss plate connections, bearing plates, anchor connections, wind uplift connections, bridging and bracing.

C. Shop Drawings: Indicate truss sizes, dimensions, spacing of trusses, associated components, uplift connectors, web and chord sizes, plate sizes, loads and truss cambers, framed openings.

D. Design Calculations: Indicate design loads, truss reactions, and member forces, deflections, and stresses.

E. Manufacturer's/Fabricator's Certificate: Certify that products meet or exceed specified requirements.

F. Delegated Design Submittals: Submit signed and sealed Shop Drawings with design calculations and assumptions for sizes, dimensions, spacing of trusses, associated components, uplift connectors, web and chord sizes, plate sizes, design loads, truss cambers, framed openings.

G. Source Quality-Control Submittals: Indicate results of shop tests and inspections.

H. Qualifications Statements:

1. Submit qualifications for manufacturer/fabricator, erector, and licensed professional.
2. Submit manufacturer's/fabricator's approval of erector.

1.5 QUALITY ASSURANCE

A. Perform Work as follows:

1. Lumber Grading: Certified by DOC PS 20.
2. Plywood Grading Agency: Certified by APA/EWA.
3. Lumber: Comply with DOC PS 20.
4. Wood Structural Panels: DOC PS 1 or DOC PS 2.

B. Truss Design, Fabrication, and Installation: Comply with TPI BSCI, TPI DSB, and TPI 1.

1.6 QUALIFICATIONS

A. Manufacturer/Fabricator: Company specializing in manufacturing products specified in this Section with minimum three years' experience.

B. Erector: Company specializing in performing Work of this Section with minimum three years' experience.

1. Licensed Professional: Professional engineer experienced in design of specified Work and licensed in State of California

1.7 DELIVERY, STORAGE, AND HANDLING

A. Section 01 6000 - Product Requirements: Requirements for transporting, handling, storing, and protecting products.

B. Inspection: Accept materials on Site and inspect for damage.

C. Storage:

1. Do not lay trusses flat.
2. Store truss depth in vertical position resting on intermittent bearing pads.

1.8 EXISTING CONDITIONS

A. Field Measurements:

1. Verify field measurements prior to fabrication.
2. Indicate field measurements on Shop Drawings.

PART 2 - PRODUCTS

2.1 PERFORMANCE AND DESIGN CRITERIA

A. Design Roof Loads: As noted on Project Drawings.

2.2 MATERIALS

A. Steel Plate Connectors:

1. Comply with TPI 1, Section 6.
2. Die stamped with integral teeth.
3. Finish: Hot dip galvanized.

B. Truss Bridging: Type, size, and spacing as recommended by truss manufacturer/fabricator.

2.3 FABRICATION

A. Fabricate trusses to achieve specified structural requirements.

B. Fabricate top chord extensions as indicated on Drawings.

C. Fabricate to achieve minimum end bearing of:

1. 7 - 1/2 inches on masonry.

2.4 ACCESSORIES

A. Wood blocking:

1. As specified in Section 06 1000 - Rough Carpentry

2. Moisture Content:

a. Maximum: 19 percent.

b. Minimum: 7 percent.

B. Fasteners and Anchors:

1. Material:

2. High Humidity and Treated Wood Locations: ASTM A153, hot dipped galvanized steel.

a. Elsewhere: Unfinished steel.

b. Nails and Staples: Comply with ASTM F1667.

2.5 SOURCE QUALITY CONTROL

A. Section 01 4000 - Quality Control: Requirements for testing, inspection, and analysis.

B. Inspection: Inspect Work performed at manufacturer's/fabricator's facility to verify conformance to Contract Documents.

C. Certificate of Compliance:

1. If manufacturer/fabricator is approved by authorities having jurisdiction, submit certificate of compliance indicating Work performed at manufacturer's/fabricator's facility conforms to Contract Documents.

2. Specified shop tests are not required for Work performed by approved manufacturer/fabricator.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Section 01 7300 - Execution Requirements: Requirements for erection examination.

B. Verify that supports and openings are ready to receive trusses.

3.2 PREPARATION

A. Section 01 7300 - Execution Requirements: Requirements for erection preparation.

B. Coordinate placement of bearing items.

3.3 ERECTION

A. Set members level, plumb, and in correct position.

B. Make provisions for erection loads and sufficient temporary bracing to maintain plumb and aligned structure until completion of erection and installation of permanent bracing.

C. Do not field cut or alter structural members without approval of Architect/Engineer.

D. Place headers and supports to frame openings.

E. Frame openings between trusses with lumber as specified in Section 06 1000 - Rough Carpentry.

3.4 TOLERANCES

A. Section 01 4000 - Quality Requirements: Requirements for tolerances.

B. Maximum Variation from Indicated Position:

1. Framing Members: 1/4 inch.

END OF SECTION

SECTION 06 1800
GLUED-LAMINATED CONSTRUCTION

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Glue laminated wood beams and purlins.

1.2 REFERENCE STANDARDS

A. AITC 117 - Standard Specifications for Structural Glued Laminated Timber of Softwood Species; 2010.

B. AITC A190.1 - American National Standard for Wood Products - Structural Glued Laminated Timber; 2007.

C. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2014.

D. ASTM F3125/F3125M - Standard Specification for High Strength Structural Bolts, Steel and Alloy Steel, Heat Treated, 120 ksi (830 MPa) and 150 ksi (1040 MPa) Minimum Tensile Strength, Inch and Metric Dimensions; 2015a.

E. AWPA U1 - Use Category System: User Specification for Treated Wood; 2012.

F. AWS D1.1/D1.1M - Structural Welding Code - Steel; 2015 (Errata 2016).

G. RIS (GR) - Standard Specifications for Grades of California Redwood Lumber; 2000.

H. SPIB (GR) - Grading Rules; 2014.

I. WCLIB (GR) - Standard Grading Rules for West Coast Lumber No. 17; 2004, and supplements.

J. WWPA G-5 - Western Lumber Grading Rules; 2011.

1.3 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Shop Drawings: Indicate framing system, sizes and spacing of members, loads and cambers, bearing and anchor details, bridging and bracing, framed openings.

1.4 QUALITY ASSURANCE

A. Manufacturer/Fabricator Qualifications: Company specializing in manufacture of glue laminated structural units with three years of documented experience, and certified by AITC in accordance with AITC A190.1.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Protect members to AITC requirements for individually wrapped.

B. Leave individual wrapping in place until finishing occurs.

PART 2 PRODUCTS

2.1 GLUED-LAMINATED UNITS

A. Glued-Laminated Units: Fabricate in accordance with AITC 117 Industrial grade where members are not exposed and per AITC Architectural grade where members are exposed.

B. Verify dimensions and site conditions prior to fabrication.

C. Cut and fit members accurately to length to achieve tight joint fit.

D. Fabricate member with camber built in.

E. Do not splice or join members in locations other than those indicated without permission.

F. After end trimming, seal with penetrating sealer in accordance with AITC requirements.

2.2 FABRICATION

A. Fabricate glue laminated structural members in accordance with AITC Architectural grade where members are exposed.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that supports are ready to receive units.

B. Verify sufficient end bearing area.

3.2 PREPARATION

A. Coordinate placement of bearing items.

3.3 ERECTION

A. Lift members using protective straps to prevent visible damage.

B. Set structural members level and plumb, in correct positions or sloped where indicated.

C. Provide temporary bracing and anchorage to hold members in place until permanently secured.

D. Fit members together accurately without trimming, cutting, splicing, or other unauthorized modification.

3.4 TOLERANCES

A. Framing Members: 1/8 inch maximum from true position.

END OF SECTION

SECTION 06 4100
ARCHITECTURAL WOOD CASEWORK

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Custom-fabricated cabinet units.

B. Cabinet hardware.

1.2 RELATED REQUIREMENTS:

A. Section 06 1000 - Rough Carpentry

B. Section 09 9100 - Colors

C. Division 22 - Plumbing: Plumbing utilities and fixtures.

1.3 REFERENCES

A. American National Standards Institute:

1. ANSI A156.9 - Cabinet Hardware.

2. ANSI A208.1 - Mat-Formed Wood Particleboard.

B. Woodwork Institute:

1. WI - Architectural Woodwork Standards.

1.4 DEFINITIONS

A. Exposed Portions - All Grades: Surfaces visible when doors and drawers are closed; underside of bottoms of cabinets over 4 feet above finished floor; cabinet tops under 6 feet above finished floor or if over 6 feet and visible from upper building level or floor; visible front edges of web frames, ends, divisions, tops, shelves, and hanging stiles; visible sloping tops of cabinets; visible portions of bottoms, tops, and ends in front of sliding doors.

B. Semi-Exposed Portions: Shelves; divisions; interior face of ends, backs, and bottoms; drawer sides, subfronts, backs, and bottoms; underside of bottoms of cabinets between 2-1/2 and 4 feet above finished floor; interior faces of hinged doors, except Premium Grade; visible surfaces in open cabinets or behind glass for Custom Grade and all rooms designated as storage, janitor, closet, or utility.

C. Concealed Portions: Toe space; sleepers, web frames, stretchers, and solid sub-tops; security panels; underside of bottoms of cabinets less than 2-1/2 feet above finished floor; flat tops of cabinets 6 feet or more above finished floor except if visible from upper building level; 3 non-visible edges of adjustable shelves; underside of countertops, knee spaces, and drawer aprons; faces of cabinet ends of adjoining units that butt together.

1.5 SUBMITTALS

A. Shop Drawings: Indicate materials, component profiles and elevations, assembly methods, joint details, fastening methods, accessory listings, hardware location and schedule of finishes.

1. Submit shop drawings in conformance to AWS Section 1 - Submittals. The first page of the original shop drawings shall bear a Woodwork Institute Certified Compliance Label.

B. Product Data: Submit data for hardware accessories.

C. Samples: Submit sample of plastic laminate manufacturer's standard colors and finishes for selection.

D. Certification: Submit copy of fabricator's WI certified compliance certificate.

1.6 QUALITY ASSURANCE

A. Millwork and installation shall be in accordance with Custom Grade of the Architectural Woodwork Standards, latest edition. If provisions for the Grade specified are in conflict with, or modified by the drawings and/or specifications, the modifications shall govern.

B. Certified Compliance:

1. Before delivery to the job-site, if the millwork supplier is:

a. A WI Licensee, they shall issue a WI Certified Compliance Certificate with original submittals indicating the millwork products furnished for this project and certifying that these products and their installation, if applicable, will fully meet all the requirements of the AWS Grade or Grades specified and the contract documents.

b. A Non-WI Licensee, they shall provide a WI Certified Compliance Tracking Acknowledgement with the original submittals, that they have arranged for inspection by a WI Inspector after completion of fabrication and installation. If all conditions are found to be compliant, the inspector will issue a Certified Compliance Certificate, indicating the millwork products furnished for this project, and certifying that these products and their installation, if applicable, fully meet all the requirements of the Grade or Grades specified.

2. Each casework elevation shall bear a WI Certified Compliance Label.

3. Each countertop shall bear the WI Certified Compliance Label.

C. Inspections by authorized WI Inspectors shall be made in accordance with the following schedule. Self-certified WI installers can self-inspect.

1. Site inspection immediately following final installation of all cabinet work.

2. Additional site inspections may be required at the option of the Architect and at no cost to the Owner when certified WI inspection reports indicate unsatisfactory conformance with specified requirements.

D. Submit written confirmation of all WI inspections, including WI Certified Compliance Certificate for installation.

E. WI Certification costs shall be included.

1.7 QUALIFICATIONS

A. Fabricator: Company specializing in performing Work of this section with minimum five years documented experience.

B. Fabricator: Authorized to provide WI Certified Compliance Certificate.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials only when the project is ready for installation and the general contractor has provided a clean storage area.

1. Delivery of architectural millwork shall be made only when the area of operation is enclosed.

2. Maintain indoor temperature and humidity within the range recommended by the Architectural Woodwork Standards for the location of the project.

1.9 1.9 ENVIRONMENTAL REQUIREMENTS

A. During and after installation of Work of this section, maintain same temperature and humidity conditions in building spaces as will occur after occupancy.

1.10 1.10 FIELD MEASUREMENTS

A. Verify field measurements prior to fabrication.

B. Where casework is indicated to be fitted to other construction, check actual dimensions of other construction by accurate field measurements before manufacturing woodwork; show recorded measurements to final shop drawings. Coordinate manufacturing schedule with construction progress to avoid delay of Work.

PART 2 - PRODUCTS

2.1 CABINET COMCOMPONENTS

A. General:

1. Material Grade: WI Custom Grade.

2. Lumber and Plywood: Kiln-dry to equilibrium moisture content suitable for fabrication in shop and use intended. Particleboard not permitted.

B. Lumber shall be in accordance with the Architectural Woodwork Standards Grade specified for the product being fabricated. Moisture Content shall be 6 percent to 12 percent for boards up to 2 inch nominal thickness, and shall not exceed 19 percent for thicker pieces.

1. Concealed Portions: Paint grade Birch.

C. Core: MDF, meeting the requirements of Architectural Woodwork Standards. Particleboard not permitted.

D. Veneer core plywood: Non-telegraphing hardwood manufactured with exterior glue.

E. Plywood: Marine plywood, surfaced 1 side.

F. Hardboard: ANSI A135.4, tempered, smooth surface both faces.

G. Medium Density Fiberboard: ANSI A208.2.

H. High Pressure Decorative Laminate: NEMA LD 3, GP50 for horizontal surfaces, GP28 for vertical surfaces, CL20 for cabinet liner surfaces, BK20 for undecorated backing sheets, PF42 for post forming, FR50 for fire-retardant surfaces; and shall meet the requirements of the Architectural Woodwork Standards for its intended use.

1. Manufacturer: Formica, Wilsonart or equal.

2. Colors: To be selected by Architect from manufacturer's standard colors. Up to three colors to be selected. I. Melamine Laminate: Low pressure decorative, ALA approved.

2.2 ACCESSORIES

A. Adhesive for High Pressure Decorative Laminates: Type II water-resistant.

B. Plastic Edge Banding:

1. 3mm PVC, color to match plastic laminate, at plastic laminate finished cabinets.

2. 1mm PVC, color to match plastic laminate, at all edges of removable shelves.

3. Fasteners: Size and type to suit application.

C. Bolts, Nuts, Washers, Lags, Pins, and Screws: Of size and type to suit application; US26D finish in exposed locations.

D. Concealed Joint Fasteners: Threaded steel.

E. Hardware:

1. General Requirements:

a. General: Furnish necessary screws, staples, bolts or other fastenings of proper size and type to secure items in position and, where exposed, to match finish of hardware item fastened.

b. Finish: Exposed hardware; US26D (stain chromium plated).

c. Keying: Key groups of locks the same in accordance with the Owner's directions.

2. Typical hardware.

a. Pulls at Drawers and Doors:

1) U-shaped wire accessible pull hardware at casework, solid stainless steel wire pull, 3-1/2 inches center-to-center, one per drawer.

2) Manufacturer: Hettich International, No. 11144, US26D.

3. Hinges at Doors:

a. Model No. RP374, Heavy-duty wrap around, pin butt hinge, satin chrome finish.

b. Manufacturer: Rockford Process Control, or equal.

4. Magnetic Catches: EPCO EP 592 (Heavy Duty).

5. Elbow Catches: Ives 2A-92; clear aluminum finish.

6. Locks for Cabinets:

a. Pin tumbler cylinder, with 90-degree bolt throw, key removable in locked and unlocked positions with 3/4-inch diameter bore hole, brass construction. Dull chrome finish.

b. Manufacturer: National Lock, or equal.

1) Doors: National Lock No. N 8173-26D.

2) Drawers: National Lock No. N 8179-26D.

7. Shelf Rests:

a. Bored Hole Shelf Support System:

1) Holes shall extend vertically within 6 inches of the interior top or bottom of cabinet body.

2) Hole spacing: 1 inch on center.

b. Shelf Clips: Hettich International #079707 Sekura #6 shelf clip for placement in multi-bored holes.

c. Zinc die-cast; nickel-plated, 5 mm pin.

8. Door and Drawer Silencers: Bumper Specialties, 1/2-inch, 0.14 in thick, clear.

9. Wire Access Grommets:

a. Doug Mockett MM Series, Solid Brass Grommet and Liner Set. 2-7/8 inch. Finish to be selected by Architect from full line of finishes.

2.3 LAMINATE MATERIALS

A. Manufacturers:

1. Wilsonart as the basis of design, www. Wilsonart.com
2. Equals from the following are acceptable provided the color range is similar to that specified.
    a. Nevamar: www.nevamar.com
    b. Formica: www.formica.com

B. High Pressure Decorative (HDPL): NEMA LD3, types as recommended for specific applications

C. Provide specific types as follows:
1. Horizontal Surfaces: HGP, 0.042 inch nominal thickness.
2. Vertical Surfaces: VGS, 0.028 inch nominal thickness
3. Cabinet Liner: CLS, 0.020 inch nominal thickness

D. Color: Plastic Laminate - Wilsonart
1. PL-1: 7909-60 Fusion Maple for cabinets.
2. PL-2: 4651-60 Navy Legacy for countertops.

2.4 FABRICATION

A. Plastic Laminate Casework:
1. Shall be Architectural Woodwork Standards Custom Grade.
2. Casework shall be Architectural Woodwork Standards CONSTRUCTION TYPE A, frameless, and cabinet and door INTERFACE STYLE 1, overlay.
3. Exposed interior surfaces shall be high pressure laminate matching exposed surfaces.
4. Semi-exposed surfaces: Low-pressure melamine overlay.
5. Doors, drawer fronts, and false fronts: Flush overlay.
    a. a. Edgeband at doors, drawer fronts, and false fronts: 3mm PVC.
6. Cabinet body joints and back faces: 1mm PVC plastic edge banding.

B. Drawers shall be plywood and meet the requirements of the AWS for Custom Grade.

C. Casework Hardware:
1. Hinges: Four No. 8 screws into end panel and door panel.
2. Magnetic Catches: One catch on cabinet doors up to 48 inches high; two catches (top and bottom) on cabinet doors over 48 inches high.
3. Cylinder Locks: Provide one lock at each single door (and one lock at each pair of doors). Provide one lock at each drawer. All casework to be lockable.

D. Shop assemble casework for delivery to site in units easily handled and to permit passage through building openings.

E. Fit shelves, doors, and exposed edges with matching veneer for wood cabinets. Use one piece for full length only.

F. Cap exposed high pressure decorative laminate finish edges with plastic edge binding.

G. Apply high pressure decorative laminate finish in full uninterrupted sheets consistent with manufactured sizes. Fit corners and joints hairline; secure with concealed fasteners. Slightly bevel arises.

H. Fabricate cabinets and counter tops with cutouts for electrical fittings. Verify locations of cutouts from on-site dimensions. Seal cut edges.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify adequacy and proper location of any required backing or support framing.

B. Verify that mechanical, electrical, plumbing, and other building components affecting work in this Section are in place and ready.

3.2 INSTALLATION

A. Install all work in conformance with the Architectural Woodwork Standards, latest edition.

1. Installation shall conform to the AWS Grade of the items being installed.

2. Provide WI Certified Compliance Certificate for installation.

B. Casework:

1. General: Install level, with tight joints between units; scribe edges to fit adjacent structure. Secure to horizontal notched steel track in wall as shown on drawings.

2. Filler Panels: Scribe to cabinets and abutting structure.

C. Hardware:

1. General: Check hardware upon delivery to site; store in an orderly manner. Fit and install in place without marring or injuring either hardware or casework.

2. Coordinate Keying requirements with Owner. Casework shall be keyed by room. D. Set and secure casework in place; rigid, plumb, and level.

D. Use fixture attachments in concealed locations for wall mounted components. Attach to blocking in walls per DSA requirements.

E. Use concealed joint fasteners to align and secure adjoining cabinet units and counter tops.

F. Carefully scribe casework abutting other components, with maximum gaps of 1/32 inch Do not use additional overlay trim for this purpose.

G. Secure cabinet and counter bases to floor using appropriate angles and anchorages.

H. Countersink anchorage devices at exposed locations. Conceal with solid wood plugs of species to match surrounding wood; finish flush with surrounding surfaces.

3.3 ADJUSTING

A. Adjust moving or operating parts to function smoothly and correctly.

3.4 CLEANING

A. Immediately following installation, clean casework (including counters, shelves, hardware, fittings, and fixtures) to remove dirt, stains, scratches, and abrasions.

B. Protect casework against damage by other trades; repair or replace damaged and defaced material at no cost to Owner.

END OF SECTION

SECTION 06 5300
COMPOSITE DECKING

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Composite decking on site concrete benches and where shown on drawings.

B. Furring metal channels.

1.2 RELATED REQUIREMENTS

A. Section 03 3000 - Cast-in-Place Concrete: Bearing support.

B. Section 05 5000 – Miscellanous Metal Fabrications

C. Section 32 1315 - Architectural Site Concrete

1.3 REFERENCE STANDARDS

A. ASTM D7032 - Standard Specification for Establishing Performance Ratings for Wood-Plastic Composite and Plastic Lumber Deck Boards, Stair Treads, Guards, and Handrails; 2017.

B. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2015a.

C. ASTM D-7031-04: Standard Guide for Evaluating Mechanical and Physical Properties of Wood-Plastic Composite Products, ASTM International

D. ASTM E-84-01: Test Method for Surface Burning Characteristics of Building Materials, ASTM International.

E. ASTM D 570: Water Absorption of Plastics

1.4 DESIGN/PERFORMANCE REQUIREMENTS

A. Structural Performance:

1. Plank: Uniform Load – 100 pound-feet per square foot.

B. Fire-Test Response Characteristics per ASTM E-84.

1.5 SUBMITTALS

A. Product Data: Manufacturer's data sheets on each product, including:

1. Preparation instructions.

2. Storage and handling requirements.

3. Installation methods.

B. Shop Drawings: Indicate decking layout and attachment.

C. Samples: Submit two samples, 6 by 6 inch in size illustrating texture and finish.

D. Manufacturer's Instructions: Submit manufacturer's published installation instructions.

E. Sustainable Design Submittal: For adhesives and composite wood products, provide documentation indicating that products contain no urea formaldehyde.

1.6 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with at least five years of documented experience.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver and store products in manufacturer's unopened packaging bearing the brand name and manufacturer's identification until ready for installation.

B. Comply with manufacturer's recommendations. Handle materials to avoid damage.

1.8 WARRANTY

A. Provide manufactures warranty against rot, decay, splitting, checking, splintering, fungal damage, and termite damage for a period of 10 years. In addition provide Fade and Stain Warranty against staining and fading beyond 5 Delta E (CIE units) for a period of 10 years

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. **Trex Transcend** by Trex Company, Inc., 160 Exeter Dr., Winchester, VA 22603.

B. Or Equal.

2.2 APPLICATIONS/SCOPE

A. Composite Lumber:

1. Material Description: Composite Decking consisting of recycled, extruded, Linear Low Density Polyethylene (LLDPE) and recycled wood.

2. Boards size: As shown on drawings or **1-inch thick by 5.5- inches wide by 12 inches deep**

a. Lengths: Per plans, do not splice boards, use continuous boards up to 20 feet.

b. **Edge: Grooved edge.**

c. **Color: To be selected by Architect from manufacturer's full range of options.**

B. Physical and Mechanical Properties as follows:

Test	Test Method	Value	
Flame spread	ASTM E 84	60	
Thermal Expansion	ASTM D 1037	1.9 x 10-5 inch/inch/degreeF	
Moisture Absorption	ASTM D 1037	< 1%	
Nail Withdrawal	ASTM D1761	163 lbs/in	
Screw Withdrawal	ASTM D1761	558 lbs/in	
Fungus Resistance	ASTM D1413	Rating - no decay	
Termite Resistance	AWPAE1-72	Rating = 9.6	
		Ultimate (Typical)Values *	Design Values
Compression Parallel	ASTM D198	1588 psi	540 psi

Compression Perpendicular	ASTM D143	1437 psi	540 psi
Bending Strength	ASTM D198	3280 psi	500 psi
Shear Strength	ASTM D143	1761 psi	360 psi
Modulus of Elasticity	ASTM D4761	495,000psi	200,000 psi
Modulus of Rupture	ASTM D4761	3800 psi	1800 psi

2.3 ACCESSORIES

A. Furring Channels: Provide galvanized steel channels and attachment to concrete as shown on **drawing sheet A003.**

B. Fasteners:Provide non-corrosive concealed fasterners for grooved-edge boards as recommended by the manufacturer.

C. End Caps: Manufacturer's standard caps that match the profile of the board and can be mechanically secured to the open end of the boards.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that support framing is ready to receive decking.

3.2 PREPARATION

A. Coordinate placement of support items.

3.3 INSTALLATION

A. General: Install products in accordance with manufacturer's published installation instructions.

B. Cut, drill, and rout using carbide tipped blades

C. Install end caps at exposed cut ends.

D. Install furring channels per manufacturer's published instruction.

E. Secure with fasteners.

F. Secure with manufacturer's proprietary fastener system.

3.4 CLEANING

A. Clean surfaces according to manufacturer's written instructions.

3.5 PROTECTION

A. Protect installed work from subsequent construction operations. Repair damaged surfaces. Remove and replace work which cannot be repaired.

END OF SECTION

SECTION 07 1326
SHEET WATERPROOFING

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Application of rolled, self-adhering waterproofing membrane system.

1.2 RELATED SECTIONS

A. Section 03 30 00 - Cast-in-Place Concrete.

B. Section 07 6200 - Flashing and Sheet Metal.

C. Section 07 92 00 - Joint Sealants.

1.3 REFERENCES

A. ASTM D412 - Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers-Tension.

B. ASTM E96 (Method B) - Standard Test Methods for Water Vapor Transmission of Materials.

C. ASTM E154 - Standard Test Methods for Water Vapor Retarders Used in Contact with Earth Under Concrete Slabs, on Walls, or as Ground Cover.

1.4 SUBMITTALS

A. Submit manufacturer's product data and application instructions.

B. Submit installer’s qualifications

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. Store adhesives at temperatures of 40 degrees F and above to facilitate handling.

D. Do not store at temperatures above 90 degrees F.

1.6 ENVIRONMENTAL REQUIREMENTS

A. Protect rolls from direct sunlight until ready for use

B. Do not apply membrane when air or surface temperatures are below 40o F.

PART 2 PRODUCTS

2.1 MANUFACTURER

A. W. R. Meadows, MEL-ROL Waterproofing System as the basis of design.

B. Or Equal.

2.2 MATERIALS

A. Rolled, Self-Adhering Waterproofing Membrane: Polymeric waterproofing membrane protected by release paper on polyethylene carrier film with exposed polymeric membrane strips on both sides.

1. Waterproofing membrane shall have the following characteristics:

a. Thickness:

1) Carrier Film: 4 mils.

2) Polymeric Membrane: 56 mils.

b. Tensile Strength, ASTM D 412, Die C:

1) Carrier Film: 5,900 psi (40.71 MPa) minimum.

2) Polymeric Membrane: 590 psi (4.07 MPa) minimum.

c. Water Vapor Permeability, ASTM E 96, Method B: 0.019 perms.

d. Water Absorption, ASTM D 570: 0.1%, 72 hours maximum.

e. Resistance to Hydrostatic Head: Equivalent to 240 feet of water.

f. Puncture Resistance, ASTM E 154: 67 lb.

g. Exposure to Fungi, Soil Test: Pass, 16 weeks.

2.3 ACCESSORIES

A. Surface Conditioner:

1. Mel-Prime W/B or equal

B. Corner Tape: W.R. Meadows Detail Strip or equal.

C. Waterproofing Protection Course: W.R. Meadows, Protection Course or equal

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine surfaces to receive self-adhering membrane. Do not begin surface preparation or application until unacceptable conditions have been corrected.

3.2 SURFACE PREPARATION

A. Clean and prepare surfaces to receive waterproofing in accordance with manufacturer's instructions.

B. Concrete surfaces to be clean, smooth, and free of standing water.

C. Patch holes and voids and smooth out surface misalignments.

D. Apply surface conditioner to surfaces that will be covered within one working day according to manufacturer’s recommended coverage rates.

E. Install corner tape on all inside and outside corners, including the footing.

F. Apply a 9 inch strip of self-adhering membrane over construction, control, and expansion joints and over cracks greater than 1/16 inch wide.

G. Seal all terminations with mastic.

3.3 APPLICATION

A. Application

1. Apply waterproofing membrane system in accordance with manufacturer's instructions.
2. Ensure accessory materials are compatible with membrane and approved by membrane manufacturer.
3. Remove release paper on edge and position the membrane.
4. Pull balance of release paper off, running the roll vertically over the top of the corner tape at the footing.
5. Immediately hand-rub the membrane firmly to the surface, removing bubbles or wrinkles, then pressure roll the complete surface to assure positive adhesion.
6. Overlap all seams and stagger end laps at least 2 ½ inches
7. Seal all terminations with mastic.
8. Inspect membrane before covering. Cover tears and inadequate overlaps with membrane. Seal edges of patches with mastic.

3.4 PROTECTION

A. Protect membrane with immediate application of waterproofing protection course.

END OF SECTION

SECTION 07 1416
FLUID APPLIED WATERPROOFING

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Application of single-component, fluid-applied, waterproofing membrane.

1.2 RELATED SECTIONS

A. Section 03 3000 - Cast-in-Place Concrete.

B. Section 07 1326 - Sheet Waterproofing.

C. Section 07 2500 - Weather Barriers.

1.3 REFERENCES

A. ASTM C836 - Standard Specification for High Solids Content, Cold Liquid-Applied Elastomeric Waterproofing Membrane for Use with Separate Wearing Course.

B. ASTM C661 - Standard Test Method for Indentation Hardness of Elastomeric-Type Sealants by Means of a Durometer.

C. ASTM D816 - Standard Test Methods for Rubber Cements.

D. ASTM D1644 - Standard Test Methods for Nonvolatile Content of Varnishes.

E. ASTM D2370 - Standard Test Method for Tensile Properties of Organic Coatings.

F. ASTM D2697 - Standard Test Method for Volume Nonvolatile Matter in Clear or Pigmented Coatings.

G. ASTM E96 - Standard Test Methods for Water Vapor Transmission of Materials.

1.4 SUBMITTALS

A. Submit manufacturer's product data for membrane, surface conditioner, flexible flashings, joint cover sheet and joint and crack sealants, and application instructions.

B. Submit contractor’s qualifications and project list of five similar projects.

C. Submit certification on manufacturer’s letterhead stating the installer is certified to install the product.

D. Submit cerification with manufacturer's report on field observation.

1.5 QUALITY ASSURANCE

A. Installer Qualifications:

1. Ten years’ experience with projects of similar scope who has completed five projects in the last year. Provide list of projects, location and dates. .

2. Obtain waterproofing materials from a single manufacturer regularly engaged in manufacturing the product. Manufacturer must have certified installers.

3. Provide products which comply with state regulations controlling use of volatile organic compounds (VOCs).

1.6 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. Store at temperatures between 40° - 70° F.

D. Protect materials during handling and application to prevent damage or contamination.

1.7 ENVIRONMENTAL REQUIREMENTS

A. Do not apply membrane when air, material, or surface temperatures are expected to fall below 30o F within four hours of completed application.

1. Do not apply membrane if rainfall is forecast or imminent within 12 hours.

2. Do not apply waterproofing membrane to any surfaces containing frost.

PART 2 PRODUCTS

2.1 MANUFACTURER

A. W. R. Meadows Hydralastic 836 Waterproofing Membrane as the basis of design.

B. Or Equal.

2.2 MATERIALS

A. Waterproofing Membrane: single-component, cold-applied, solvent-free, non-shrink, liquid waterproofing membrane.

1. Waterproofing membrane shall have the following properties as determined by laboratory testing:

a. Solids content:

1) By weight, ASTM D1644: 98%.

2) By volume, ASTM D2697: 98%.

b. Tensile Strength, ASTM D2370: 70 psi.

c. Elongation, ASTM D2370: 440%.

d. Water Vapor Transmission, ASTM E96 (Method B): 0.07 perms.

e. Shore 00 Hardness, ASTM C661: 55.

1) Low Temperature Flexibility, ASTM D816: -20° F pass ¼ (6.4mm) mandrel.

2.3 ACCESSORIES

A. Joint Tape: 6 inches wide reinforcing fabric for corners, crack, and joint treatment, HCR by W. R. Meadows or equal.

B. Waterproofing Protection Course: Meadows, Perminator or Protection Course or equal.

C. Drainage Board per 07 1800 Traffic Deck Coating

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine surfaces to receive membrane. Do not begin surface preparation or application until unacceptable conditions have been corrected.

3.2 SURFACE PREPARATION

A. Protect adjacent surfaces not designated to receive waterproofing.

B. Clean and prepare surfaces to receive waterproofing in accordance with manufacturer's instructions.

C. Do not apply waterproofing to surfaces unacceptable to manufacturer.

D. Clean concrete surfaces so they are free of all coatings, dirt, oil, paints and other contaminants.

E. Patch all holes and voids and smooth out any surface misalignments.

F. Remove and patch concrete form ties.

G. Treatment of Existing Cracks and All Non-Structural Joints

1. Identify cracks and joints and apply a 30 wet mil coat of the fluid applied membrane ensuring that there is a minimum of 3 inches of membrane extending in all directions.

2. Embed the non-woven reinforcing fabric over the entire area of this membrane and work in using trowel.

3. Completely cover the glass mesh with a second coat of the barrier at 30 wet mils while the first coat is still wet, again extending 3 inches onto the wall in all directions.

4. Treatment of Inside and Outside Corners

a. Apply a 30 wet mil coat of the fluid applied membrane ensuring that there is a minimum of 3 inches of membrane extending onto the wall in all directions.

b. Embed the non-woven reinforcing fabric over the entire area of this membrane and work in using trowel.

c. Completely cover the glass mesh with a second coat of the air/vapor barrier at 30 wet mils while the first coat is still wet, again extending 3 inches in all directions.

3.3 APPLICATION

A. Apply waterproofing membrane system in accordance with manufacturer's instructions.

B. Gently mix membrane prior to application.

C. Apply membrane by trowel, flat-blade squeegee, or roller, at a thickness of 60 wet mils.

D. Frequently inspect surface area to ensure proper adhesion and consistent thickness is achieved.

E. Apply drainage board where waterproofing is above occupied spaces.

3.4 PROTECTION

A. Protect membrane with application of waterproofing protection course.

B. Backfill immediately using care to avoid damaging waterproofing membrane system.

END OF SECTION

SECTION 07 1900
WATER REPELLENTS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Water repellent coatings on the entire exposed exterior of new concrete masonry walls.

B. Water repellent coatings on the entire exposed exterior of new pour-in-place concrete site walls and benches.

1.2 RELATED REQUIREMENTS

A. Section 01 6116 - Volatile Organic Compound (VOC) Content Restrictions.

B. Section 04 2200 - Unit Masonry

C. Section 32 1313 - Site Concrete

D. Section 32 1315 - Architectural Site Concrete

1.3 SUBMITTALS

A. Product Data: Manufacturer's data sheets on each product to be used, including:

1. Preparation instructions and recommendations.

2. Storage and handling requirements and recommendations.

3. Submit description for protection of surrounding areas and non-masonry surfaces, surface preparation, application, and final cleaning.

4. Pre-approval of warranty application confirmation.

5. Environmental Certification: Submit applicable certificates of environmental regulations testing and compliance acceptable to Authority Having Jurisdiction (AHJ).

6. Sustainable Design Submittal: Submit certification that water repellents furnished comply with regulations controlling content of volatile organic compounds (VOC).

B. Notice of Warranty: Submit project warranty information.

1.4 QUALITY ASSURANCE

A. Installer Qualifications:

1. Submit qualifications of applicator; stating applicator has a minimum of three (3) years experience using the specified or a similar product. Provide a list of several most recently completed projects, including project name and location, names of Owner and architect, and description of products used, substrates, and method of application.

2. Employs persons trained for the application of the specified or similar products.

3. Comply with applicable federal, state, and local environmental regulations.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Delivery: Deliver materials to the job site in original, tightly sealed, unopened containers, with labels clearly identifying product name and manufacturer. Verify that the product matches that of the original sample applied on the test panel.

B. Storage and Handling: Store containers upright in a cool, dry place. Keep away from sparks and open flame. Store and handle materials in accordance with manufacturer's written instructions.

C. Store and dispose of solvent-based materials, and materials used with solvent-based materials, in accordance with requirements of local authorities having jurisdiction.

1.6 PROJECT CONDITIONS

A. Maintain environmental conditions (temperature and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

B. Product can be applied at any temperature providing that there is no frozen moisture present in the substrate. When applied at temperatures below 40 degrees Fahrenheit the product may cure at a slower rate. Optimal application temperatures shall be above 40 degrees F (5 degrees C) or below 95 degrees F (35 degrees C).

C. Do not apply material if the substrate is wet or contains frozen moisture. Allow substrate to dry for a minimum of 48 hours after rain or 72 hours after power washing.

D. Do not apply material during inclement weather or if precipitation is expected within 12 hours.

E. Do not use spray method of application under windy conditions.

1.7 WARRANTY

A. Manufacturer's Warranty:

1. Water Repellents: Manufacturer warrants the performance of the products, for a period of ten (10) years from the date of application (Warranty Date). The product, when applied in accordance with application instructions will prevent water penetration for the full warranty period. If the product fails to perform as stated, manufacturer will provide sufficient product to retreat the specific area where product has failed.

1.8 EXTRA MATERIAL

A. One (1) gallon of graffiti removal - Professional Phase II Cleaner.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Basis-of-Design: Professional Products of Kansas, Inc., which is located at: 4456 S. Clifton ; Wichita, KS 67216; Toll Free Tel: 800-676-7346; Tel: 316-522-9300; Fax: 316-522-9346; Email: request info <http://admin.arcat.com/users.pl?action=UserEmail&company=Professional Products of Kansas, Inc.&coid=34975&rep=146&fax=316-522-9346&message=RE: Spec Question (07190ppk): &mf=>; Web: www.watersealant.com <http://www.watersealant.com/> **(no known equal).**

2.2 PENETRATING WATER REPELLENTS

A. The graffiti resistant coating product is selected as a standard of quality and based on manufacturer's recommendations for execution. Application procedure and coverage rates shall be in conformance with effectiveness of testing samples submitted, recommendation of application rates suggested, approved manufacturers standards and as a minimum, that specified herein.

B. Products:

1. Professional Water Sealant: One coat provides water repellent protection.

a. PWS-15 Super Strength:

1) Form: Liquid.

2) Color: Clear.

3) Active Substance: RTV Silicone Rubber.

4) Percent Active Material: 15 percent.

b. PWS-5 Regular Strength:

1) Form: Liquid.

2) Color: Clear.

3) Active Substance: RTV Silicone Rubber.

4) Percent Active Material: 5 percent.

C. Performance: Water repellent/graffiti barrier shall:

1. Penetrate the surface and cure to silicone rubber, which remains below the surface and prevents water and paint from penetrating and bonding while permitting moisture vapor transmission. The silicone rubber retains its characteristic 400 percent elongation, allowing for bridging of hairline cracks.

a. Be unaffected by ultraviolet light, airborne pollutants, salt spray or acid rain.

b. Cure to a clear, flat finish. Slight darkening or enhancement is acceptable.

2. Be non-sacrificial, capable of withstanding repeated cycles of graffiti tagging/removal with no requirement to re-apply.

D. Requests for substitutions will be considered in accordance with the following provision:

1. Proposed alternate products shall be equal in terms of chemical composition and performance standards. Products shall be a penetrating, breathable treatment using a Room Temperature Vulcanizing (RTV) Silicone Rubber base. Silane and siloxane based products will not be considered.

2.3 ANTI-GRAFFITI MAINTENANCE PRODUCTS

A. Phase II Cleaner:

1. Compositions: Bio-degradable surfactants in a bio-degradable solvent.

2. Use: Removal of graffiti from surfaces treated with PROFESSIONAL Water Sealant and Anti-Graffitiant.

PART 3 EXECUTION

3.1 EXAMINATION

A. Do not begin installation until substrates have been properly prepared.

1. The required joint sealants have been installed.

2. Masonry and mortar has cured a minimum of 28 days.

3. Surface to be treated is clean, dry, and contains no frozen moisture.

4. Environmental conditions are appropriate for application.

B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.2 PROTECTION

A. Special precautions shall be taken to avoid fumes from entering the building being treated. Ventilation systems and fresh air intakes shall be turned off and covered.

B. Protect shrubs, metal, glass, vehicles, and other building hardware from overspray.

3.3 PREPARATION

A. Clean all dirt, oil, grease, mold, mildew, efflorescence, or any other coating or material from surfaces that interfere with penetration, performance, adhesion, or aesthetics of water repellent/graffiti barrier. Rinse thoroughly to remove cleaner residues. Allow surfaces to dry completely before application of water repellent/graffiti barrier.

B. Repair, patch, and fill all cracks, voids, defects, and damaged areas in surface as approved by the Architect. Allow repair materials to cure completely before application of water repellent/graffiti barrier.

1. Allow new masonry and concrete construction and repointed surfaces to cure for a minimum of 28 days before application of water repellent/graffiti barrier.

C. Protect shrubs, metal, glass, vehicles, painted surfaces, surfaces to be painted and other building hardware from overspray.

D. Special precautions shall be taken to avoid fumes from entering the building being treated. Ventilation systems and fresh air intakes shall be turned off and covered.

3.4 APPLICATION OF WATER REPELLENT

A. Apply water repellent/graffiti barrier in accordance with manufacturer's written instructions, using appropriate method and coverage rate as determined by mock-up testing results.

B. Base Coat: Apply using high volume, low pressure spray equipment, starting at the top of the designated area, create a 4-6 inch rundown of product from the point where the spray makes contact with the surface. Work all the way down the wall filling in the run-down with an equal volume of material. Avoid excessive overlapping. Brush any excess product that may accumulate on ledges and other areas that may hold excess material.

1. **Exposed Concrete Block Walls: Use PWS-15 Super Strength.**

2. **Exposed Pour-in-Place Concrete Walls: Use PWS-5 Regular Strength for both horizontal and vertical applications.**

C. On horizontal surfaces, the water repellent must not be allowed to puddle or pond.

1. Over-application may result in product curing on the surface.

2. Product that has not absorbed within 5 minutes must be immediately wiped up.

3. PWS-15 Super Strength is not recommended for use on horizontal surfaces.

3.5 FIELD QUALITY CONTROL

A. Manufacturer's Field Services: Provide services of manufacturer's representative to inspect and approve the substrate before application, to instruct the applicator on the product and application method to be used, and to field test the surfaces after application.

B. Spray Test: After water repellent/graffiti barrier has cured, spray treated surfaces with water for evidence of water absorption (darkening of surface).

3.6 CLEANING

A. Immediately clean water repellent/graffiti barrier from adjoining surfaces and surfaces soiled or damaged by water repellent/graffiti barrier as work progresses. The Contractor shall remove all equipment, material and debris, leaving

the area in an undamaged and acceptable condition. Dispose of material containers according to state and local environmental regulations.

B. Repair, restore, or replace to the satisfaction of the Architect, all materials, landscaping, and non-masonry surfaces damaged by exposure to material application.

3.7 MAINTENANCE

A. Graffiti Removal: Surfaces that have been properly treated with PROFESSIONAL® Water Sealant Anti-Graffitiant provide for easy removal of graffiti. Remove graffiti as soon as possible after surface has been defaced. Apply Professional Phase II Cleaner directly to the painted surface and allow it to work for 5-10 minutes. Agitate with a nylon brush and rinse thoroughly with water. A power washer (not to exceed 1400 psi) may also be used to remove graffiti. After surface has been cleaned and allowed to dry completely, it will continue to protect against graffiti penetration and permit additional cleaning cycles if necessary. NOTE: Use of any product other than Professional Phase II Cleaner to remove graffiti may damage the protective coating, thereby necessitating reapplication.

END OF SECTION

SECTION 07 2100
INSULATION

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Thermal batt insulation for exterior walls.
2. Acoustic Insulation for interior walls.
3. Thermal batt insulation for filling perimeter of windows and door shim void spaces and crevices in exterior wall and roof.

B. Related Sections:

1. Section 05 3100 - Steel Decking
2. Section 05 4100 - Metal Stud Framing
3. Secion 07 2115 - Board Insulation: Installation requirements for continous board insulation at exterior wall behind the entire exterior wall finishes including but not limited to portland cement plastering, sidings and metal wall panels.
4. Section 07 2500 - Weather Barriers
5. Section 07 4113 - Metal Roof Panels: Installation requirements for board insulation at roof.
6. Section 07 4213 - Metal Wall Panels
7. Section 07 4646 - Fiber Cement Siding
8. Section 07 5419 - Single Ply Membrane Roofing: Installation requirements for board insulation over low slope roof deck specified in this section.
9. Section 07 6200 - Sheet Metal Flashing and Trim
10. Section 09 2116 - Gypsum Board Assemblies
11. Section 09 2400 - Portland Cement Plastering

1.2 SUBMITTALS

A. Product Data:

1. Material List: Provide a list of materials for installation under this section.
2. Provide manufacturer's printed Product Data for each type insulation and accessory.

B. Manufacturer's Instructions: Submit manufacturer's printed installation instructions.

C. Certification: Provide certification that insulation materials conform to requirements of CBC Section 701.

1.3 QUALITY ASSURANCE

A. Surface Burning Characteristics: Flame spread rating shall not exceed 25 and smoke density shall not exceed 50.

B. Sustainability Requirements: Provide glass-fiber blanket insulation as follows:

1. Free of Formaldehyde: Insulation manufactured with 100 percent acrylic binders and no formaldehyde.

C. Comply with following as a minimum requirement:

1. ASTM C 177 - Steady-State Heat Flux-Measurements and Thermal Transmission Properties by Means of Guarded-Heat-Plate Apparatus
2. ASTM C 518 - Steady-State Heat Flux-Measurements and Thermal Transmission Properties by Means of Heat-Flow-Meter Apparatus
3. ASTM C 665 - Mineral Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing
4. ASTM C665 - Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing; 2017.
5. ASTM C1289 - Standard Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board; 2017.
6. ASTM E 84 - Surface Burning Characteristics of Building Materials
7. ASTM E 119 - Fire Tests of Building Construction and Materials
8. ASTM E 136 - Behavior of Materials in a Vertical Tube Furnace at 750º C.

1.4 DELIVERY, STORAGE AND HANDLING

A. Deliver materials to Project site and store in a safe, dry place, with labels intact and legible at time of installation.

B. Protect building insulation materials from damage.

1.5 PROJECT CONDITIONS

A. Avoid exposure to humidity and moisture. Protect from exposure to sunlight.

PART 2 - PRODUCTS

2.1 GLASS FIBER INSULATION

A. Acceptable Manufacturers:

1. Owens-Corning, Toledo, OH; 800-438-7465, www.owenscorning.com <http://www.owenscorning.com>.
2. Certainteed Corp., Insulation Group, Valley Forge, PA; 800-233-8990, www.certainteed.com <http://www.certainteed.com>.
3. Johns Manville, Denver, CO; 800-654-3103, www.specJM.com <http://www.specJM.com>.
4. Thermafiber, Inc., Wabash, IN; 888-834-2371, www.thermafiber.com <http://www.thermafiber.com>.

B. Sustainability Requirements: Provide glass-fiber blanket insulation as follows:

1. Free of Formaldehyde: Insulation manufactured with 100 percent acrylic binders and no formaldehyde.
2. Low Emitting: Insulation tested according to ASTM D 5116 and shown to emit less than 0.05-ppm formaldehyde.
3. Low Emitting: Complies with the testing and product requirements of the California Department of Public Health's (formerly, the California Department of Health Services') "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."
4. Recycled Content of Insulation: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 40 percent.

2.2 MATERIALS

A. General:

1. Kraft facing at locations where insulation will be covered by finish materials; Type II, Class C per ASTM C665. In concealed locations, facings shall be installed behind and in substantial contact with the unexposed surface of the ceiling, floor or wall finish.

B. Thermal Batt Insulation: Preformed glass fiber batt in accordance with **2019** CBC Section 719, California Referenced Standards Code Chapter 12-13, ASTM E84, and UL 723, conforming to the following:

1. Facings:

a. Faced on one side with foil reinforced kraft (FSK) face at exposed locations (facing not covered by finish materials); Type III, Class A per ASTM C665; flame spread 25 and smoke developed 50 per ASTM E84.

2. Unfaced insulation is allowed for filling perimeter of windows and door shim void spaces and crevices in exterior wall and roof.

C. Acoustic Insulation: ASTM C665; Type I; preformed glass fiber batt; conforming to the following:

1. Facing: Acoustic insulation shall be unfaced where covered on both sides by finish materials. Provide Type II Class C kraft facing where insulation is exposed.

2. Flame Spread and Smoke Density Properties: 25/450 maximum in accordance with **2019** CBC Section 719, California Referenced Standard Code Chapter 12-13, ASTM E84, and UL 723.

3. Provide formaldehyde-free thermal insulation products.

D. Accessories:

1. Staples: Steel wire; galvanized; type and size to suit application.

2. Tape: Polyester self-adhering type, mesh reinforced, 2 inches wide.

PART 3 - EXECUTION

3.1 PREPARATION

A. Clean substrates of substances that are harmful to insulation, including removing projections capable of puncturing insulation or vapor retarders, or that interfere with insulation attachment.

3.2 INSTALLATION, GENERAL

A. Comply with insulation manufacturer's written instructions applicable to products and applications.

B. Install insulation that is undamaged, dry, and unsoiled and that has not been left exposed to ice, rain, or snow at any time.

C. Extend insulation to envelop entire area to be insulated. Fit tightly around obstructions and fill voids with insulation. Furnish manufacturer's recommended clips to tightly fit batts at joints. Remove projections that interfere with placement. Maintain total insulation integrity over entire area to be insulated, including areas between closely spaced members. Cut and fit batt insulation tightly around pipes, conduits and penetrations.

D. Provide sizes to fit applications and selected from manufacturer's standard thicknesses, widths, and lengths. Apply single layer of insulation units unless multiple layers are otherwise shown or required to make up total thickness or to achieve R-value.

E. Do not compress batt insulation in excess of 10 percent.

F. Prevent batt insulation from sagging during and after installation by installing adequate wire.

G. Metal door and window frames in acoustically insulated walls shall be filled with insulation, unless otherwise indicated.

3.3 INSTALLATION OF INSULATION IN FRAMED CONSTRUCTION

A. Blanket Insulation: Install in cavities formed by framing members according to the following requirements:

1. Install insulation in accordance with insulation manufacturer's instructions and with the flame spread rating and smoke density requirements of CBC Section 719.

2. Trim insulation neatly to fit spaces. Insulate miscellaneous gaps and voids.

3. Fit insulation tight in spaces and tight to exterior side of mechanical and electrical services within the plane of insulation.

4. Use insulation widths and lengths that fill the cavities formed by framing members. If more than one length is required to fill the cavities, provide lengths that will produce a snug fit between ends.

5. Place insulation in cavities formed by framing members to produce a friction fit between edges of insulation and adjoining framing members.

6. Maintain 3-inch (76-mm) clearance of insulation around recessed lighting fixtures not rated for or protected from contact with insulation.

7. Attics: Install eave ventilation troughs between roof framing members in insulated attic spaces at vented eaves.

8. For metal-framed wall cavities where cavity heights exceed 96 inches (2438 mm), support unfaced blankets mechanically and support faced blankets by taping flanges of insulation to flanges of metal studs.

a. Securely fasten and anchor insulation in place to prevent displacement or sagging of material in all areas.

b. At metal joists, install insulation using wire and clips and anchor as recommended by manufacturer to securely hold insulation in place.

9. Batts In Horizontal or Sloped Applications: Provide tightly stretched string wires along center of horizontal or sloping batts where support spacing exceed 16" on centers.

3.4 PROTECTION

A. Protect Work of this section until Substantial Completion.

3.5 CLEANUP

A. Remove rubbish, debris, and waste materials and legally dispose of off Project site.

3.6 INSULATION SCHEDULE

A. **Thermal - Vertical:**

1. **Thickness: 6 inches.**

2. **R-Value: R-21 minimum**

3. **Applications:**

a. **Exterior stud walls.**

B. **Acoustic - Vertical**

1. **Thickness: Full width, depth, and height of cavity, without gaps or voids. Do not compress insulation.**
2. **Applications: Interior stud walls.**

END OF SECTION

SECTION 07 2115
BOARD INSULATION

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Rigid polyisocyanurate foam insulation with coated glass-mat facers as continuous exterior wall insulation.

B. Fasteners, adhesives, and sealants necessary for a complete installation.

1.2 WORK SPECIFIED IN OTHER SECTIONS

A. Division 01 Section 017419, “Construction Waste Management,” for proper separation, handling, and disposal of waste materials.

B. Division 01 Section 019113, “General Commissioning,” for commissioning requirements.

C. Division 05 Section 054000, “Cold Formed Metal Framing,” for cold formed metal framing supported wall assemblies utilizing rigid polyisocyanurate foam board insulation.

D. Division 07 Section 072500, “Weather Barriers” for requirements of weather barriers in conjunction with rigid polyisocyanurate foam board insulation.

E. Division 07 Section 079200, “Joint Sealants” for requirements of joint sealants in conjunction with rigid polyisocyanurate foam board insulation.

1.3 SUBMITTALS

A. Make submittals in accordance with requirements specified in Division 01 Section 01 3300 “Submittal Procedures.”

B. Product Test Reports: Submit evaluation reports published by independent authority indicating evidence of compliance with specified criteria.

C. Product Data: Submit product data for each type of product indicated.

D. Samples: Submit three samples, minimum size 4 in X 8 in.

1.4 QUALITY ASSURANCE

A. Board Insulation:

1. Description: ASTM C1289, Type 2, Class 2, closed cell polyisocyanurate foam core faced with high-performance coated glass facers on both sides.

2. Approved for use in NFPA 285 wall assemblies.

3. Flame spread/smoke developed rating: Class A, maximum 25/450, tested to ASTM E84.

4. Free from CFCs, HCFCs, and HFCs.

5. Compressive strength: Minimum 25 PSI, tested to ASTM D1621.

6. Moisture vapor transmission: Maximum 1.2 perms, tested to ASTM E96 desiccant method.

7. Water absorption: Maximum 1.0 percent by volume, tested to ASTM C209.

8. Dimensional stability: Maximum 2 percent linear change, tested to ASTM D2126.

9. Pass ASTM 2357 air barriers assembly test.

10. Qualify as weather resistive barrier per AC 71 with sealed joints; ICC-ES-ESR 1375.
11. Service temperature: Minus 100 to plus 250 degrees F.
12. Potential heat 12,000 BTU/LB, tested to NFPA289
13. Auto ignition temperature 800 deg F, tested to ASTM D1929
14. Microbial resistance:
    a. Pass ASTM D6329.
    b. Pass UL2824.
15. Recycled content: minimum 10 percent
16. Tested to UL 2818; GreenGuard Gold certified.
17. Comply with CDPH 01350 low-emitting chamber requirements.

1.5 STORAGE AND HANDLING

A. Comply with Manufacturer's recommendations for the proper storage and handling of insulation materials.

B. Store materials off of ground, protected from physical damage, and covered or otherwise shielded from sunlight.

C. Protect insulation so that insulation does not come in direct contact with rain, snow, or other moisture sources.

D. Cover installation within 60 calendar days of initial installation.

1.6 WASTE MANAGEMENT AND DISPOSAL

A. Separate and recycle waste materials in accordance with Section 017419, "Construction Waste Management."

PART 2 PRODUCTS

2.1 POLYISOCYANURATE RIGID FOAM BOARDWALL INSULATION

A. Coated Glass-Mat Faced Polyisocyanurate Foam Board Wall Insulation: **Energy Shield CGF formerly Rboard manufactured by Atlas Roofing Corporation or equal.**

1. **Provide coated glass faced insulation, 2-inch thick, 2.13 RSI Value, and 12.1 R-value unless noted otherwise.**
2. Facer Materials: Coated glass-mat facer on each face of insulation.
3. Size: 4 ft x 8 ft.

2.2 ACCESSORIES

A. Mechanical Fasteners: Select type, size and length compatible with the substrate, wall system and exposure.

B. Joint Sealant: Single component, non-shrink joint sealants and backings compatible with each other and with other materials in the assembly.

C. Joint Tape: Joint tape suitable for use with coated glass-mat facers. Ensure compatibility prior to use by field testing.

PART 3 EXECUTION

3.1 EXAMINATION

A. Inspect areas to receive insulation. Ensure that substrates intended for adhesive fastening are clean and free from moisture or other materials that may have a deleterious effect on adhesion. Prepare report identifying conditions that may be detrimental to the performance of the insulation and proceed with installation only after the conditions noted have been properly addressed.

3.2 INSTALLATION

A. General:

1. Comply with Manufacturer's instructions for installation of polyisocyanurate rigid foam board wall insulation.

2. Do not install polyisocyanurate rigid foam board wall insulation that has become soiled, wet, or has not been properly protected from sunlight.

3. Dry fit polyisocyanurate rigid foam board wall insulation prior to final installation. Neatly trim around conduits, pipes, and other items that will penetrate insulation board.

B. Mechanical Attachment:

1. Fasten insulation boards with corrosion resistant fasteners through sheathing into studs. Use 3/8 inch head roofing nails for wood studs, and self-drilling tapping screws for metal studs, or to “Z” channels, as applicable.

2. Select a mechanical fastener appropriate for the intended substrate. Fasten insulation board to substrate with mechanical anchors spaced no greater than 9.5 mm (3/8 in) from edge of board or opening, 305 mm (12 in) on center at perimeter edges and openings and no greater than 406 mm (16 in) on center in both directions within the field of the perimeter. The washer of a single 44.5 mm (1 ¾ in) washer style fastener may be used to bridge adjoining boards. Fastener penetration into studs shall be not less than 3/4 inch.

3. Bottom row of insulation panels shall be mounted on foundation casing “J” mold, refer to Section 09 2400 Portland Cement Plastering.

4. Stagger vertical joints at least one stud from adjacent courses.

3.3 ACCESSORIES

A. Joint Treatment: For joints, gaps, and openings less that 13 mm wide, install continuous bead of joint treatment to form a seal at all board joints and openings.

B. Expanding Foam Sealant: For joints, gaps, and openings greater than 13 mm wide, install sealant in a continuous ribbon between adjacent board edges, working sealant in to joint for a full depth bead of sealant.

C. Tape: Install tape to form a continuous seal between adjacent boards. Ensure compatibility and maintain adequate overlaps.

3.4 PROTECTION

A. Protect polyisocyanurate rigid foam board wall insulation from excess moisture, mechanical damage, and exposure to open flame.

B. Promptly repair damage caused to insulation in a manner that retains integrity and continuity of insulation and facer materials.

C. Cover insulation with cladding promptly, but no later than 60 days after installation of insulation.

END OF SECTION

SECTION 07 2500
WEATHER BARRIERS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Mechanically attached permeable flexible plastic sheet air barriers.

2. Flexible flashing of openings, penetrations, joints, and terminations of exterior walls and taping of seams.

B. Related Requirements:

1. Section 05 4100 – Structural Metal Stud Framing.

2. Section 07 2115 - Board Insulation.

3. Section 07 4213 - Metal Wall Panels.

4. Section 07 4646 - Fiber Cement Siding.

5. Section 07 6000 – Flashing and Sheet Metal.

6. Section 07 9200 – Joint Sealants.

7. Section 08 4113 - Aluminum Entrances and Storefronts.

8. Section 08 5113- Aluminum Windows.

9. Section 09 2400 – Portland Cement Plastering.

1.2 REFERENCES

A. ASTM International:

1. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.

2. ASTM E1677 - Standard Specification for an Air Barrier (AB) Material or System for Low-Rise Framed Building Walls.

3. ASTM E2178 – Standard Test Method for Air Permeance of Building Materials.

B. International Code Council (ICC):

1. ICC-ES Evaluation Reports.

1.3 SUBMITTALS

A. Product Data: Submit manufacturer's product data for each material and component proposed for installation.

B. Shop Drawings: Dimensioned plans and elevations indicating:

1. Complete information as to size and location of openings, sleeves, conduits, ducts, boxes, inserts, attachments, and structural interferences.

2. Layout of air barrier showing sheet lapping, cutting, flashing and taping, with references to enlarged details.

C. Installation Instructions: Submit detailed manufacturer’s installation instructions.

D. Material Samples: Submit minimum 8-1/2-inch by 11-inch samples of air barrier, and 12 inch long flashing.

E. Test Reports: Submit Test Reports showing performance characteristics equaling or exceeding those specified.

F. Evaluation Reports: Submit ICC-ES Evaluation Report demonstrating conformance of plastic sheet air barrier to CBC 1404.2, for use as water-resistive barrier.

G. Qualification Statements:

1. Installer: Statement from plastic sheet air barrier manufacturer indicating installer is approved, certified, or has been trained for the installation of their products.

1.4 QUALITY ASSURANCE

A. Manufacturer:

1.5 Plastic sheet air barrier components and accessories shall be from a single source.

A. Manufacturer shall have a minimum of five years of continued experience in the manufacture of the specified products.

B. Installer:

1. Minimum five years in the installation of air/weather barriers.

2. Trained or certified by manufacturer for the installation of their products.

1.6 DELIVERY, STORAGE AND HANDLING

A. Deliver materials to the job site in undamaged and original packaging.

B. Store materials in a clean, dry, protected location and within temperature range required by plastic sheet air barrier manufacturer. Protect stored materials from direct sunlight.

C. Handle materials in accordance with Manufacturer's recommendations.

1.7 WARRANTY

A. Provide a ten year manufacturer's standard material warranty for replacement of plastic sheet air barriers that fail due to material defects.

B. Installation Warranty: Provide a two year installation warranty for the plastic sheet air barrier, including accessories, against loss of water-tight seal and loss of attachment.

C. Warranty shall start on the day of Substantial Completion.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Manufacturer and Products:

1. DuPont (E. I. du Pont de Nemours and Company): Tyvek CommercialWrap.

2. Polymer Group Inc., TyparMetroWrap.

3. Or Equal.

B. Properties:

1. Plastic sheet air barrier shall be Type I in accordance to ASTM E1677.

2. Air Permeance: shall not exceed 0.004 cfm/ft2, under a pressure differential of 0.3 in w.g. (1.57 psf) (0.02 L/m2 at 75 Pa), when tested in accordance with ASTM E2178.

3. Flame-spread and smoke-developed indexes of less than 25 and 450, respectively, when tested in accordance to ASTM E84.

2.2 MISCELLANEOUS MATERIALS

A. Flashing: Self-adhesive butyl rubber compound, bonded to a high-density polyethylene film, aluminum foil, or spunbonded polyolefin to produce an overall thickness of not less than 0.025 inch (0.6 mm).

1. DuPont (E. I. du Pont de Nemours and Company); FlexWrap and StraightFlash.

2. Polymer Group Inc.; Flashing Flex and Flashing AT.

3. Or Equal.

B. Fasteners: Manufacturer approved fasteners.

C. Tape: Three inch wide seam tape. Pressure-sensitive plastic tape recommended by air barrier manufacturer for sealing joints and penetrations in air barrier.

D. Sealants and Adhesive Primers: Compatible with plastic sheet air barrier and flashings system and approved by OWNER's Office of Environmental Health and Safety (OEHS).

1. Sealant: Dow Corning 732.

2. Spray Adhesive: Design Polymerics DP77.

3. Or Equal.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas and conditions under which plastic sheet air barrier will be installed.

B. Verify that substrate to receive air barrier has been completed and inspected before commencement of work.

C. For the installation of flashing and tape, surface shall be smooth, clean, dry and free from voids, loose substrate, protrusions, or any material that would hinder adhesion.

3.2 INSTALLATION

A. Install plastic sheet air barrier in accordance to manufacturer's installation guidelines, providing continuity throughout exterior walls. Install plastic sheet air barrier with drainage plane surface pattern in vertical position for proper drainage.

B. Install plastic sheet air barrier starting from the bottom of the building up to ensure proper overlapping of vertical and horizontal seams. Upper layer of plastic sheet air barrier shall overlap bottom layer by a minimum of six inches. Plastic sheet air barrier shall extend over the weep screed by two inches and be taped down.

C. Secure plastic sheet air barrier by fastening into studs at 12 to 18 inches on center vertically.

D. Unroll plastic sheet air barrier directly over windows and doors rough openings. Do not install fasteners within six inches of the sills and jambs of the openings and within nine inches of the header, plastic sheet air barrier shall be fastened at these locations during flashing installation.

E. Horizontal joints shall be overlapped a minimum of six inches with upper courses overlapping lower courses in water-shedding fashion. Vertical seams shall be overlapped a minimum of six inches. Overlap corners of building a minimum of 12 inches.

F. Tape vertical and horizontal seams using adhesive tape recommended by manufacturer. Seal tears and cuts with adhesive tape as recommended by manufacturer.

G. Place patch or strip of self-adhered flashing over plastic sheet air barrier where base plates, metal channels, z-girts, or other hardware will be installed.

3.3 FLASHING

A. Cut air barrier from door and window openings along jambs and sill. Cut a header flap at 45 degree angle to expose eight inches of plastic sheet air barrier to allow for head flashing installation. Install sill flashing per manufacturer instructions, overlapping up the jambs a minimum of six inches on each side.

B. Wrap flashing around interior jamb, wall face and exterior jamb, overlapping the vertical portion of the sill flashing by at least two inches.

C. Adhere flashing to the head following manufacturer's instructions. Flashing shall wrap jamb flashings by a minimum of two inches.

D. Flash piping, conduit, duct and similar penetrations through walls, and flashing ledgers and sills as recommended by manufacturer.

3.4 FIELD QUALITY CONTROL

A. Manufacturer's technical representative shall inspect the work and submit a statement indicating that the installation has been done in conformance to manufacturer's installation instructions.

3.5 CLEANING

A. Remove rubbish, debris, and waste material and legally dispose of off the Project site.

3.6 PROTECTION

A. Protect the Work of this section until Substantial Completion.

END OF SECTION

SECTION 07 4113
METAL ROOF PANELS

NOT USED

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Structural standing seam metal roof panels.

B. Accessories including concealed anchor clips, fasteners, perimeter flashing, trim and penetration treatments.

1.2 REFERENCES

A. ASTM International

1. ASTM A240; Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications.

2. ASTM A653; Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

3. ASTM A666; Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar.

4. ASTM B69; Standard Specification for Rolled Zinc.

5. ASTM B85; Standard Specification for Aluminum Alloy Die Castings.

6. ASTM B117; Standard Practice for Operating Salt Spray(Fog) Apparatus.

7. ASTM B209; Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.

8. ASTM B221; Standard Specification for Aluminum and Aluminum Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.

9. ASTM B370; Standard Specification for Copper Sheet and Strip for Building Construction.

10. ASTM C920 – Standard Specification for Elastomeric Joint Sealants.

11. ASTM E1592; Standard Test Method for Structural Performance of Sheet Metal Roof and Siding Systems by Uniform Static Air Pressure Difference.

12. ASTM E1646; Standard Test Method for Water Penetration of Exterior Metal Roof Panel Systems by Uniform Static Air Pressure Difference.

13. ASTM E1680; Standard Test Method for Rate of Air Leakage through Exterior Metal Roof Panel Systems.

B. Southern Building Code Conference International (SBCCI)

1. SBCCI Standard 12-99; Standard for Determining the Wind Resistance from Windborne Debris.

C. Underwriters Laboratories (UL)

1. UL 580; Tests for Uplift Resistance of Roof Assemblies

D. Factory Mutual (FM)

1. FM 4471; Approval Standard for Class 1 Panel Roofs

1.3 SUBMITTALS

A. Refer to Section 01 3300 Submittal Procedures.

B. Product Data: Submit manufacturer current technical literature for each type of product.

C. Shop Drawings - Submit detailed drawings showing:

1. Profile
2. Gauge of panel
3. Location, layout and dimensions of panels
4. Location and type of fasteners
5. Shape and method of attachment of all trim
6. Locations and type of sealants
7. Installation sequence.
8. Other details as may be required for a weathertight installation

D. Samples: Provide nominal 3 x 5 inch of each color indicated.

E. Quality Assurance Submittals

1. Design Data, Test Reports: Provide manufacturer test reports indicating product compliance with requirements.
2. Manufacturer Erection Instructions: Provide manufacturer's written installation instructions including proper material storage, material handling, installation sequence, panel location(s), and attachment methods, details and required trim and accessories.

F. Closeout Submittals

1. Refer to Section 01 7800 Closeout Submittals.

1.4 ADMINISTRATIVE REQUIREMENTS

A. Pre-installation meeting: Conduct a pre-installation meeting at the job site attended by Owner, Architect, Manufacturer's Technical Representative, Panel Installer, and Contractors of related trades. Coordinate structural support requirements in relation to roof panel system, installation of any separate air/water barriers, treatment of fenestration, and other requirements specific to the project.

1.5 QUALITY ASSURANCE

A. Requirements of Regulatory Agencies:

1. Metal roofing systems shall be Class A per CBC Section 1505.
2. Metal roofing systems shall meet or exceed the wind uplift requirements for the location of the installation as per CBC.

B. Manufacturer Qualifications: Manufacturer shall have a minimum of ten (10) years experience in the production of metal roof panels. Manufacturer shall demonstrate past experience with examples of projects of similar type and exposure.

C. Installer Qualifications: Installer shall be authorized by the manufacturer regarding proper installation of the specified product, and have a minimum of five (5) years experience with projects of similar size and scope.

NOT USED

D. Metal roof panel attachment shall meet the requirements of Factory Mutual 4471 – Class 1 Rating.

1.6 DELIVERY, STORAGE AND HANDLING

A. Deliver panel materials and components in manufacturer's original, unopened, undamaged packaging with identification labels intact.

B. Store roof panel materials on dry, level, firm, and clean surface. Elevate one end of bundle to allow moisture run-off, cover and ventilate to allow air to circulate and moisture to escape.

1.7 WARRANTY

A. Material Warranty: Standard form in which manufacturer agrees to repair or replace items that fail in materials or workmanship within specified warranty period. The items covered by the warranty include structural performance and material integrity.

1. Warranty Period: Two (2) years from date of Substantial Completion.

B. Installers "Weather-tight" Warranty: The Manufacturer Certified Installer shall provide a "leak-free" roofing warranty in which the installer agrees to repair leaks discovered in the roofing system under the terms outlined by the roofing manufacturer within the specified warranty period.

1. Warranty Period: Two (2) years from date Substantial Completion.

C. Weather-tight Warranty: Provide manufacturer's limited weathertightness warranty in which manufacturer agrees to repair or replace components of roofing system that fail in materials or workmanship within specified warranty period.

1. Warranty Period: Twenty (20) years from date Substantial Completion, or 20 years and 3 months from the date of shipment from manufacturer's plant, whichever occurs first.

D. Finish Warranty: Standard form in which manufacturer agrees to repair or replace metal panels that evidence deterioration of fluoropolymer finish, including flaking or peeling from approved primed metal substrate, chalk in excess of 8 when tested in accordance with ASTM D4214, Method A, and /or color fading in excess of 5 ?E Hunter units on panels when tested in accordance with ASTM D2244.

1. Warranty Period: Twenty (20) years from date Substantial Completion, or 20 years and 3 months from the date of shipment from manufacturer's plant, whichever occurs first.

NOT USED

PART 2 PRODUCTS

2.1 MANUFACTURER

A. Taylor Metal Incorporated

B. Basis of Design: **VERSA-SPAN FLAT PANEL**

C. Substitutions: Under provisions of Division 01.

2.2 PERFORMANCE REQUIREMENTS

A. Structural Performance:

1. Roof assembly shall be tested for structural performance under uniform static air pressure differences in accordance with ASTM E1592.

a. Uniform Pressure: As indicated on drawings; acting inward or outward.

b. Deflection: Panel shall be limited to L/180.

B. Metal roof panels shall be capable of withstanding a 250 pound concentrated load applied to a 4 square inch area in the middle of the panel. No noticeable buckling or permanent distortion of the panel shall occur.

C. Water Penetration under Static Pressure: Provide metal roof panel systems designed to resist penetration of water under static pressure. Testing shall be based on ASTM E1646. Roof panels when tested shall have no water leakage at 30.0 pounds per square foot.

D. Air Infiltration: Provide metal roof panel assemblies designed to resist air infiltration. Testing shall be done based on ASTM E1680. Roof panels when tested shall have a maximum air leakage of 0.004 cfm per square feet of fixed roof area at a minimum static air-pressure differential of 30.0 foot pounds per square foot.

E. Wind Uplift Resistance:

1. Roof assembly shall comply with UL 580 for wind uplift resistance; class UL 90.

F. Energy Performance:

1. Energy Star Qualified: Metal panels shall meet the requirements of Energy Star Roofing Products for low-slope.

2. Solar Reflectance Index: Panels shall have a solar reflectance index of not less than 78 for low-sloped roof.

3. Fire Performance: Roof assembly to meet requirements of ASTM E108, Class A.

G. Finish Characteristics:

1. Gloss: 15 ± 5 tested in accordance with ASTM D523

2. Pencil Hardness: HB - H tested in accordance with ASTM D3363

3. Flexibility, T-Bend: 1-2T bend tested in accordance with ASTM D4145

4. Flexibility, Mandrel: No cracking tested in accordance with ASTM D522

5. Adhesion: No adhesion loss tested in accordance with ASTM D3359

6. Reverse Impact: No cracking or adhesion loss tested in accordance with ASTM D2794

7. Abrasion Resistance: 65 ± 10 liters tested in accordance with ASTM D968

8. Graffiti Resistance: Minimal effect

9. Acid Pollutant Resistance: No effect tested in accordance with ASTM D1308

10. Salt Fog Resistance: Passes 1000 hours tested in accordance with ASTM B117

11. Cyclic Salt Fog and UV Exposure: Passes 2016 hours tested in accordance with ASTM D5894

12. Humidity Resistance: Passes 1500 hours when tested in accordance with ASTM D2247 and D714

13. Color Retention: Passes 5000 hours when tested in accordance with ASTM G153 and G154

14. Chalk Resistance: Maximum chalk is a rating of 8 when tested in accordance with ASTM D4214, Method A

15. Color Tolerances: Greater than 5$\underline{\Delta}$E units on panels when tested in accordance with ASTM D2244.

2.3 ROOF PANEL MATERIALS

A. Steel (Galvalume/Zincalume):

1. Aluminum-Zinc Alloy-Coated Steel Sheet: ASTM A792, Class AZ50 coating designation, Grade 40.

a. Gauge: 20.

NOT USED

2.4 ROOF PANELS

A. Roof Panel Descriptions:

1. Panel Width: 16 inches

2. Profile: SRR.

3. Seam Height: 2½ inches

4. Texture: Smooth

2.5 ROOF UNDERLAYMENT MATERIALS

A. Provide one layer of high temperature resistant self-adhesive roofing sheet underlayment, W.R. Grace"Ultra", GAF StormGuard HT Leak Barrier, or equal, self-adhesive roofing underlayment designed for use in high temperature applications, consisting of butyl rubber based adhesive and 30 mil cross-laminated, high density polyethylene and backed by a protective plastic release liner. Provide primer when recommended by underlayment manufacturer.

B. Slip Sheet: Manufacturer's recommended slip sheet, of type required for application.

2.6 SUBSTRATE BOARDS (ROOF COVER BOARD)

A. Glass-Mat Gypsum Sheathing Board: ASTM C 1177/C 1177M.

1. Type and Thickness: Type X, 5/8 inch.

2. Product: Dens-Deck Prime Gypsum Roof Board, by Georgia Pacific Corporation; Atlanta, GA or approved equal.

3. Substrate-Board Fasteners: Factory coated steel fasteners and metal or plastic plates complying with corrosion-resistance provisions in FMG 4470, designed for fastening substrate board to substrate

2.7 ROOF INSULATION

A. Provide insulation boards, fabricated to R-value indicated. Rigid polyisocyanurate board, with a strong white or black fibrous glass facer conforming to or exceeding the requirements of ASTM C 1289 / FS HH-I-1972 with the following characteristics:

1. Thermal Resistance: R-31 minimum.

2. Compressive Strength: 20 psi.

3. Install per manufacturer's recommendations.

2.8 ACCESSORIES

A. Miscellaneous Metal Subframing and Furring: ASTM C 645; cold-formed, metallic-coated steel sheet, ASTM A 653/A 653M, G90 (Z275 hot-dip galvanized) coating designation. Provide manufacturer's standard sections as required for support and alignment of metal panel system.

1. Gauge: 16 gauge minimum.

B. Roof panel accessories: Provide accessories as required for a complete installation. Accessories shall be as indicated on approved shop drawings and per manufacturer's approved standard details.

1. Fasteners: Fasteners as recommended by manufacturer.

2. Concealed Anchor Clips: Floating anchor clip, two piece, or single halter style clip.

3. Closure Strips: Provide closed cell closure strips, minimum 1 inch thick matching metal roof panel profile.

NOT USED

C. Flashing and Trim:

1. Fabricate flashing and trim from same material as roof panels unless otherwise noted. Finish to match metal roof panels.

2. Locations include, but are not limited to the following: Drips, eave and rake edges, roof penetrations, hips, and valleys.

D. Panel Sealant:

1. Joint Sealant: ASTM C920 as recommended in writing by metal roof panel manufacturer.

2. Butyl Tape: Per panel manufacturer's recommendations for panel to panel and panel to trim seal.

3. Butyl Sealants: Non-skinning type per panels manufacturer's recommendations.

2.9 FABRICATION

A. Metal roof panels shall be formed to lap with edges of adjacent panels which are then mechanically attached to roof deck using fasteners and concealed anchor clips. Anchor clips are then machine seamed into standing seam.

B. Fabricate metal roof panels with joints between panels designed to form weathertight seals.

C. Curved roof panels: Panels shall be factory or field curved as approved by manufacturer.

D. Flashing and Trim Accessories: Fabricate trim accessories to comply with recommendations outlined in SMACNA's "Architectural Sheet Metal Manual".

2.10 FINISHES

A. Steel:

1. Finish and Color:

a. Color:

1) Exposed Surface: **Pacific Blue.**

2) Concealed Surface: Manufacturer's standard primer.

b. Finish System:

1) 2.4 mil. Fluropolymer (PVDF) Three Coat system: 0.8 mil primer with 0.8 mil Kynar 500 (70%) SOLID color coat and 0.8 mil clear coat.

PART 3 EXECUTION

3.1 EXAMINATION

A. Provide field measurements to manufacturer as required to achieve proper fit of the metal roof panels to building envelope. Measurements shall be provided in a timely manner so that there is no impact to construction or manufacturing schedule.

B. Supporting Steel: All structural supports required for installation of panels shall be by contractor. Support members shall be installed within the following tolerances:

1. Plus or minus 1/4 inch in 20 feet in any direction along plane of framing.

2. Plus or minus 1/2 inch from framing plane over entire roof.

NOT USED

C. Examine individual panels upon removing from the bundle; notify manufacturer of panel defects. Do not install defective panels.

3.2 ROOF INSULATION

A. Install insulation according to manufacturer's instruction and recommendation

3.3 ROOF UNDERLAYMENT INSTALLATION

A. General: Install underlayments according to tile manufacturer's written recommendations and recommendations in NRCA's "The NRCA Roofing and Waterproofing Manual."

B. Self-Adhering Sheet Underlayment: Apply primer if required by manufacturer. Seal joints in insulation as recommended by manufacturer. Comply with temperature restrictions of underlayment manufacturer for installation. Apply at locations indicated on Drawings, wrinkle free, in shingle fashion to shed water, and with end laps of not less than 6 inches (152 mm) staggered 24 inches (610 mm) between courses. Overlap side edges not less than 3-1/2 inches (90 mm). Roll laps with roller. Cover underlayment within 14 days.

1. Apply over the entire roof surface to receive metal roof panel.

2. Apply over the roof area indicated below:

a. Roof perimeter for a distance up from eaves of 24 inches (610 mm) beyond interior wall line.

b. Valleys, from lowest point to highest point, for a distance on each side of 18 inches (460 mm). Overlap ends of sheets not less than 6 inches (152 mm).

c. Rake edges for a distance of 18 inches (460 mm).

d. Hips and ridges for a distance on each side of 12 inches (305 mm).

e. Roof-to-wall intersections for a distance from wall of 18 inches (460 mm).

C. Slip Sheet: Apply slip sheet over underlayment before installing metal roof panels.

D. Flashings: Install flashings to cover underlayment to comply with requirements specified in Section 07 62 00 "Sheet Metal Flashing and Trim."

3.4 PANEL INSTALLATION

A. Apply sealant to joints per manufacturer's recommendations and approved shop drawings.

B. Install panels level and true-to-line to dimensions and layout indicated on approved shop drawings.

C. Install metal roof panels in one piece lengths from ridge to eave unless otherwise indicated on approved shop drawings.

D. Attach panels to framing using recommended clips, screws, fasteners and sealants as indicated on approved shop drawings.

E. Installation shall be in accordance with manufacturer's installation guidelines and recommendations. Roof panels shall be installed weathertight, without distortion, buckles or waves.

F. Seaming of panels shall be done using an electric powered seaming machine as recommended by manufacturer.

G. Provide weatherproof fittings for pipe and conduit penetrating roof.

H. Curb units shall be under/over type as recommended by roof panel manufacturer.

I. Cutting and fitting of panels shall be neat, square and true. Torch cutting is prohibited.

NOT USED

J. Dissimilar materials; where the metal panel system comes into contact with dissimilar materials, treat contact areas as recommended by roof panel manufacturer.

3.5 FLASHING AND TRIM INSTALLATION

A. Place trim and trim fasteners only as indicated per details on the approved shop drawings.

B. Apply sealant at trim, per manufacturer's details and approved shop drawings, for weathertight installation.

3.6 CLEANING AND PROTECTION

A. Remove protective film immediately after installation.

B. Touch-up, repair or replace metal panels and trim that have been damaged.

C. After metal roof panel installation, clear weep holes and drainage channels of obstructions, dirt, and sealant.

END OF SECTION

NOT USED

SECTION 07 4213
METAL WALL PANELS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Structural standing seam metal wall panels.

B. Accessories including concealed anchor clips, fasteners, perimeter flashing, trim and penetration treatments.

1.2 RELATED SECTIONS

A. Section 07 2100 - Insulation

B. Section 072115 - Board Insulation

C. Section 07 4113 - Metal Roof Panels

1.3 REFERENCES

A. ASTM International

1. ASTM A240; Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications.

2. ASTM A653; Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

3. ASTM A666; Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar.

4. ASTM B69; Standard Specification for Rolled Zinc.

5. ASTM B85; Standard Specification for Aluminum Alloy Die Castings.

6. ASTM B117; Standard Practice for Operating Salt Spray (Fog) Apparatus.

7. ASTM B209; Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.

8. ASTM B221; Standard Specification for Aluminum and Aluminum Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.

9. ASTM B370; Standard Specification for Copper Sheet and Strip for Building Construction.

10. ASTM C920 – Standard Specification for Elastomeric Joint Sealants.

11. 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.

12. ASTM E330; Standard Test Method for Structural Performance of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference.

13. ASTM E331; Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference.

14. ASTM E1592; Standard Test Method for Structural Performance of Sheet Metal Roof and Siding Systems by Uniform Static Air Pressure Difference.

1.4 SUBMITTALS

A. Refer to Section 01 3300 Submittal Procedures.

B. Product Data: Submit manufacturer current technical literature for each type of product.

C. Shop Drawings - Submit detailed drawings showing:

1. Profile

2. Gauge of panel

3. Location, layout and dimensions of panels

4. Location and type of fasteners

5. Shape and method of attachment of all trim

6. Locations and type of sealants

7. Installation sequence.

8. Other details as may be required for a weathertight installation

D. Samples: Provide nominal 3 x 5 inch of each color indicated. Provide panel width by 10 inches long minimum.

E. Quality Assurance Submittals

1. Design Data, Test Reports: Provide manufacturer test reports indicating product compliance with requirements.

2. Manufacturer Erection Instructions: Provide manufacturer's written installation instructions including proper material storage, material handling, installation sequence, panel location(s), and attachment methods, details and required trim and accessories.

F. Closeout Submittals

1. Refer to Section 01 7800 Closeout Submittals.

1.5 ADMINISTRATIVE REQUIREMENTS

A. Pre-installation meeting: Conduct a pre-installation meeting at the job site attended by Owner, Architect, Manufacturer's Technical Representative, Panel Installer, and Contractors of related trades. Coordinate structural support requirements in relation to wall panel system, installation of any separate air/water barriers, treatment of fenestration, and other requirements specific to the project.

1.6 QUALITY ASSURANCE

A. Manufacturer Qualifications: Manufacturer shall have a minimum of ten (10) years experience in the production of metal wall panels. Manufacturer shall demonstrate past experience with examples of projects of similar type and exposure.

B. Installer Qualifications: Installer shall be authorized by the manufacturer regarding proper installation of the specified product, and have a minimum of five (5) years experience with projects of similar size and scope.

1.7 DELIVERY, STORAGE AND HANDLING

A. Refer to Section [01 60 00 Product Requirements] [Insert section number and title].

B. Deliver panel materials and components in manufacturer's original, unopened, undamaged packaging with identification labels intact.

C. Store wall panel materials on dry, level, firm, and clean surface. Elevate one end of bundle to allow moisture run-off, cover and ventilate to allow air to circulate and moisture to escape.

1.8 WARRANTY

A. Material Warranty: Standard form in which manufacturer agrees to repair or replace items that fail in materials or workmanship within specified warranty period. The items covered by the warranty include structural performance and material integrity.

1. Warranty Period: Two (2) years from date of Substantial Completion.

B. Installers "Weather-tight" Warranty: The Manufacturer Certified Installer shall provide a "leak-free" wall warranty in which the installer agrees to repair leaks discovered in the wall system under the terms outlined by the wall panel manufacturer within the specified warranty period.

1. Warranty Period: Two (2) years from date Substantial Completion.

C. Weather-tight Warranty: Provide manufacturer's limited weathertightness warranty in which manufacturer agrees to repair or replace components of wall system that fail in materials or workmanship within specified warranty period.

1. Warranty Period: Twenty (20) years from date Substantial Completion, or 20 years and 3 months from the date of shipment from manufacturer's plant, whichever occurs first.

PART 2 PRODUCTS

2.1 MANUFACTURER

A. Berridge Manufacturing Company

B. Basis of Design: **FW-12 PANEL**

C. Substitutions: Under provisions of Division 01.

2.2 PERFORMANCE REQUIREMENTS

A. Structural Performance: Provide metal wall panel systems designed to resist the following. Testing shall be done based on ASTM E330 or E1592:

1. Wind Loads: Determine loads based on the following minimum design wind pressures:

a. Uniform pressure as indicated on Drawings.

1) Deflection Limits: Metal wall panel assemblies shall withstand horizontal deflections no greater than L/180 of the span.

B. Air Infiltration: Provide metal wall panel assemblies designed to resist air infiltration. Testing shall be done based on ASTM E283. Wall panels when tested shall have a maximum air leakage of 0.01 cfm per square feet of fixed wall area at a minimum static air-pressure differential of 1.57 foot pounds per square foot.

C. Water Penetration under Static Pressure: Provide metal wall panel systems designed to resist penetration of water under static pressure. Testing shall be based on ASTM E331. Wall panels when tested shall have no water leakage at 6 pounds per square foot.

2.3 WALL PANEL MATERIALS

A. Steel (Galvalume/Zincalume):

1. Aluminum-Zinc Alloy-Coated Steel Sheet: ASTM A792, Class AZ50 coating designation, Grade 40.

a. Gauge: 20.

2.4 WALL PANELS

A. Wall Panel Descriptions:

1. Panel Width: 16 inches

2. Profile: MorZip

3. Seam Height: 2½ inches

4. Texture: Smooth

2.5 INSULATION

A. Refer to Section 07 2100 - Insulation.

B. Refer to Section 07 2115 - Board Insulation.

2.6 ACCESSORIES

A. Wall panel accessories: Provide accessories as required for a complete installation. Accessories shall be as indicated on approved shop drawings and per manufacturer's approved standard details.

1. Fasteners: Fasteners as recommended by manufacturer.

2. Concealed Anchor Clips: Floating anchor clip, two piece, or single halter style clip.

3. Closure Strips: Provide closed cell closure strips, minimum 1 inch thick matching metal wall panel profile.

4. Roof to Wall Accessories: Provide roof to wall transistion trims, closure strips and other panel accessories required for a complete installation.

B. Flashing and Trim:

1. Fabricate trim from same material and material thickness as wall panels. Finish must match metal wall panels.

2. Locations include, but are not limited to the following: Drips, sills, jambs, corners, framed openings, parapet caps, reveals and fillers.

C. Metal Framing:

1. General: ASTM C645, cold-formed metallic-coated steel sheet, ASTM A653, G60 hot-dip galvanized.

2. Hat-Shaped, Rigid Furring Channels:

a. Nominal Thickness: 0.040 inch.

b. Depth: 7/8 inch.

D. Panel Sealant:

1. Joint Sealant: ASTM C920 as recommended in writing by metal wall panel manufacturer.

2. Butyl-Rubber-Based, Solvent-Release Sealant: ASTM C1311.

2.7 FABRICATION

A. Metal wall panels shall be formed to lap and interconnect with edges of adjacent panels which are then mechanically attached through panel to supports using concealed fasteners.

B. Metal wall panels shall have factory-installed sealant at panel joints to provide a tight seal and minimize noise from movements within panel assembly.

C. Fabricate metal wall panels to eliminate condensation on interior side of panel and with joints between panels designed to form weathertight seals.

D. Trim Accessories: Provide manufacturer's standard extruded aluminum trim.

E. Soffit panels shall be non-perforated.

2.8 FINISHES

A. Steel:

1. Finish and Color:

a. Color:

1) Exposed Surface: **Award Blue.**

2) Concealed Surface: Manufacturer's standard primer.

b. Finish System:

1) 2.4 mil. Fluropolymer (PVDF) Three Coat system: 0.8 mil primer with 0.8 mil Kynar 500 (70%) SOLID color coat and 0.8 mil clear coat.

PART 3 EXECUTION

3.1 EXAMINATION

A. Provide field measurements to manufacturer as required for proper fit of the metal wall panels to building envelope. Measurements shall be provided in a timely manner so that there is no impact to construction or manufacturing schedule.

B. Supporting Steel: All structural supports required for installation of panels shall be by others. Support members shall be installed within the following tolerances:

1. Plus or minus 1/8 inch in 5 feet in any direction along plane of framing.

2. Plus or minus ¼ inch cumulative in 20 feet in any direction along plane of framing.

3. Plus or minus ½ inch from framing plane on any elevation.

4. Plumb or level within 1/8 inch at all changes of transverse for horizontal corner panel applications.

5. Verify that horizontal bearing support has been provided behind vertical panel systems and vertical bearing support has been provided behind horizontal panel systems. Width of support shall be as recommended by manufacturer.

C. Examine individual panels upon removing from the bundle; notify manufacturer of panel defects. Do not install defective panels.

3.2 PANEL INSTALLATION

A. Apply sealant to joints per manufacturer's recommendations and approved shop drawings.

B. Install panels level and true-to-line to dimensions and layout indicated on approved shop drawings.

C. Install metal wall panels in one piece lengths from eave to base unless otherwise indicated on approved shop drawings.

D. Attach panels to framing using recommended clips, screws, fasteners and sealants as indicated on approved shop drawings.

E. Installation shall be in accordance with manufacturer's installation guidelines and recommendations. Wall panels shall be installed weathertight, without distortion, buckles or waves.

F. Seaming of panels shall be done using an electric powered seaming machine as recommended by manufacturer.

G. Provide weatherproof fittings for pipe and conduit penetrating walls.

H. Cutting and fitting of panels shall be neat, square and true. Torch cutting is prohibited.

I. Dissimilar materials; where the metal panel system comes into contact with dissimilar materials, treat contact areas as recommended by wall panel manufacturer.

3.3 FLASHING AND TRIM INSTALLATION

A. Place trim and trim fasteners only as indicated per details on the approved shop drawings.

B. Apply sealant at trim, per manufacturer's details and approved shop drawings, for weathertight installation.

3.4 CLEANING AND PROTECTION

A. Remove protective film immediately after installation.

B. Touch-up, repair or replace metal panels and trim that have been damaged.

C. After metal wall panel installation, clear weep holes and drainage channels of obstructions, dirt, and sealant.

END OF SECTION

SECTION 07 5419
SINGLE PLY MEMBRANE ROOFING - FULLY ADHERED

PART 1 GENERAL

1.1 DESCRIPTION

A. Installation of a Class A, UL listed Single Ply membrane assembly, fully adhered attached over specified insulation and barrier board.

B. Section Includes:

1. Barrier Board
2. Thermal Insulation
3. Barrier/Cover Board.
4. Single Ply membrane fully adhered attached
5. Base Flashings
6. Clean Up

C. Warranties

1. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

D. Related Work

1. Sheet Metal
2. Sealants and Caulking
3. Plumbing
4. Masonry
5. Carpentry
6. HVAC
7. Electrical

1.2 SCOPE OF WORK

A. The roofing contractor shall furnish and install a fully adhered attached TPA-FB (Tri-Polymer Alloy) single ply system roofing membrane as described in this specification and in accordance with the Contract Documents.

B. Roof system assembly is to be installed over metal deck. Roof system is to be a UL Class A, Fire Rated assembly.

C. Coordinate with other trades.

D. Review work requirements from Section 05 3100 for Glass Fiber Insulation Strips for installation at acoustic deck flutes. Install per Manufacturers written recommendations.

1.3 PERFORMANCE REQUIREMENTS

A. General: Install a watertight, single ply roofing and base flashing system with compatible components that will not permit the passage of liquid water and will withstand wind loads, thermally induced movement, and exposure to weather without failure.

B. QUALITY ASSURANCE

1. The roofing system shall be installed by a "Approved" Manufacturers roofing contractor as a minimum. Ratings less than "Approved" are not acceptable.

2. There shall be no deviations made from these specifications without the prior written approval of the Architect.

3. Upon completion of the installation, contractor shall notify Manufacturers Technical Service Department who shall inspect the completed roof to verify that the visible elements of the installation have been installed in accordance with Manufacturers specifications, detail drawings, and approved changes and eligible for the specified warranty.

4. Provide manufacturers Technical Service Inspectors who are to review the installation procedures and materials. Contractor shall provide three (3) Technical Inspections/Observation. Each Technical Inspection/Observation shall be reported in writing to the Owner and Architect as a minimum.

C. SUBMITTALS

1. Submit the following:

a. Copies of manufacturers specifications, product data sheets and details.

b. Certificates of Compliance from roofing manufacturer that all material to be supplied complies with all industry standards and is provided by one manufacturer.

c. For Manufacturers other than the Basis Of Design, provide the following:

1) Samples of each material to be used in the roof system including each component.

2) Sample of Manufacturers Warranty for manufacturers/systems other than specified. Highlight all exclusions and exceptions. Failure of Warranty to include flashings and all components of system is basis for rejection

3) Material Safety Data Sheets.

4) Written verification from Manufacturer that contractor is an authorized applicator.

5) Submit, for approval, any primary items necessary but not furnished by system manufacturer. Only items that have written approval from manufacturer will be accepted.

6) Certificates of Compliance from roofing manufacturer that all material to be supplied complies with all industry standards and is provided by one manufacturer.

D. PRODUCT DELIVERY, STORAGE AND HANDLING

1. Materials shall be delivered in the original, unopened containers.

2. All products shall be delivered to the job site with the manufacturer’s labels on each roll or container. When required, the label shall also indicate the specified code/insurance approvals.

3. All materials shall be stored flat, elevated from the roof or deck, protected with waterproof covers as necessary to keep the materials dry. The plastic wrap on TPA-FB System rolls is not a waterproof cover.

4. Adhesives shall be stored at temperatures above 40 degrees F. All flammable materials shall be stored in a cool, dry area away from spark and open flames.

5. All materials shall be provided from one manufacturer to assure compatibility.

6. All materials shall be protected from damage.

7. Materials damaged in handling or storage shall not be used without authorization by Tremco. Unsalvageable materials shall be replaced at the contractors expense.

8. Material Safety Data Sheets, available from Tremco, shall be reviewed.

E. QUALIFICATIONS

1. Installer Qualifications: Engage an experienced installer to perform Work of this Section who has specialized in installing roofing similar to that required for this Project; who is approved, authorized, or licensed by the roofing system manufacturer to install manufacturer's product; and who is eligible to receive the standard roofing manufacturer's warranty. Roofing Contractor to certify that the company or any of its officers have not been in bankruptcy within the past 10 years.

2. Contractor shall provide the Manufacturers Technical Services Inspections and Observations. The Technical Services inspections are to verify and confirm the materials and installation procedures are performed in a manner to comply with the manufacturers warranty. Each Technical Service inspection shall be submitted to Pre-Roofing attendees. Technical Inspectors shall be full time employees of the Manufacturer.

F. JOB CONDITIONS

1. TPA-FB Single Ply System shall not be installed during periods of precipitation or be installed under certain adverse weather conditions.

2. Only as much of the new roofing as can be made weathertight each day shall be completed in accordance with the specifications.

3. All work shall be scheduled and executed without exposing the interior building area(s) to the effect of inclement weather. The existing building and its content shall be protected against all risks associated with installation of the roof system.

4. All surface areas to receive membrane or flashings, shall be thoroughly dry. Should surface moisture occur, the contractor shall provide necessary materials and equipment to dry the surface area affected prior to installation.

5. All areas contaminated by dirt, debris, and dust shall be cleaned from surfaces by vacuuming, sweeping or power blowing.

6. The roofing contractor shall take measures necessary to avoid damage to the TPA-FB Single Ply System during construction. The roofing contractor shall advise the general contractor concerning potential damage to the System and the measures taken to avoid such damage during construction.

7. When storing material on the roof, and during application, the roofing contractor shall ensure that overloading of the deck and structure does not occur.

8. Temporary waterstops shall be installed at the end of each day’s work and shall be removed before proceeding with the next day’s work. Waterstops shall be compatible with all materials.

9. Water tightness of the waterstops is the contractors responsibility.

10. Any deteriorated deck or flashing substrate that is discovered shall be promptly reported to the owner or his designated representative.

11. The roofing contractor shall investigate all existing roof drain lines. Nonfunctioning drains shall be reported to the owners’ representative prior to job start. It is the responsibility of the roofing contractor to insure adequate connection of the drain to the drain lines.

12. If waste products, petroleum, grease, oil, solvents, mineral oil, and other contaminants come into contact with the TPA-FB roofing membrane, contact Manufacturer for precautions and cleaning procedures.

13. Site clean up, including both interior and exterior building areas that have been affected by the roof installation, shall be completed to the Owners satisfaction. All landscaped areas affected shall be raked clean and seeded, as required.

14. All roofing, flashings and metal work shall be immediately removed from the site to a regulated legal dumping area authorized to receive such materials.

G. WARRANTY

1. General Warranty: The warranties specified in this Article shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by the Contractor under requirements of the Contract Documents. Warranty shall include inspections during the 2nd and 5th years with written reports of condition submitted to the Owner.

    a. Type: Manufacturers "Quality Assurance "

2. Warranty Period: 20 years.

    a. Roof System Warranty shall include all flashings, penetrations, underlayment, insulation, barrier board, and seals.

    b. Roof Warranty shall be issued by same Manufacturer as the Metal Roofing Manufacturer and the underlayment for metal roofing to assure sole source responsibility of all roof systems.

    c. All roofing materials are to be compatible with another to avoid dissimilar interaction and failures.

    d. Contractors Warranty: Contractor shall issue a two-year (2 year) warranty covering labor and installation of specified system and components.

H. PRE-INSTALLATION

1. Pre-installation conference: A pre-installation conference shall be held with a representative of the Owner and all parties and trades involved with work on the roof, to discuss all aspects of the project. The contractors field representative and/or foreman for the project shall be in attendance.

2. Pre-installation Conference: Before installing roofing system, conduct conference at Project site to comply with requirements of Division 1 Section "Project Meetings." Notify participants at least 5 working days before conference.

    a. Meet with Owner; Architect; Owner's insurer, if applicable; testing and inspecting agency representative; roofing Installer; roofing system manufacturer's representative; deck Installer; and installers whose work interfaces with or affects roofing, including installers of roof accessories and roof-mounted equipment.

    b. Review methods and procedures related to roofing installation, including manufacturer's written instructions.

    c. Examine deck substrate conditions and finishes for compliance with requirements, including flatness and attachment to structural members.

    d. Review loading limitations of deck during and after roofing.

    e. Review flashings, special roofing details, roof drainage, roof penetrations, equipment curbs, and condition of other construction that will affect roofing.

f. Review governing regulations and requirements for insurance, certifications, and inspection and testing, if applicable.

g. Review temporary protection requirements for roofing system during and after installation.

h. Review roof observation and repair procedures after roofing installation.

i. Document proceedings, including corrective measures or actions required, and furnish copy of record to each participant.

PART 2 PRODUCTS

2.1 MATERIAL MANUFACTURER

A. Single Ply Fully Adhered Membrane. All components, flashings, adhesives, underlayment and sealants of the TPA-FB Single Ply System shall be manufactured by one manufacturer to maintain compatibility. System shall be UL and FM listed. The Owner has established roofing repairs and maintenance based upon the specified manufacturer.

1. TPA-FB by Tremco.

2. Substitutions: No Substitutions of Manufacturer or system type.

2.2 TRI-POLYMER ALLOY MEMBRANE

A. The membrane shall be TPA-FB, a tri-polymer alloy, polyester reinforced roofing membrane supplied by Tremco, Inc., Beachwood OH, USA. The sheet shall conform to the properties listed below.

B. Color: White (top)/Gray or Black (bottom)

C. Roll Size: 76-inch wide x 90- foot long

D. Weight: 8.0 oz. ft2 (nominal)

E. Thickness ASTM D-751: 60 mil (nominal) in field

F. Breaking Strength ASTM D-751: 300 lbs

G. Seam Strength ASTM D-638: 90%

H. Elongation @ Fabric Break ASTM D-751: 25% x 25%

I. Tear Strength ASTM D-751: 100 lbs x 100 lbs

J. Low Temperature Bend ASTM D-2136: Pass (-40EF)

K. Permeance ASTM D-96: 0.003 Perms

L. Dimensional Change ASTM D-1204: 0.3%

M. Hydrostatic Resistance ASTM D-751: 400 psi

N. Ozone Resistance ASTM D-1149: Pass

O. EMMAQUA Test ASTM E-838: Pass (2.7 million Langleys)

P. The TPA-FB membrane shall be fully adhered attached directly to substrates that exhibit sufficient tensile and pull resistance.

2.3 RELATED MATERIALS

A. Insulation:

1. Thermal Insulation: Polyisocyanurate insulation, rigid closed cell foam core laminated on both sides with black non-asphaltic facer. Compressive strength of 20 PSI minimum. CFC and HFC free. Facer material using 100% recycled material. ASTM C 1289-11, Type II, Class I. panels in sizes specified. Provide tapered units as required for slope and drainage as indicated. Average R value across roof shall be R30 in main roof area as indicated.

2. Accessories:

a. Joint tape, fabric reinforced.

b. Adhesive: Low Rise insulation adhesive.

3. Insulation and Barrier Board Panels:

a. Barrier Board at Deck Level: 1/4" Dens Deck, pre-primed by Roofing Manufacturer or approved equal.

1) Barrier Board Accessories: Joint Tape, fabric reinforced.

2) Attachment: Fully adhered

3) At walls: Butyl Adhesive. Sheeting Bond

b. Thermal Insulation: Polyisocyanurate closed cell foam insulation panels, complying with ASTM C1289. Faced with non-asphaltic materials made from 100% recycled materials. CFC and HCFC free. Size, 4x8, Thickness as required to meet values indicated on drawings.

c. Top Barrier Board: ½: inch thick Dens Deck board, complying with ASTM C1117/C and 1177/M. Water resistant , silicone treated gypsum core, faced with embedded fiberglass mats on top and bottom

4. Flashing: Base and Wall flashings:

a. Tremco TPA-FB Membrane Flashing

b. Tremco TPA-FB Prefabricated Flashing: pipe boots, inside corners, outside corners.

c. Edge Flashings: TPA Clad Metal. 24 gauge, galvanized metal having membrane fully adhered at the time of manufacturer.

d. Sealants: Tremseal PRO, .

e. Surface Mounted Counter Flashing: 24 gauge, 70% Kynar finished. Accessories as required for complete installation. Accessories to have same finish.

f. Foam Rod Stock: Polyethylene or Neoprene in shapes and sizes as needed.

g. Wood Nailers:

1) Minimum #2 lumber, wolmanized or pressure treated for rot resistance with a salt-based preservative. No creosote or asphaltic type preservations shall be allowed.

2) Wood nailers shall conform to Factory Mutual Loss Prevention Data Sheet 1-49.

3) All wood shall have maximum moisture content of 19% by weight on a dry weight basis.

h. Roof Traffic Pads: Roll Walk pads shall be heat welded.

i. Field Membrane Adhesive: TPA-FB Bonding Adhesive WB. Water based, bonding adhesive formulated for use with specified membranes. Asbestos free. California VOC compliant.

j. Wall Membrane Adhesive. Sheeting Bond, white elastomeric butyl adhesive.

PART 3 EXECUTION

3.1 PRE-JOB

A. The Primary contractor, the owner or the owners representative, and all parties involved with the installation of the roof system shall conduct a pre-roofing conference before any work begins. The meeting shall review all procedures and obligations.

3.2 SUBSTRATE PREPARATION

A. A proper substrate shall be provided to receive the Tremco TPA-FB Single Ply System.

B. Surfaces on which the Tremco TPA-FB Single Ply System is to be applied, shall be compatible, clean, smooth, and free of fins, sharp edges, loose and foreign material, oil, grease and other contaminants that affect adhesion.

C. When possible, work shall begin at the lowest point of the roofing project area and proceed to the highest point. All seams should be shingled with, or run parallel to, the flow of water.

D. All substrates shall be free of water, ice, or snow.

3.3 WOOD NAILERS and PANELS

A. Treated wood nailers shall be installed at the perimeter of the roof and around other projections and penetrations that are to be flashed.

B. Nailers, new or existing, shall be securely anchored to the deck to resist 200 lbs. per foot applied in any direction.

C. The thickness of the nailer shall be provided such that the top of the nailer is flush with the surface to which the TPA-FB membrane is to be applied.

3.4 BARRIER BOARD

A. Barrier (Cover) Board: Dens Deck shall be installed with joints staggered from panels below minimum of 8".

1. Walls: Install with screws and plates on walls.

2. Field: Barrier board in field applications shall be secured using insulation adhesive applied at rate as required by Manufacturer.

3. Barrier board and tapered insulation shall be installed in accordance with the shop drawings.

4. Both layers, top and bottom, of Barrier board shall be installed according to the insulation manufacturers instructions. This includes board layout.

5. Barrier board shall be adequately supported to sustain normal roof traffic without damage. Barrier board shall be laid on acceptable substrate or air barrier with tight joints in parallel courses with end joints staggered from deck joints minimum 8 inches.

6. Field-trimmed panels shall be fitted tightly around roof protrusions and terminations. Cut edges shall face inward and not along any roof edge or opening. Joint gaps larger than ¼ inch shall be filled with sealant.

3.5 INSULATION BOARD

A. Boards shall be installed using Low Rise insulation adhesive.

B. First layer shall be installed using Low Rise Insulation Adhesive

C. Subsequent panels/barrier board panels: Insulation thickness larger than 2" shall be installed in multiple layers. First layer of all insulation shall be panel sizes no larger than 2" x 4' x 8' over metal decks. Subsequent layers shall be largest panel size available. Panels shall be installed using Insulation Adhesive.

D. No more panels shall be applied than can be covered with the finished TPA-FB membrane by the end of the day or the onset of inclement weather.

E. Panels must be attached in accordance with the guidelines established by FM, NRCA, for the specific insulation.

F. Use only Roofing Manufacturers attachment methods or substitute approved in writing.

G. Walls or Curbs: Fasteners shall be driven perpendicular to the work surface and the fastener shall pass through the vertical substrate and extend a minimum of 1 ½" beyond.

H. Create drain sumps using insulation only. ½" thick Barrier board shall extend to drain bowl.

3.6 TPA FLASHINGS

A. All flashing shall be fabricated out of TPA membrane. Clad Metal used shall be 24 gauge (min) galvanized G90.

B. Fabricate and install Tremco TPA flashing to comply with details and project drawings and the recommendations of SMACNA Sheet Metal Manuals for fabrication and Factory Mutual's Loss Prevention Data Sheet I-49.

C. All metal work shall be completed in conjunction with the roofing and flashing operation so as to provide a daily watertight condition.

D. Metal shall be installed to provide adequate resistance to bending and to allow for normal thermal expansion and contraction. Allow for minimum 1/4" space between metal joints.

E. Perimeter Edge Metal flashing: shall have a 5" minimum nailing flange and hemmed metal edge. Metal flashing shall be fastened to solid wood blocking with annular ring nails, 4" o.c. Fasteners shall penetrate the wood a minimum of 1 -1/4".

F. Continuous metal hook strips are required on all metal edge flashings. Each hook strip shall be fastened 12" o.c. into wood blocking or masonry wall. Hook strips should be continuous and at least 20-gauge. They should be secured with annular threaded nails long enough to penetrate the wood 1 - ¼". The nail head should be 3/16" minimum. When screws are used, they should be No. 8 (minimum), long enough to penetrate wood 3/4" or metal 3/8". Screws should be 24" apart in Zone 1 and 16" apart in Zone 2 (refer to FM I-49). Screws should be either corrosion-resistant steel or treated to resist corrosion. When an existing metal panel wall has no hook strip, the fascia metal should be fastened directly to the wall with No. 8 galvanized sheet metal screws, through neoprene washers, spaced 24" in Zone 1 and 16" in Zone 2.

G. Fasten metal flashings 4" o.c. to treated wood nailers using galvanized annular ring nails.

H. Install Tremco TPA flashings prior to the installation of the TPA-FB membrane. Flange of flashing component shall be at the same level as the insulation or other substrate to which the membrane will be applied.

I. Install adjacent pieces of coated metal flashing with 1/4" gap. Apply a 2" wide continuous strip of foil tape over the gap to act as a bond breaker. Hot air weld a 6" strip of C3 membrane, over the foil tape, to each piece of flashing to form a watertight splice.

J. Fasten the top of Tremco TPA coated metal base flashing 8" o.c. using fasteners appropriate for the underlying substrate.

3.7 MEMBRANE INSTALLATION

A. Placement:

1. The Tremco TPA-FB membrane shall be fully adhered and properly installed over the prepared substrate surface. The surface shall be clean, dry, smooth, and free from contamination.

2. The membrane shall be cut to fit neatly around all penetrations and roof projections.

3. The roofing membrane shall be unrolled and positioned with a minimum 4" overlap. Laps shall be shingled with, or run parallel to, the slope of the roof.

B. Attachment:

1. Begin installation at low point of deck. Position roll of elastomeric sheeting square to roof edge in a manner, which provides sufficient material to facilitate flashing.

2. Avoid wrinkles. Reposition when necessary. Do not stretch material unevenly.

3. Install second and succeeding rolls in same manner. Overlap seams and end laps minimum four (4) inches.

4. Seal edges in accordance with manufacturers recommendations.

5. Field Membrane :

a. Fully secure underlying sheet at lap.

b. Membrane attachment at metal:

c. Fully adhered using Insulation Adhesive

6. Membrane Seaming:

a. All edge surfaces to be seamed by hot air welding. Surfaces must be wiped with solvent using clean rags.

b. Heat weld laps with approved welding equipment. Adjust welding speed and temperature base upon ambient conditions and material.

3.8 FIELD QUALITY CONTROL

A. Final Roof Inspection: Arrange for roofing system manufacturer's technical personnel to inspect roofing installation on completion.

B. Repair or remove and replace components of membrane roofing system where inspections indicate that they do not comply with specified requirements.

C. Additional inspections, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

3.9 PROTECTIO AND CLEANING

A. Protect membrane roofing system from damage and wear during remainder of construction period. When remaining construction will not affect or endanger roofing, inspect roofing for deterioration and damage, describing its nature and extent in a written report, with copies to Architect and Owner.

B. Correct deficiencies in or remove membrane roofing system that does not comply with requirements; repair substrates; and repair or reinstall membrane roofing system to a condition free of damage and deterioration at time of Substantial Completion and according to warranty requirements.

C. Clean overspray and spillage from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction

END OF SECTION

SECTION 07 6200
SHEET METAL FLASHING AND TRIM

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Fabricated sheet metal items, including flashings, counterflashings, gutters, and downspouts.

B. Sealants for joints within sheet metal fabrications.

1.2 RELATED REQUIREMENTS

A. Section 03 3000 - Cast in Place Concrete

B. Section 04 2000 - Unit Masonry: Metal flashings embedded in masonry.

C. Section 07 9200 - Joint Sealants

1.3 REFERENCE STANDARDS

A. AAMA 611 - Voluntary Specification for Anodized Architectural Aluminum; 2014 (2015 Errata).

B. AAMA 2603 - Voluntary Specification, Performance Requirements and Test Procedures for Pigmented Organic Coatings on Aluminum Extrusions and Panels (with Coil Coating Appendix); 2017a.

C. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2017.

D. ASTM B32 - Standard Specification for Solder Metal; 2008 (Reapproved 2014).

E. ASTM B101 - Standard Specification for Lead-Coated Copper Sheet and Strip for Building Construction; 2012.

F. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate; 2014.

G. ASTM B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate (Metric); 2014.

H. ASTM B749 - Standard Specification for Lead and Lead Alloy Strip, Sheet, and Plate Products; 2014.

I. ASTM C920 - Standard Specification for Elastomeric Joint Sealants; 2018.

J. ASTM D2178/D2178M - Standard Specification for Asphalt Glass Felt Used in Roofing and Waterproofing; 2015a.

K. ASTM D4586/D4586M - Standard Specification for Asphalt Roof Cement, Asbestos-Free; 2007, with Editorial Revision (2012).

L. CDA A4050 - Copper in Architecture - Handbook; current edition.

M. SMACNA (ASMM) - Architectural Sheet Metal Manual; 2012.

1.4 SUBMITTALS

A. Shop Drawings: Indicate material profile, jointing pattern, jointing details, fastening methods, flashings, terminations, and installation details.

1.5 QUALITY ASSURANCE

A. Perform work in accordance with SMACNA (ASMM) and CDA A4050 requirements and standard details, except as otherwise indicated.

B. Fabricator and Installer Qualifications: Company specializing in sheet metal work with 10 years of documented experience.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Stack material to prevent twisting, bending, and abrasion, and to provide ventilation. Slope metal sheets to ensure drainage.

B. Prevent contact with materials that could cause discoloration or staining.

PART 2 PRODUCTS

2.1 SHEET MATERIALS

A. Galvanized Steel: ASTM A653/A653M, with G90/Z275 zinc coating; minimum 24 gage, (0.0239 inch) thick base metal.

B. Aluminum: ASTM B209 (ASTM B209M); 20 gage, (0.032 inch) thick; anodized finish to match adjacent finish.

1. Clear Anodized Finish: AAMA 611 AA-M12C22A41 Class I clear anodic coating not less than 0.7 mils thick.

2. Color Anodized Finish: AAMA 611 AA-M12C22A42/44 Class I integrally or electrolytically colored anodic coating not less than 0.7 mils thick.

C. Lead Sheet: ASTM B749, 0.047 inch minimum thickness; UNS Number L51121.

D. Lead Coated Copper: ASTM B101, 24 oz/sq ft weight of bare copper sheet, HOO (cold-rolled) temper.

2.2 FABRICATION

A. Form sections true to shape, accurate in size, square, and free from distortion or defects.

B. Form pieces in longest possible lengths.

C. Hem exposed edges on underside 1/2 inch; miter and seam corners.

D. Form material with flat lock seams, except where otherwise indicated; at moving joints, use sealed lapped, bayonet-type or interlocking hooked seams.

E. Fabricate corners from one piece with minimum 18 inch long legs; seam for rigidity, seal with sealant.

2.3 EXTERIOR PENETRATION FLASHING PANELS

A. Flashing Panels for Exterior Wall Penetrations: Premanufactured components and accessories as required to preserve integrity of building envelope; suitable for conduits and facade materials to be installed.

2.4 ACCESSORIES

A. Fasteners: Galvanized steel, with soft neoprene washers.

B. Underlayment: ASTM D2178/D2178M, glass fiber roofing felt.

C. Slip Sheet: Rosin sized building paper.

D. Primer: Zinc chromate type.

E. Protective Backing Paint: Zinc molybdate alkyd.

F. Concealed Sealants: Non-curing butyl sealant.

G. Exposed Sealants: ASTM C920; elastomeric sealant, with minimum movement capability as recommended by manufacturer for substrates to be sealed; color to match adjacent material.

H. Fenestration Perimeter Flashing Attachments: Two-piece flashing receiver and clip of extruded aluminum, at least 0.045 inch thick, for attaching flashing at perimeter of exterior wall fenestration openings.

1. Provide flashing receiver profile appropriate for flashing applications.

I. Plastic Cement: ASTM D4586/D4586M, Type I.

J. Reglets: Surface mounted type, galvanized steel; face and ends covered with plastic tape.

K. Solder: ASTM B32; Sn50 (50/50) type.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify roof openings, curbs, pipes, sleeves, ducts, and vents through roof are solidly set, reglets in place, and nailing strips located.

B. Verify roofing termination and base flashings are in place, sealed, and secure.

3.2 PREPARATION

A. Install starter and edge strips, and cleats before starting installation.

B. Back paint concealed metal surfaces with protective backing paint to a minimum dry film thickness of 15 mil.

3.3 INSTALLATION

A. Insert flashings into reglets to form tight fit; secure in place with lead wedges; pack remaining spaces with lead wool; seal flashings into reglets with sealant.

B. Secure flashings in place using concealed fasteners, and use exposed fasteners only where permitted..

C. Apply plastic cement compound between metal flashings and felt flashings.

D. Fit flashings tight in place; make corners square, surfaces true and straight in planes, and lines accurate to profiles.

E. Exterior Flashing Receivers: Install in accordance with manufacturer's recommendations, and in proper relationship with adjacent construction, and as follows:

F. Schedule:

1.

Location	Type
Storefront	Aluminum
Louvers	Aluminum
Soffit perimeter	Aluminum
All Others	Galvanized, unless noted otherwise.

G. Solder metal joints for full metal surface contact, and after soldering wash metal clean with neutralizing solution and rinse with water.

END OF SECTION

SECTION 07 8413
PENETRATION FIRESTOPPING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Penetrations for the passage of duct, cable, cable tray, conduit, piping, electrical busways and raceways through fire-rated vertical barriers, horizontal barriers, and vertical service shaft walls and partitions.
2. Mineral fiber insulation, fire safing, and safing edge of floor slabs.
3. Damming material, clips, and closures.
4. Gaps between the top of walls and ceilings or roof assemblies.
5. Openings around structural members which penetrate floors or walls.

B. Related Requirements:

1. Section 03 3000 - Cast-in-Place Concrete
2. Section 07 2100 - Insulation
3. Section 07 9200 - Joint Sealants
4. Section 09 2116 - Gypsum Board Assemblies
5. Division 22 - Plumbing
6. Division 23 - HVAC
7. Division 26 - Electrical
8. Division 27 - Communications

1.2 REFERENCES

A. ASTM Standards:

1. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
2. ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials.
3. ASTM E814 - Standard Test Method for Fire Tests of Through-Penetration Fire Stops.
4. ASTM E1399 - Standard Test Method for Cyclic Movement and Measuring Minimum and Maximum Joint Widths on Architectural Joint Systems.
5. ASTM E1966 - Standard Test Methods for Fire-Resistive Joint Systems.

B. Underwriters Laboratories, Inc.

1. UL 263 - Standard for Fire Tests of Building Construction and Materials.
2. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials.
3. UL 1479 - Fire Tests of Through Penetration Firestops.
4. UL 2079 - Test for Fire Resistance of Building Joint Systems.

5. UL Fire Resistance Directory.

C. Testing Services:

1. Intertek ES SAT.

2. Southwest Research Institute.

3. Underwriters Laboratories.

D. International Firestop Council Guidelines for Evaluating Firestop Systems Engineering Judgments.

E. California Building Code, Chapter 7 Fire Tests of Through-Penetration Fire Stops.

F. Firestop Contractors International Association (FICA) Manual of Practice.

1.3 SYSTEM DESCRIPTION

A. Provide fire stops and smoke seals to prevent the passage of fire, smoke, toxic gasses or water from one floor or area to another. Seal openings in floors, fire rated walls and permanent partitions penetrated by pipes, ducts, conduits and other items for the type of construction.

B. Mineral fiber insulation installed as fire safing.

C. Provide damming material, clips, and closures for support and containment of dams, and other insulation materials required for tested and rated fire stop systems.

1.4 QUALITY ASSURANCE

A. Performance Criteria:

1. Provide materials and Work to conform to source quality control criteria specified herein and CBC requirements in fire resistant wall and floor assemblies to prevent the passage of fire, smoke, and toxic gases.

2. Installed fire stops shall be of sufficient thickness, width, and density to provide a fire resistance rating at least equal to the floor, wall, or partition construction into which it is installed.

B. Comply with CBC requirements for fire rated construction.

C. Qualifications of Manufacturer: Products furnished for fire stopping and smoke seals shall be manufactured by a firm which has been continuously and regularly employed in the manufacture of these materials for a period of at least 5 years.

D. Qualifications of Installer: The Work of this section shall be installed by a firm which has been in the business of installing similar materials for at least 5 consecutive years; and can provide evidence of satisfactory completion of 5 projects of similar size and scope. Installer shall have applicators trained and certified by manufacturer for performing this Work.

E. SUBMITTALS

F. Product Data:

1. Submit manufacturer's Product Data for each type of fire stop and smoke seal material proposed for installation. Indicate product characteristics, typical installations, performance, and limitation criteria and test data.

2. Submit fire test reports from independent testing agency indicating the following:

a. Fire test report of fire stop material installed to substrate and penetration materials similar to the Work of this section. Test to indicate both Fire Resistance (F) and Temperature (T) Ratings.

b. Test reports of products to be installed shall indicate conformance to ASTM E814, UL rating with UL classified system description, and UL classified system detail.

1.5 DELIVERY, STORAGE AND HANDLING

A. Deliver products to the Project site in manufacturer's original, unopened containers bearing correct UL labeling.

B. Fire stop material shall be stored above grade in an area protected from detrimental weather and moisture conditions and in compliance with manufacturer's requirements, including temperature restrictions.

C. Fire stop and seal materials shall be installed before expiration of shelf life.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Products of this section shall be as manufactured by:

1. 3M Fire Protection Products.

2. Hilti, Inc.

3. Tremco, Inc.

4. Equal.

B. Provide materials and systems of specified manufacturers to suit penetration and substrate as determined by various conditions of installation.

C. Provide firestopping composed of components that are compatible with the substrates forming openings and the items penetrating the firestop, under conditions of service and application, as demonstrated by the fire stopping manufacturer based on testing and field experience.

2.2 MATERIALS

A. Cast-in Firestop Devices: Pre-installed firestop devices penetrating cast-in-place concrete and concrete over metal decks, for use with combustible and non-combustible pipe, insulated pipe, conduits and cable bundles. Provide metal deck adapters and top seal plugs.

1. 3M: Fire Barrier Cast-in-Place Devices.

2. Hilti: CP 653 Speed Sleeve; CP 680 Cast-in-Place FS Device

3. Tremco: CIPP Plastic, CIPP Metal.

4. Equal.

B. Firestop Collar: Made of galvanized steel housing and Intumescent inserts for firestopping combustible pipes through walls and floors. For use with concrete, masonry, wood floor and gypsum wall assemblies. Provide two collars on walls, one on each side, and one collar on underside of floors.

1. 3M: Plastic Pipe Device PPD.

2. Hilti: CP 643N and CP 644.

3. Tremco: TREMstop D.

4. Nelson Firestop Products: PCS Pipe Choke System.

5. Equal.

C. Fire Block: Intumescent flexible block based on a two component foam, for use in walls and floors and concrete, masonry and gypsum wall assemblies. For large openings containing multiple penetrations: wall openings up to 48 inches by 48 inches and floors up to 36 inches by 36 inches.

1. 3M: Fire Barrier Self-Locking Pillow.
2. Hilti: FS 657.
3. Tremco: TREMstop PS1, TREMstop PS2.
4. Equal.

D. Firestop Putty Stick: Intumescent, non-hardening, firestop putty for single or bundled cables and non-combustible pipe penetrations. For use in horizontal or vertical, concrete, masonry or gypsum wall assemblies.

1. 3M: MP + Stix.
2. Hilti: CP 618 and CP 619T.
3. Tremco: TREMstop MP Putty Stick.
4. Equal.

E. Firestop Putty Pad: Moldable firestop putty for protection of electrical outlet boxes.

1. 3M: MPP+.
2. Hilti: CP 617.
3. Tremco: TREMstop MP Putty Pad.
4. Equal.

F. Firestop Sealant: Smoke, gas and water resistant. For use in horizontal or vertical, concrete or gypsum wall assemblies.

1. Two or single component intumescent system for protection of combustible and non-combustible pipe, conduit and cable penetrations.
    a. 3M: CP-25WB+, IC-15WB+, 3000WT.
    b. Hilti: FS ONE.
    c. Tremco: TREMstop IA+ or FyreCaulk.
    d. Equal.
    e. Equal.
2. Acrylic based system that provides movement capability in fire rated joints and seals through penetration applications.
    a. 3M: FD 150+.
    b. Hilti: CP 606.
    c. Tremco: TREMstop Acrylic GG.
    d. Nelson Firestop Products: FSC3.
    e. Equal.
3. Self-leveling silicone-based firestop sealant for use with through penetrations and construction floor joints.

a. 3M: 1000 SL.

b. Hilti: CP 604.

c. Tremco: TREMstop Fyre-sil S.L.

d. Nelson Firestop Products: CLK AA539, AA552.

e. Equal.

G. Metal Deck Strips and Plugs: Precut preformed mineral wool plugs and strips to fit flutes of metal deck profile and gap between top of wall and metal deck.

1. 3M: PM4.

2. Hilti: CP 777 Speed Plugs; CP 767 Speed Strips.

3. Tremco:

4. Nelson Firestop Products:

5. Equal.

H. Fire Safing, Mineral Fiber or Ceramic Wool Non-Combustible Insulation:

1. Mineral Fiber: Density 4 pounds per cubic foot, USG Thermafiber, Johns Manville Industrial Insulation Group (IIG), Roxul AFB, or equal.

2. Ceramic Wool: Density 6 pounds per cubic foot, Johns Manville "Ceramic Fiber Insulation", Unifrax "Fiberfrax" ceramic fiber, or equal. Provide material in tested thickness for required hour rating.

a. Flame Spread: Less than or equal to 25.

b. Smoke developed: Less than or equal to 50.

3. For mineral fiber, provide 20 gage minimum size metal retainer clips and plates for fire safing support in vertical applications and in compliance with tested system design.

2.3 SOURCE QUALITY CONTROL

A. Fire stop and smoke seal material shall be tested by an independent testing agency for conformance to Flame (F) and Temperature (T) requirements of ASTM E814/UL 1479.

B. Conform to UL Fire Hazard Classification Requirements. Material shall be classified as a fill, void, or cavity material and system for UL Through Penetration Firestop System.

C. Material shall be tested and shall display Flame Spread Index of 25 or less, and Smoke Developed Index of 450 or less when tested in accordance with ASTM E84.

PART 3 - EXECUTION

3.1 APPLICATION REQUIREMENTS

A. Provide single component fire stop sealant or putty:

1. Within penetrations subject to movement including conduit, cable bundles, and noncombustible pipe.

2. As a sealant for smoke barrier construction, fire, and smoke dampers, mechanical, electrical framed elements in gypsum board partition systems, and other conditions.

B. Provide mineral fiber insulation for fire safing at joints and openings through floor slabs, walls, and partitions not indicated to be grouted, gaskets, sealed or otherwise made sound or air tight in this or other sections. Fire safing shall be packed and wedged solidly from both sides of walls and partitions, and from both top and bottom sides of slabs with noncombustible mineral fiber insulation.

3.2 PREPARATION

A. Examine the areas and conditions where fire stops and smoke seals are to be installed for conditions detrimental to the proper completion of the Work. Do not proceed with the Work until unsatisfactory conditions have been corrected for rated fire protection.

B. Surface to receive fire stops or smoke seals shall be free of dirt, dust, grease, form release agents, or other matter that would impair the bond of the fire stop material to the substrate or penetrating items. Substrate shall be frost free and when required, dry.

C. Voids and cracks in substrate shall be filled and unnecessary projections removed before installation of fire stops.

D. Assure that all pipes, conduit, cable, and other items, which penetrate fire rated construction, have been permanently installed before installation of fire stops. Schedule and sequence the Work to assure that partitions and other construction, which would conceal penetrations, are not installed before the installation of fire stops and smoke seals.

E. Comply with manufacturer's recommendations for temperature and humidity conditions before, during, and after installation of fire stops and smoke seals.

3.3 INSTALLATION

A. General: Provide installation in accordance with manufacturer's installation procedures, as required. Install fire stops in accordance with fire test reports, UL Fire Resistance Directory, Intertek Testing Services Directory or SpecDirect, and reviewed Sample installations.

B. Dam Construction:

1. Install dams when required to properly contain fire stopping materials within openings and as required to achieve fire resistance rating as tested and rated.

2. Provide in conformance with installation requirements for type of floor, wall, and partition construction, and as recommended by fire stop manufacturer.

3. Combustible damming material shall be removed after appropriate curing. Noncombustible damming material may be left as a permanent component of the fire stop system.

4. Placement of dams shall not interfere with function, or adversely affect the appearance, of adjacent construction.

C. Installation of Single Component Fire Stop Sealant:

1. Provide noncombustible insulation to achieve fire resistance rating.

2. Install with manual or powered sealant gun. For up to 3 hour rating, install to the thickness required by the Listed System Designs for wall and floor applications.

3. Surface of gun grade fire stop sealant shall be tooled with clean potable water.

4. Remove excess materials from adjacent surfaces within 10 minutes, with either water or other material compatible with sealant and recommended by sealant manufacturer, leaving the Work in a neat, clean condition.

3.4 FIELD QUALITY CONTROL

A. Examine sealed penetration areas to ensure proper installation before concealing or enclosing areas.

B. Repair damaged areas and restore integrity of assembly.

C. Keep areas of work accessible until inspection by authorities having jurisdiction.

3.5 CLEANUP

A. Clean surfaces adjacent to sealed openings and joints and remove excess of firestopping materials.

END OF SECTION

SECTION 07 9200
JOINT SEALANTS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Joint sealants.

2. Preparation for application of sealants.

B. Related Requirements:

1. Section 07 6200 - Sheet Metal Flashing and Trim.

2. Section 07 8413 - Penetration Firestopping.

3. Division 08 - Openings.

4. Division 09 - Finishes.

5. Section 10 2800 - Restroom Accessories.

1.2 SUBMITTALS

A. Product Data: Submit manufacturer's literature for each sealant material.

B. Material Samples: Submit samples indicating color range available for each sealant material intended for installation in exposed locations.

C. Test Reports: Submit manufacturer's adhesion compatibility test reports according to ASTM C794 for each substrate.

1.3 QUALITY ASSURANCE

A. Qualifications of Installer: Firm installing similar materials for at least five consecutive years.

1.4 DELIVERY, STORAGE AND HANDLING

A. Store in accordance with manufacturer’s recommendations. Provide a uniform ambient temperature between 60 and 80 degrees F.

1.5 WARRANTY

A. Manufacturer: five year material warranty.

B. Installer: two year installation and application warranty.

PART 2 - PRODUCTS

2.1 GENERAL

A. Furnish sealants meeting following in-service requirements:

1. Normal curing schedules are permitted.

2. Non-staining, color fastness (resistance to color change), and durability when subjected to intense actinic (ultraviolet) radiation are required.

2.2 MATERIALS

A. Sealants:

1. Sealant 1: Acrylic latex, one-part, non-sag, mildew resistant acrylic emulsion compound complying with ASTM C834, Type S, Grade NS, formulated to be paintable.

a. Tremco Inc., Acrylic Latex Caulk.

b. Pecora Corporation, AC-20.

c. Equal.

2. Sealant 2: Silicone sealant, one-part non-acid-curing silicone sealant complying with ASTM C920, Type S, Grade NS, Class 25.

a. Dow Corning Corp., Dow Corning 790, 791, 795.

b. General Electric Co., Silpruf.

c. Tremco, Inc., Spectrem 1.

d. Pecora Corp., 864.

e. Equal.

3. Sealant 3: One-part mildew-resistant silicone sealant, complying with ASTM C920, Type S, Grade NS, Class 25.

a. Dow Corning Corp., Dow Corning 786.

b. General Electric Co., Sanitary 1700.

c. Tremco, Inc., Proglaze White.

d. Equal.

4. Sealant 4: Multi-part pouring urethane sealant, complying with ASTM C920, Type M, Grade P, Class 25.

a. Sika Corporation, Sikaflex 2C NS/SL.

b. Equal.

B. See 07 8413 - Penetration Firestopping for rated sealants.

C. Joint Backing: ASTM D1056; round, closed cell Polyethylene Foam Rod; oversized 30 to 50 percent larger than joint width, reticulated polyolefin foam.

D. Primer: Non-Staining Type. Provide primer as required and shall be product of manufacturer of installed sealant.

E. Bond Breaker: Pressure sensitive tape recommended by sealant manufacturer.

F. Sealants shall have normal curing schedules, shall be nonstaining, color fast and shall resist deterioration due to ultraviolet radiation.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that joint openings are ready to receive Work and field tolerances are within the guidelines recommended by sealant manufacturer.

3.2 SURFACE PREPARATION

A. Joints and spaces to be sealed shall be completely cleaned of all dirt, dust, mortar, oil, and other foreign materials which might adversely affect sealing Work. Where necessary, degrease with a solvent or commercial degreasing agent. Surfaces shall be thoroughly dry before application of sealants.

B. If recommended by manufacturer, remove paint and other protective coatings from surfaces to be sealed before priming and installation of sealants.

C. Preparation of surfaces to receive sealant shall conform to the sealant manufacturer's specifications. Provide air pressure or other methods to achieve required results. Provide masking tape to keep sealants off surfaces that will be exposed in finished Work.

D. Etch concrete or masonry surfaces to remove excess alkalinity, unless sealant manufacturer's printed instructions indicate that alkalinity does not interfere with sealant bond and performance. Etch with 5 percent solution of muriatic acid; neutralize with dilute ammonia solution, rinse thoroughly with water and allow to dry before sealant installation.

E. Perform preparation in accordance with ASTM C804 for solvent release sealants, and ASTM C962 for elastomeric sealants.

F. Protect elements surrounding Work of this section from damage or disfiguration.

3.3 SEALANT APPLICATION SCHEDULE

A.	Horizontal concrete joints	Sealant 4	Color: Gray
B.	Doors and window frames, vertical joints	Sealant 1	Color to match adjacent
C.	Glass and glazing	Sealant 2	Color: Clear
D.	Joints in ceramic tile and fixtures	Sealant 3	Color: White
E.	Joints not scheduled	Sealant 1	Color to match adjacent

3.4 APPLICATION

A. Provide sealant around all openings in exterior walls, and any other locations indicated or required for structure weatherproofing and waterproofing.

B. Sealants shall be installed by experienced workers using specified materials and proper tools. Preparatory Work and installation of sealant shall be as specified and in accordance with manufacturer's printed instructions and recommendations.

C. Concrete and other porous surfaces shall be primed before installing sealants. Primer shall be installed with a brush that will reach all parts of joints to be filled with sealant.

D. Sealants shall be stored and installed at temperatures as recommended by manufacturer. Sealants shall not be installed when they become too jelled to be discharged in a continuous flow from gun. Modification of sealants by addition of liquids, solvents, or powders is not permitted.

E. Sealants shall be installed with guns furnished with proper size nozzles. Sufficient pressure shall be furnished to fill all voids and joints solid. In sealing around openings, include entire perimeter of each opening, unless indicated or specified otherwise. Where gun installation is impracticable, suitable hand tools shall be provided.

F. Sealed joints shall be neatly pointed on flush surfaces with beading tool, and internal corners with a special tool. Excess material shall be cleanly removed. Sealant, where exposed, shall be free of wrinkles and uniformly smooth. Sealing shall be complete before final coats of paint are installed.

G. Comply with sealant manufacturer's printed instructions except where more stringent requirements are indicated on Drawings or specified.

H. Partially fill joints with joint backing material, furnishing only compatible materials, until joint depth does not exceed 1/2 inch joint width. Minimum joint width for metal to metal joints shall be 1/4 inch. Joint depth, shall be not less than 1/4 inch and not greater than 1/2 inch.

I. Install sealant under sufficient pressure to completely fill voids. Finish exposed joints smooth, flush with surfaces or recessed as indicated. Install non-tracking sealant to concrete expansion joints subject to foot or vehicular traffic.

J. Where joint depth prevents installation of standard bond breaker backing rod, furnish non-adhering tape covering to prevent bonding of sealant to back of joint. Under no circumstances shall sealant depth exceed 1/2 inch maximum, unless specifically indicated on Drawings.

K. Prime porous surfaces after cleaning. Pack joints deeper than 3/4 inch with joint backing to within 3/4 inch of surface. Completely fill joints and spaces with gun applied compound, forming a neat, smooth bead.

3.5 MISCELLANEOUS WORK

A. Sealing shall be provided wherever required to prevent light leakage as well as moisture leakage.

B. Install sealants to depths recommended by sealant manufacturer but within following general limitations:

1. For joints in concrete walks, slab and paving subject to traffic, fill joints to a depth equal to 75 percent of joint width, but not more than 3/4 inch deep or less than 3/8 inch deep, depending on joint width.

2. For building joints, fill joints to a depth equal to 50 percent of joint width, but not more than 1/2 inch deep or less than 1/4 inch deep.

3.6 CURING

A. Sealants shall cure in accordance with manufacturer's printed recommendations. Do not disturb seal until completely cured.

END OF SECTION

SECTION 07 9500
EXPANSION CONTROL

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 the following:

1. Architectural joint systems for building exteriors.

B. Related Sections include the following:

1. Division 03 Section "Cast-in-Place Concrete" for cast-in architectural-joint-system frames furnished, but not installed, in this Section.

2. Division 07 Section "Sheet Metal Roofing" for sheet metal roof joint systems.

3. Division 07 Section "Sheet Metal Flashing and Trim" for sheet metal wall joint systems.

4. Division 07 Section "Joint Sealants" for liquid-applied joint sealants.

1.3 DEFINITIONS

A. Maximum Joint Width: Widest linear gap a joint system tolerates and in which it performs its designed function without damaging its functional capabilities.

B. Minimum Joint Width: Narrowest linear gap a joint system tolerates and in which it performs its designed function without damaging its functional capabilities.

C. Movement Capability: Value obtained from the difference between widest and narrowest widths of a joint.

D. Nominal Joint Width: The width of the linear opening specified in practice and in which the joint system is installed.

1.4 SUBMITTALS

A. Shop Drawings: Provide the following for each joint system specified and obtain approval prior to fabrication and shipment of materials to the job site:

1. Placement Drawings: Include line diagrams showing plans, elevations, sections, details, splices, blockout requirement, entire route of each joint system, and attachments to other work. Where joint systems change planes, provide isometric or clearly detailed drawing depicting how components interconnect.

B. Product Data: Submit copies of manufacturer’s latest published literature for materials specified herein for approval, and obtain approval before materials are fabricated and delivered to the site. Data to clearly indicate movement capability of cover assemblies and suitability of material used in exterior seal for UV exposure.

C. Samples for Initial Selection: For each type of joint system indicated.

1. Include manufacturer's color charts showing the standard range of colors and finishes available for each exposed metal and elastomeric seal material.

D. Certificates – Material test reports from qualified independent testing laboratory indicating and interpreting test results relative to compliance of fire-rated expansion joint assemblies with requirements indicated.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: Approved by manufacturer and having experience installing joint systems that are similar in design complexity.

B. Source Limitations: Obtain all architectural joint systems through one source from a single manufacturer.

C. Product Options: Drawings indicate size, profiles, and dimensional requirements of architectural joint systems and are based on the specific systems indicated. Refer to Division 01 Section "Product Requirements."

1. Do not modify intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If modifications are proposed, submit comprehensive explanatory data to Architect for review.

D. Loading Characteristics: Standard loading refers to covers that are capable of withstanding up to 500 lb. point loads. Heavy duty refers to covers that are capable of withstanding up to 2000 lb. point loads.

E. Fire-Test-Response Characteristics: Where indicated, provide architectural joint system and fire-barrier assemblies identical to those of assemblies tested for fire resistance per UL 2079 and/or ASTM E 1966 by a testing and inspecting agency acceptable to authorities having jurisdiction. Fire rating not less than the rating of adjacent construction.

F. Manufacturer to provide 5 year warranty for all joint covers.

1.6 COORDINATION

A. Coordinate installation of exterior wall joint systems with roof expansion assemblies to ensure that wall transitions are watertight.

PART 2 PRODUCTS

2.1 MATERIALS

A. Aluminum: ASTM B 221, Alloy 6063-T5, 6063-T6, 6063-T52, 6061-T5, 6061-T6, 6061-T51, 6105-T5, 6105-T6, 6005-T5, 6005A-T5, 6005A-T61 for extrusions; ASTM B 209, Alloy 6061-T6, 3003-H14, 5005-H34 for sheet and plate.

1. Apply manufacturer's standard protective coating on aluminum surfaces to be placed in contact with cementitious materials.

2. High-Performance Organic Finish (Two-Coat Fluoropolymer): AA-C12C40R1x (Chemical Finish: cleaned with inhibited chemicals; Chemical Finish: conversion coating; Organic Coating: manufacturer's standard two-coat, thermocured system consisting of specially formulated inhibitive primer and fluoropolymer color topcoat containing not less than 70 percent polyvinylidene fluoride resin by weight). Prepare, pretreat, and apply coating to exposed metal surfaces to comply with AAMA 2604 and with coating and resin manufacturers' written instructions.

B. Stainless Steel: ASTM A167, A240A, A240M - Type 304 for plates, sheet, and strips.

1. Finish: No.4, directional satin.

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. When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.

C. Brass: ASTM B 36/B 36M, UNS Alloy C26000 for half hard sheet and coil.

D. Bronze: ASTM B 455, Alloy C38500 for extrusions; Alloy C28000 Muntz Metal for plates.

E. Elastomeric Seals: Preformed elastomeric membranes or extrusions to be installed in metal frames.

F. Compression Seals: ASTM D2000; preformed rectangular elastomeric extrusions having internal baffle system and designed to function under compression.

G. Moisture Barrier: 7-ply laminate reinforced Polyethylene.

H. Accessories: Manufacturer's standard anchors, clips, fasteners, set screws, spacers, and other accessories compatible with material in contact, as indicated or required for complete installations.

2.2 ARCHITECTURAL JOINT SYSTEMS, GENERAL

A. General: Provide architectural joint systems of design, basic profile, materials, and operation indicated. While specified joint systems establish the function and aesthetic intent, it may be necessary for the manufacturer to modify the joint systems to accommodate the movement requirements as scheduled in the contract documents. Such modifications should be made without significant changes to the aesthetic or functional intent of the joint systems. Provide units with capability to accommodate variations in adjacent surfaces.

B. Design architectural joint systems for the following size and movement characteristics:

1. Nominal Joint Width: 10 inches.

2. Maximum Joint Width:

3. Minimum Joint Width:

4. Lateral Shear Movement Capability:

2.3 ARCHITECTURAL JOINT SYSTEMS FOR BUILDING EXTERIORS

A. Construction Specialties, Inc., P.O. Box 380 Muncy, PA, shall manufacture expansion joint cover assemblies specified herein and indicated on the drawings. Other manufacturers may be accepted as substitutions only if the manufacturer can demonstrate product compliance with the requirements of the contract documents. Substitution requests must be reviewed prior to bid and must include the following information:

1. Details

2. ASTM- E1399 test reports

3. Mock-ups

4. Reference list of projects with similar products as those specified herein.

5. Sample of written 5 year warranty

B. Architectural Joint Systems for Exterior Walls and Soffits:

1. Basis-of-Design Product: Construction Specialties, Inc. **Model SF**

2. Type: Flat seal.

a. Seal Material: Santoprene.

1) Color: As selected by Architect from manufacturer's standard range.

b. Secondary Seal: Manufacturer's standard extruded-elastomeric seal designed to prevent water and moisture infiltration.

c. Pantograph Mechanism: Manufacturer's standard pantographic wind-load support mechanism with stainless-steel fasteners for 12” joints and larger.

3. All miters and changes in direction to be factory fabricated, heat welded transitions.

C. Architectural Joint Systems for Exterior Roofs:

1. Basis-of-Design Product: Construction Specialties, Inc. **Model SRJ, SRJW**

2. Type: Vertical cover-plate.

a. Exposed Metal: Aluminum.

1) Finish: High-Performance Organic Finish (Two-Coat Fluoropolymer).

b. Secondary Seal: 7-ply laminate reinforced Polyethylene.

3. Cover plate thickness shall be determined by the performance requirements of the roof, but shall be no less than .090" thick.

4. Factory Fabricated Transitions: all end caps, transitions and miters to be factory fabricated to ensure weather integrity. Field fabrication is not acceptable.

2.4 FINISHES

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

C. Appearance of Finished Work: Noticeable variations in same piece are not acceptable.

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine surfaces and blockouts where architectural joint systems will be installed for installation tolerances and other conditions affecting performance of work.

1. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Prepare substrates according to architectural joint system manufacturer's written instructions.

B. Repair concrete slabs and blockouts using manufacturer's recommended repair grout of compressive strength adequate for anticipated structural loadings.

C. Coordinate and furnish anchorages, setting drawings, and instructions for installing joint systems. Provide fasteners of metal, type, and size to suit type of construction indicated and to provide for secure attachment of joint systems.

D. Cast-In Frames: Coordinate and furnish frames to be cast into concrete.

3.3 INSTALLATION

A. Comply with manufacturer's written instructions for storing, handling, and installing architectural joint assemblies and materials unless more stringent requirements are indicated.

B. Metal Frames: Perform cutting, drilling, and fitting required to install joint systems.

1. Install in true alignment and proper relationship to joints and adjoining finished surfaces measured from established lines and levels.

2. Adjust for differences between actual structural gap and nominal design gap due to ambient temperature at time of installation. Notify Architect where discrepancies occur that will affect proper joint installation and performance.

3. Cut and fit ends to accommodate thermal expansion and contraction of metal without buckling of frames.

4. Locate in continuous contact with adjacent surfaces.

5. Standard-Duty Systems: Shim to level where required. Support underside of frames continuously to prevent vertical deflection when in service.

6. Heavy-Duty Systems: Repair or grout blockout as required for continuous frame support and to bring frame to proper level. Shimming is not allowed.

7. Locate anchors at interval recommended by manufacturer, but not less than 3 inches from each end and not more than 24 inches o.c.

C. Seals in Metal Frames: Install elastomeric seals and membranes in frames to comply with manufacturer's written instructions. Install with minimum number of end joints.

1. Provide in continuous lengths for straight sections.

2. Seal transitions according to manufacturer's written instructions. Vulcanize or heat-weld field-spliced joints as recommended by manufacturer.

3. Installation: Mechanically lock seals into frames or adhere to frames with adhesive or pressure-sensitive tape as recommended by manufacturer.

D. Compression Seals: Apply adhesive or lubricant adhesive as recommended by manufacturer before installing compression seals.

E. Terminate exposed ends of joint assemblies with field- or factory-fabricated termination devices.

F. Fire-Resistance-Rated Assemblies: Coordinate installation of architectural joint assembly materials and associated work so complete assemblies comply with assembly performance requirements.

1. Fire Barriers: Install fire barriers to provide continuous, uninterrupted fire resistance throughout length of joint, including transitions and field splices.

G. Water Barrier: Provide water barrier at exterior joints and where called for on Drawings. Provide drainage fittings where indicated.

3.4 PROTECTION

A. Do not remove protective covering until finish work in adjacent areas is complete. When protective covering is removed, clean exposed metal surfaces to comply with manufacturer's written instructions.

B. Protect the installation from damage by work of other Sections. Where necessary due to heavy construction traffic, remove and properly store cover plates or seals and install temporary protection over joints. Reinstall cover plates or seals prior to Substantial Completion of the Work.

END OF SECTION

SECTION 08 1113
HOLLOW METAL DOORS AND FRAMES

PART 1 GENERAL

1.1 SUMMARY

A. This Section includes the following products manufactured in accordance with SDI Recommended Standards:

1. Doors: Welded, seamless, honeycomb core steel doors.

2. Frames: Pressed steel frames for doors, transoms, sidelights, mullions, interior glazed panels, and other interior and exterior openings of following type:

a. Welded unit type

3. Louvers in doors.

4. Assemblies: Provide standard steel door and frame assemblies as required for the following:

a. Labeled and fire rated.

5. Provide factory primed doors and frames to be field painted. Factory primed metal doors shall receive an additional coat of primer at the jobsite prior to the application of finish coats

B. Related Sections:

1. Section 03 3000 - Cast-In-Place Concrete

2. Section 05 4100 - Structural Metal Stud Framing

3. Section 07 6200 - Sheet Metal Flashing and Trim

4. Section 07 9200 - Joint Sealants

5. Section 08 7100 - Door Hardware

6. Section 08 8000 - Glazing

7. Section 09 9113 - Exterior Painting- Field paint finish.

8. Section 09 9123 - Interior Painting - Field paint finish.

C. Submittals:

1. Product data for each type of door and frame specified, including details of construction, materials, dimensions, hardware preparation.

2. Shop drawings showing fabrication and installation of standard steel doors and frames. Include details of each frame type, elevations of door design types, conditions at openings, details of construction, location and installation requirements of door and frame hardware and reinforcements, and details of joints and connections. Show anchorage and accessory items.

D. Quality Assurance

1. Provide doors and frames complying with Steel Door Institute "Recommended Specifications Standard Steel Doors and Frames" ANSI/SDI-100 and as herein specified.

E. Delivery, Storage, and Handling

1. Deliver doors and frames cardboard-wrapped or crated to provide protection during transit and job storage.

2. Inspect doors and frames upon delivery for damage. Minor damages may be repaired provided refinished items are equal in all respects to new work.

3. Store doors and frames at building site under cover. Place units on minimum 4-inches high wood blocking. Avoid use of non-vented plastic or canvas shelters which could create humidity chamber. If cardboard wrapper on door becomes wet, remove carton immediately. Provide 1/4-inches spaces between stacked doors to promote air circulation.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering standard steel doors and frames which may be incorporated in the work include; but are not limited to, the following:

1. Exterior Steel Doors and Frames:

a. Steelcraft Manufacturing Co., LW16 Series as basis of design.

b. Curries Company, 707T Series

c. Or equal

2. Interior Steel Doors and Frames:

a. Steelcraft Manufacturing Co., LW18 series doors and DW16 Series Frames as basis of design.

b. Curries Company, KD Series

c. Or equal

B. Materials:

1. Hot-Rolled Steel Sheets and Strip: Commercial quality carbon steel, pickled and oiled, complying with ASTM A 569 and ASTM A 568.

2. Cold-Rolled Steel Sheets: Commercial quality carbon steel, complying with ASTM A 366 and ASTM A 568.

3. Galvanized Steel Sheets: Zinc-coated carbon steel sheets of commercial quality, complying with ASTM A 526, or drawing quality, ASTM A 642, hot dipped galvanized in accordance with ASTM A 525, with A60 coating designation, mill phosphatized.

4. Supports and Anchors: Fabricate of not less than 18-gage sheet steel; galvanized where used with galvanized frames.

5. Inserts, Bolts, and Fasteners: Manufacturer's standard units. Where items are to be built into exterior walls, hot-dip galvanize in compliance with ASTM A 153, Class C or D as applicable.

6. Shop Applied Paint: Apply after fabrication.

a. Primer: Rust-inhibitive Epoxy-Polyamide in accordance with SSPC-PS 13.01 and with MIL-P-24441, Formula 150. Either air-drying or baking, suitable as a base for specified finish paints. Provide second primer coat as indicated in Paragraph 3.02, A.

C. Doors:

1. Provide metal doors of SDI grades and models specified below or as indicated on drawings or schedules:

a. Exterior Doors: ANSI/SDI-100, Level 3, extra heavy-duty, Model 4, minimum 16-gage galvanized steel faces. Continuously welded seams doors. PROVIDE 14 GAGE THICK FLUSH CLOSURE TREATMENT AT TOP OF ALL EXTERIOR DOORS.

b. Interior Doors: ANSI/SDI-100, Level 2, heavy-duty, Model 4, minimum 18-gage galvanized steel faces. Continuously welded seams doors.

D. Frames:

1. Provide metal frames for doors of types and styles as shown on drawings and schedules. Conceal fastenings, unless otherwise indicated.

a. Fabricate frames with mitered and welded corners.

b. Form frames with special profile to receive recessed weatherstripping.

c. Form frames from 14-gage galvanized steel.

2. Door Silencers: Except on weatherstripped frames, drill stops to receive 3 silencers on strike jambs of single-door frames and 2 silencers on heads of double-door frames.

3. Plaster Guards: Provide minimum 26-gage steel plaster guards or mortar boxes at back of hardware cutouts where mortar or other materials might obstruct hardware operation and to close off interior of openings.

4. Anchors: Equip frames with one welded-in floor anchor in each jamb. Furnish three (3) wall anchors welded into each jamb anchor. Anchors shall be of the proper type for particular construction involved (i.e. wood frame, masonry, concrete of steel stud). At wood frame construction provide (2) 8d strong tie nails per anchor tab per Division of the State Architect requirements.

E. Door Louvers:

1. Exterior Security Door Louvers: Units of sizes indicated and as follows:

a. Blade: 18 gage steel inverted split - Y, spaced 1" on center.

b. Frame: 18 gage steel, with mitered and welded corners.

c. Face Plate: 12 gage steel plate with 13/16" square perforations with countersunk mounting holes. Provide both sides of door.

d. Mounting Bolts: Thru-Bolts with one-way vandalproof heads.

e. Insect Screen: 18 - 14 aluminum or fiberglass.

f. Finish: Fluorocarbon coating which contains not less than 70% Kynar 500 as manufactured by Atochem North America, Inc. or Hylar 5000 as manufactured by Ausimont USA, Inc., polyvinylidene fluoride (PVDF) resin meeting the requirements of AAMA 605.2, or equal.

g. Manufacturer: Anemostat PLSL security louver or equal.

F. Door Vision Panel Frames

1. Exterior and interior door vision panel frames by the following manufacturers and model:

a. Manufacturer: Anemostat - LoPro, Low Profile Metal Vision Frame, or equal.

b. Galvanized at exterior conditions.

c. Finish: Fluorocarbon coating which contains not less than 70% Kynar 500 as manufactured by Atochem North America, Inc. or Hylar 5000 as manufactured by Ausimont USA, Inc., polyvinylidene fluoride (PVDF) resin meeting the requirements of AAMA 605.2, or equal

2. Glazing: Tempered, 1/4 inch, clear glass at non-rated doors, 1 hour, clear, fire-rated ceramic glazing at rated doors.

G. Fabrication:

1. Fabricate steel door and frame units to be rigid, neat in appearance and free from defects, warp or buckle. Wherever practicable, fit and assemble units in manufacturer's plant. Clearly identify work that cannot be permanently factory- assembled before shipment, to assure proper assembly at project site. Comply with ANSI/SDI-100 requirements.

    a. Internal Construction: Manufacturer's standard rigid mineral fiber core with internal sound deadener on inside of face sheets where appropriate in accordance with SDI standards.

    b. Clearances: Not more than 1/8 inch at jambs and heads. Not more than 3/4 inch at bottom.

2. Fabricate exposed faces of doors and panels, including stiles and rails of nonflush units, from only cold-rolled steel.

3. Tolerances: Comply with SDI 117 "Manufacturing Tolerances Standard Steel Doors and Frames."

4. Fabricate frames, concealed stiffeners, reinforcement, edge channels, louvers and moldings from either cold-rolled or hot-rolled steel.

5. Fabricate exterior doors, panels, and frames from galvanized sheet steel in accordance with SDI-112. Close top and bottom edges of exterior doors as integral part of door construction or by addition of minimum 14-gage inverted steel channels.

6. Exposed Fasteners: Unless otherwise indicated, provide countersunk flat or oval heads for exposed screws and bolts.

7. Hardware Preparation: Prepare doors and frames to receive mortised and concealed hardware in accordance with final Door Hardware Schedule and templates provided by hardware supplier. Comply with applicable requirements of ANSI A115 Series Specifications for door and frame preparation for hardware.

8. Reinforce doors and frames to receive surface-applied hardware. Drilling and tapping for surface-applied hardware may be done at project site. Do not use tek screws for hardware installation.

9. Locate hardware as indicated on final shop drawings or, if not indicated, in accordance with "Recommended Locations for Builder's Hardware on Standard Steel Doors and Frames," published by Door and Hardware Institute.

10. Shop Painting: Clean, treat, and paint exposed surfaces of steel door and frame units, including galvanized surfaces.

    a. Clean steel surfaces of mill scale, rust, oil, grease, dirt, and other foreign materials before application of paint.

    b. Apply shop coat of prime paint of even consistency to provide a uniformly finished surface ready to receive finish paint.

    c. Coat inside of frame profile with bituminous coating to a thickness of 1/16 inch.

    d. Finish coats per Section 09 9000. Finish paint to be applied in the field.

PART 3 EXECUTION

3.1 INSTALLATION

A. General: Install standard steel doors, frames, and accessories in accordance with final shop drawings, manufacturer's data, and as herein specified.

B. Placing Frames: Comply with provisions of SDI-105 "Recommended Erection Instructions For Steel Frames," unless otherwise indicated.

1. At drywall installations, place frames prior to construction of enclosing walls and ceilings. Set frames accurately in position, plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is completed, remove temporary braces and spreaders leaving surfaces smooth and undamaged. Seal bottom of door frames during installation with metal or foam inserts set in the appropriate sealant (compatible with sealant of adjacent systems) to provide continuity through the bottom of the door frame between systems.

2. Where indicated, grout hollow metal frames with portland cement grout with conventional aggregate. Lightweight aggregate not acceptable.

3. In steel stud partitions, install at least 3 wall anchors per jamb at hinge and strike levels.

C. Door Installation: Fit hollow metal doors accurately in frames, within clearances specified in ANSI/SDI-100.

1. Install fire-rated doors with clearances as specified in NFPA Standard No. 80.

3.2 ADJUST AND CLEAN

A. Second Prime Coat Application: Immediately after erection, sand smooth any rusted or damaged areas of prime coat and re-prime entire door and frame with air-drying primer as specified in Paragraph 2.01, B. 6., a.

B. Final Adjustments: Check and readjust operating hardware items, leaving steel doors and frames undamaged and in complete and proper operating condition.

END OF SECTION

SECTION 08 3100
ACCESS DOORS AND PANELS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Wall access door and frame units.

B. Ceiling access door and frame units.

1.2 RELATED REQUIREMENTS

A. Section 05 4100 - Metal Stud Framing: Openings in ceilings.

B. Section 09 2116 - Gypsum Board Assemblies

C. Section 09 3000 - Tiling

D. Section 09 9113 - Exterior Painting- Field paint finish.

E. Section 09 9123 - Interior Painting - Field paint finish.

F. Division 21: Fire suppresion components requiring access.

G. Division 22: Plumbing components requiring access.

H. Division 23: Mechanical components requiring access.

I. Division 26: Electrical components requiring access.

1.3 REFERENCE STANDARDS

A. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design; 2010.

B. ASTM A240/A240M - Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications; 2016.

C. ASTM A276/A276M - Standard Specification for Stainless Steel Bars and Shapes; 2016.

D. FM (AG) - FM Approval Guide; current edition.

E. ITS (DIR) - Directory of Listed Products; current edition.

F. UL (FRD) - Fire Resistance Directory; Current Edition.

1.4 SUBMITTALS

A. Product Data: Provide sizes, types, finishes, hardware, and details of adjoining work.

B. Shop Drawings: Indicate mounting details showing the correct framing.

C. Project Record Documents: Record actual locations of access units.

1.5 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

B. Installer Qualifications: Company specializing in performing work of the type specified and with at least three years documented experience.

PART 2 PRODUCTS

2.1 ACCESS DOORS AND PANELS ASSEMBLIES FOR HVAC, PLUMBING, FIRE SUPPRESION AND ELECTRICAL CONTROL ACCESS

A. Walls and ceilings:

1. Material: Steel.
2. Size: 12 inch by 12 inch minimum, or larger to provide sufficient access to controls.
3. Door/Panel: Hinged, standard duty, with tool-operated spring or cam lock and no handle.
4. Tool-operated spring or cam lock; no handle.
5. Wall Mounting Criteria: Provide surface-mounted face frame and door surface flush with frame surface.
6. Gypsum Board Mounting Criteria: Provide drywall bead frame with door surface flush with wall surface.
7. Plaster Mounting Criteria: Provide drywall bead frame with door surface flush with wall surface.

B. Walls in Restrooms:

1. Material: Stainless steel, type 304.
2. Size: Sufficient to provide access to controls.
3. Door/Panel: Hinged, standard duty.
4. Tool-operated spring or cam lock; no handle.
5. Surface mounted face frame and door surface flush with frame surface.

C. Fire-Rated Units at rated walls:

1. Wall Fire-Rating: As indicated on drawings.
2. Material: Steel.
3. Size: 12 inch by 12 inch minimum, or larger to provide sufficient access to controls.
4. Sufficient to access controls.
5. Door/Panel: Insulated double-surface panel.
6. Tool-operated spring or cam lock; no handle.

PART 3 EXECUTION

3.1 INSTALLATION

A. Install units in accordance with manufacturer's instructions.

B. Install frames plumb and level in openings, and secure units rigidly in place.

C. Position units to provide convenient access to the concealed work requiring access

3.2 SCHEDULE

A. All access door locations are not shown on the drawings. Locations to be determined by the Contractor to allow access to plumbing, fire suppresion, HVAC, and electrical devices and controls.

END OF SECTION

SECTION 08 3300
INSULATED ROLLING COUNTER SHUTTERS

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes: manual rolling counter doors

B. Related Sections:

1. 05 5000 Miscellaneous Metal Fabrications. Door opening jamb and head members
2. 06 1000 Rough Carpentry. Door opening jamb and head members
3. 08 3100 Access Doors and Panels. Access doors
4. 08 7000 Hardware. Padlocks. Master-keyed cylinder
5. 09 9113 Exterior Painting – Field Painting
6. 09 9123 Interior Painting – Field Painting

1.2 SUBMITTALS

A. Reference Section 01 3300 Administrative Requirements; submit the following items:

1. Product Data
2. Shop Drawings: Include special conditions not detailed in Product Data. Show interface with adjacent work.
3. Quality Assurance/Control Submittals:
    a. Provide manufacturer ISO 9001:2015 registration
    b. Provide manufacturer and installer qualifications - see below
    c. Provide manufacturer's installation instructions
4. Closeout Submittals:
    a. Operation and Maintenance Manual
    b. Certificate stating that installed materials comply with this specification

1.3 QUALITY ASSURANCE

A. Qualifications:

1. Manufacturer Qualifications: ISO 9001:2015 registered and a minimum of five years experience in producing counter doors of the type specified
2. Installer Qualifications: Manufacturer’s approval

1.4 DELIVERY STORAGE AND HANDLING

A. Reference Section 01 6000 Product Requirements.

B. Follow manufacturer’s instructions.

1.5 WARRANTY

A. Standard Warranty: Two years from date of shipment against defects in material and workmanship

B. Maintenance: Submit for owner's consideration and acceptance of a maintenance service agreement for installed products

PART 2 PRODUCTS

2.1 MANUFACTURER

A. Manufacturer:

1. Cookson: 1901 Litchfield Road, Goodyear, AZ 85338. Telephone: (800) 294-4358.
2. Cornell
3. Clopay Building Products
4. Or equal.

2.2 PRODUCT INFORMATION

A. Model: ESC30

2.3 MATERIALS

A. Curtain:

1. Slat Configuration:

a. Stainless Steel: No. 1F, interlocked flat-faced slats, 1-1/2 inches (38 mm) high by 1/2 inch (13 mm) deep, minimum 22 gauge AISI type 304 #4 finish stainless steel with stainless steel angle bottom bar with lift handles and vinyl astragal. Gray PVC backer slat.

b. Insulation: 3/8 inch (9.5 mm) open cell melamine

c. Total Slat Thickness: .545 inch (13.8 mm)

d. Flame Spread Index of 15 and a Smoke Developed Index of 450 as tested per ASTM E84

e. R-value: 2.0

f. U-Factor: .88

g. STC Rating: Up to 26 for the entire assembly, as tested per ASTM E90 and based on testing a complete, operable assembly

2. Finish:

a. Stainless Steel: type 304 #4 finish

B. Endlocks:

1. Fabricate interlocking slat sections stamped steel endlocks riveted to ends of alternate slats
2. Fabrication:

a. Stainless Steel: 12 gauge formed shapes

3. Finish:

a. Stainless Steel: type 304 #4 finish

C. Shaft Assembly:

1. Counterbalance Shaft Assembly:

    a. Barrel: Steel pipe capable of supporting curtain load with maximum deflection of 0.03 inches per foot (2.5 mm per meter) of width

    b. Spring Balance: Oil-tempered, heat-treated steel helical torsion spring assembly designed for proper balance of door to ensure that maximum effort to operate will not exceed 25 lbs (110 N). Provide wheel for applying and adjusting spring torque

D. Brackets:

1. Fabricate from reinforced steel plate with bearings at rotating support points to support counterbalance shaft assembly and form end closures

2. Finish:

    a. Standard (Stock Colors): Zirconium treatment followed by a white baked-on polyester powder coat; minimum 2.5 mils (0.065 mm) cured film thickness

    b. Hot-dip Galvanized: ASTM A 123, Grade 85 zinc coating, hot-dip galvanized

E. Hood:

1. Minimum 24 gauge stainless steel with reinforced top and bottom edges. Provide minimum 1/4 inch (6.35 mm) steel intermediate support brackets.

2. Finish:

    a. Stainless steel: type 304 #4 finish

2.4 OPERATION

A. Manual Operation:

1. Crank Hoist: Crank hoist operator including crank gear box, steel crank drive shaft and geared reduction unit. Fabricate gear box to completely enclose operating mechanism and be oil-tight.

2.5 ACCESSORIES

A. Locking:

1. Padlockable slide bolt: Padlockable slide bolt on coil side of bottom bar at each jamb extending into slots in guides. Provide interlock switches on motor operated units.

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine substrates upon which work will be installed and verify conditions are in accordance with approved shop drawings

B. Coordinate with responsible entity to perform corrective work on unsatisfactory substrates

C. Commencement of work by installer is acceptance of substrate

3.2 INSTALLATION

A. Install door and operating equipment with necessary hardware, anchors, inserts, hangers and supports

B. Follow manufacturer's installation instructions

3.3 ADJUSTING

A. Following completion of installation, including related work by others, lubricate, test, and adjust doors for ease of operation, free from warp, twist, or distortion

3.4 CLEANING

A. Clean surfaces soiled by work as recommended by manufacturer

B. Remove surplus materials and debris from the site

3.5 DEMONSTRATION

A. Demonstrate proper operation to Owner's Representative

B. Instruct Owner's Representative in maintenance procedures

END OF SECTION

SECTION 08 4313
ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Aluminum entrance framing systems.
2. Aluminum storefront systems.
3. Accessories:
    a. Flashings and Closures.

B. Related sections include the following:

1. Section 05 4100 - Structural Metal Stud Framing.
2. Section 07 6200 - Sheet Metal Flashing and Trims.
3. Section 07 9200 - Joint Sealants for joint sealants installed as part of aluminum entrance and storefront systems.
4. Section 08 5113 - Aluminum Windows
5. Section 08 7100 - Door Hardware
6. Section 08 8100 - Glazing

1.3 SYSTEM DESCRIPTION

A. General: Provide aluminum entrance and storefront systems capable of withstanding loads and thermal and structural movement requirements indicated without failure, based on testing manufacturer's standard units in assemblies similar to those indicated for this Project. Failure includes the following:

1. Air infiltration and water penetration exceeding specified limits.
2. Framing members transferring stresses, including those caused by thermal and structural movement, to glazing units.
    a. Glazing: Physically and thermally isolate glazing from framing members.

B. Wind Loads: Provide entrance and storefront systems, including anchorage, capable of withstanding wind-load design pressures calculated according to requirements of authorities having jurisdiction **(2019 CBC)** or the American Society of Civil Engineers' **ASCE 7-16**, "Minimum Design Loads for Buildings and Other Structures," 6.4.2, "Analytical Procedure," whichever are more stringent.

1. Deflection of framing members in a direction normal to wall plane is limited to L/175L 15 ft. high, L/240+1/4” for spans greater that 15 ft., unless otherwise indicated.

2. Static-Pressure Test Performance: Provide entrance and storefront systems that do not evidence material failures, structural distress, failure of operating components to function normally, or permanent deformation of main framing members exceeding 0.2 percent of clear span when tested according to ASTM E 330.

   a. Test Pressure: 150 percent of inward and outward wind-load design pressures.

   b. Duration: As required by design wind velocity; fastest 1 mile of wind for relevant exposure category.

C. Seismic Loads: Provide entrance and storefront systems, including anchorage, capable of withstanding the effects of earthquake motions calculated according to requirements of authorities having jurisdiction or ASCE 7, "Minimum Design Loads for Buildings and Other Structures," Section 9, "Earthquake Loads," whichever are more stringent.

D. Dead Loads: Provide entrance- and storefront-system members that do not deflect an amount which will reduce glazing bite below 75 percent of design dimension when carrying full dead load.

1. Provide a minimum 1/8-inch clearance between members and top of glazing or other fixed part immediately below.

2. Provide a minimum 1/16-inch clearance between members and doors.

E. Live Loads: Provide entrance and storefront systems, including anchorage, that accommodate the supporting structures' deflection from uniformly distributed and concentrated live loads as required by DSA without failure of materials or permanent deformation.

F. Air Infiltration: Provide entrance and storefront systems with permanent resistance to air leakage through fixed glazing and frame areas of not more than 0.06 cfm/sq. ft. of fixed wall area when tested according to ASTM E 283 at a static-air-pressure difference of 6.24 psf.

G. Water Penetration: Provide entrance and storefront systems that do not evidence water leakage through fixed glazing and frame areas when tested according to ASTM E 331 at minimum differential pressure of 20 percent of inward-acting wind-load design pressure as defined by ASCE 7, "Minimum Design Loads for Buildings and Other Structures," but not less than 6.24 lbf/sq. ft.. Water leakage is defined as follows:

1. Uncontrolled water infiltrating systems or appearing on systems' normally exposed interior surfaces from sources other than condensation. Water controlled by flashing and gutters that is drained back to the exterior and cannot damage adjacent materials or finishes is not water leakage.

H. Thermal Movements: Provide entrance and storefront systems, including anchorage, that accommodate thermal movements of systems and supporting elements resulting from the following maximum change (range) in ambient and surface temperatures without buckling, damaging stresses on glazing, failure of joint sealants, damaging loads on fasteners, failure of doors or other operating units to function properly, and other detrimental effects.

1. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.

I. Structural-Support Movement: Provide entrance and storefront systems that accommodate structural movements including, but not limited to, sway, deflection and live load deflection.

J. Dimensional Tolerances: Provide entrance and storefront systems that accommodate dimensional tolerances of building frame and other adjacent construction.

1.4 SUBMITTALS

A. Product Data: For each product specified. Include details of construction relative to materials, dimensions of individual components, profiles, and finishes.

B. Engineering Details and Calculations by manufacturer: Submit detail plans, specifications and engineering calculations for structural support for review and approval of Architect, structural engineer, and Division of the State Architect (DSA). Allow at least 12 weeks for DSA processing. DSA deferred approval is required for storefronts over 10 feet high. Provide calculation to design team even if the system is under 10 ft.

C. Shop Drawings: For entrance and storefront systems. Show details of fabrication and installation, including plans, elevations, sections, details of components, provisions for expansion and contraction, and attachments to other work.

1. For entrance systems, include hardware schedule and indicate operating hardware types, quantities, and locations.

D. Engineering Details and Calculations: Submit detail plans, specifications and engineering calculations for structural support for review and approval of Architect and structural engineer.

E. Samples for Verification: Of each type of exposed finish required in manufacturer's standard sizes. Where finishes involve normal color and texture variations, include Sample sets showing the full range of variations expected.

1. Cutaway Sample: Of each vertical-to-horizontal framing intersection of systems, made from minimum 6-inch lengths of full-size components and showing details of the following:

a. Joinery.

b. Anchorage.

c. Expansion provisions.

d. Glazing.

e. Flashing and drainage.

F. Installer Certificates: Signed by manufacturer certifying that installers comply with specified requirements.

G. Sealant Compatibility and Adhesion Test Reports: From sealant manufacturer, indicating that materials forming joint substrates and joint-sealant backings have been tested for compatibility and adhesion with sealants; include joint sealant manufacturers' written interpretation of test results relative to sealant performance and recommendations for primers and substrate preparation needed to obtain adhesion. Refer to Section 079200.

1. Product Test Reports: Based on evaluation of tests performed by manufacturer and witnessed by a qualified independent testing agency, indicate compliance of entrance and storefront systems with requirements based on comprehensive testing of current systems.

1.5 REGULATORY REQUIREMENTS

A. Window systems and exterior doors shall be certified under provisions of the 2016 California Energy Code, Section 116.

1. A fenestration product’s U-factor shall be rated in accordance with NFRC 100, using the specific glazing, window system, and door assemblies to be installed on the project.

a. If there is less than 10,000 square feet of site-built fenestration on the project, the default U-factor may be calculated as set forth in Reference Nonresidential Appendix NA6.

2. A fenestration product’s Solar Heat Gain Coefficient (SHGC) shall be rated in accordance with NFRC 200, using the specific glazing, window system, and door assemblies to be installed on the project.

a. If there is less than 10,000 square feet of site-built fenestration on the project, the default SHGC may be calculated as set forth in Reference Nonresidential Appendix NA6.

3. Provide label certificate for each type of window and door product indicating compliance with the U-factors listed in Table 116-A, SHGC values listed in Table 116-B, and air leakage requirements specified in this Section. Field-fabricated fenestration and exterior doors may only be installed when documentation indicating compliance with the above has been provided.

4. A Certificate of Acceptance shall be submitted to the enforcement agency that certifies that the fenestration product meets the acceptance requirements.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: Engage an experienced installer to assume engineering responsibility and perform work of this Section who has specialized in installing entrance and storefront systems similar to those required for this Project and who is acceptable to manufacturer.

B. Engineering Responsibility: Prepare data for entrance and storefront systems, including Shop Drawings, based on testing and engineering analysis of manufacturer's standard units in assemblies similar to those indicated for this Project.

C. Source Limitations: Obtain each type of entrance and storefront system through one source from a single manufacturer.

D. Product Options: Drawings indicate size, profiles, and dimensional requirements of entrance and storefront systems and are based on the specific systems indicated. Other manufacturers' systems with equal performance characteristics may be considered. Refer to Division 1 Section "Substitutions."

1. Do not modify intended aesthetic effect, as judged solely by Architect, except with Architect's approval and only to the extent needed to comply with performance requirements. Where modifications are proposed, submit comprehensive explanatory data to Architect for review.

E. Welding Standards: Comply with applicable provisions of AWS D1.2, "Structural Welding Code--Aluminum."

1.7 PROJECT CONDITIONS

A. Field Measurements: Verify dimensions by field measurements before fabrication and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

1.8 WARRANTY

A. WARRANTIES

1. Storefront System:

a. Provide written warranty in form acceptable to Owner jointly signed by manufacturer, installer and Contractor warranting work to be watertight, free from defective materials, defective workmanship, glass breakage due to defective design, and agreeing to replace components which fail within one year from date of Project Completion.

b. Warranty shall cover following:

1) Complete watertight and airtight system installation within specified tolerances.

2) System is structurally sound and free from distortion.

B. Special Finish Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components on which finishes do not comply with requirements or that fail in materials or workmanship within specified warranty period. Warranty does not include normal weathering.

1. Warranty Period: 5 years from date of Substantial Completion.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Basis-of-Design Product: The design aluminum entrances and storefront system are based on Arcadia, Inc. Subject to compliance with requirements, manufacturers offering products that may be incorporated in the work include, and limited to the following:

1. Arcadia, Inc., 2301 E Vernon, Vernon, CA. Telephone 323/269-7300, Fax 323/269-7390.

2. Oldcastle Building Envelope, Santa Monica, CA; 866-653-2278, www.oldcastlebe.com <http://www.oldcastlebe.com>.

3. Kawneer North America, Norcross, GA; 770-449-5555, www.kawneer.com <http://www.kawneer.com>

2.2 MATERIALS

A. Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated, complying with the requirements of standards indicated below.

1. Sheet and Plate: ASTM B 209.

2. Extruded Bars, Rods, Shapes, and Tubes: ASTM B 221; 6063 alloy, T5 temper. Wall thickness shall provide structural strength to meet specified performance requirements.

3. Extruded Structural Pipe and Tubes: ASTM B 429.

4. Bars, Rods, and Wire: ASTM B 211.

5. Welding Rods and Bare Electrodes: AWS A5.10.

B. Door members: Extruded 6063-T6 aluminum alloy (ASTM B221-Alloy G.S. 10a T6).

1. Screws, fastening devices, and internal components:

a. Aluminum, stainless steel, or zinc plated steel in accordance with ASTM A-164. Shall be aluminum or steel, providing the steel is properly isolated from aluminum.

b. Glazing Gasket (compression-type design).

C. Framing members, transition members, mullions, adaptors, and mounting: Extruded 6063-T6 aluminum alloy (ASTM B221 - Alloy G.S. 10a T6).

1. Screws, fastening devices, and internal components: Aluminum, stainless steel, or zinc-plated steel in accordance with ASTM.A-164. Perimeter anchors shall be aluminum or steel, providing the steel is properly isolated from aluminum.

2. Glazing Gasket (Silicone Compatible)

a. Compression-type design, replaceable, molded or extruded santoprene, polyvinyl chloride (PVC), or ethylene propylene diene monomer (EPDM).

b. Shall be of type that locks securely into the glazing reglet to prevent glazing gaskets from disengaging.

D. Steel Reinforcement: Complying with ASTM A 36 for structural shapes, plates, and bars; ASTM A 611 for cold-rolled sheet and strip; or ASTM A 570 for hot-rolled sheet and strip.

E. Fasteners: Stainless steel.

F. Perimeter Anchors: Stainless steel.

G. Perimeter Clips: Steel with one coat of shop primer; refer to Section 05 5000 for additional requirements.

H. Glazing as specified in Division 8 Section "Glazing."

I. Glazing Gaskets: Manufacturer's standard pressure-glazing system of black, resilient glazing gaskets, setting blocks, and shims or spacers, fabricated from an elastomer of type and in hardness recommended by system and gasket manufacturer to comply with system performance requirements. Provide gasket assemblies that have corners sealed with sealant recommended by gasket manufacturer.

J. Spacers, Setting Blocks, Gaskets, and Bond Breakers: Manufacturer's standard permanent, nonmigrating types in hardness recommended by manufacturer, compatible with sealants, and suitable for system performance requirements.

K. Sealants and joint fillers for joints at perimeter of entrance and storefront systems as specified in Division 7 Section "Joint Sealants."

L. Bituminous Paint: Cold-applied asphalt-mastic paint complying with SSPC-Paint 12 requirements, except containing no asbestos, formulated for 30-mil thickness per coat.

2.3 COMPONENTS

A. Entrance Doors: **Arcadia, Inc - WS512-HD Wide Stile Entrance Door** with 1" insulated glazing for exterior application. Provide system with internal reinforcement for hardware attachment.

1. Wide stile door. Vertical stile and top rail systems on all door frame systems shall be 5-1/32 inches wide, and bottom rail shall be 12 inches high. Corner construction shall consist of mechanical clip fastening, SIGMA deep penetration and minimum 1-1/8 inch long fillet welds. Glazing stops shall be snap-in type with EPDM flashing gaskets.

2. Hardware: As specified in Section 08 7100. Hardware shall be installed at the factory prior to shipment.

3. Thresholds: Thresholds shall be one piece thresholds in a bed of mastic. Threshold shall set no higher than 1/2 inch from the lowest floor surface. When complete, threshold shall be accessible.

4. Weather-strip: Door manufacturer's standard felt insert strip designed into door system along perimeter door edges.

5. Stile Design: As indicated on Drawings.

B. Storefront Systems:

1. Exterior: **Arcadia, Inc. Series TC-470 Thermally Broken**; (2 ¼" x 4 ½") nominal dimensions and with 1" insulated glazing; captured offset glazed; screw spline fabrication or equal as detailed on drawings.

C. Brackets and Reinforcements: Provide manufacturer's standard brackets and reinforcements that are compatible with adjacent materials. Provide nonstaining, nonferrous shims for aligning system components. See Door Hardware specification Section 08 7100.

D. Fasteners and Accessories: Manufacturer's standard corrosion-resistant, nonstaining, nonbleeding fasteners and accessories compatible with adjacent materials.

1. Reinforce members as required to retain fastener threads.

2. Do not use exposed fasteners, except for hardware application. For hardware application, use countersunk Phillips flat-head machine screws finished to match framing members or hardware being fastened, unless otherwise indicated.

E. Concealed Flashing: Manufacturer's standard corrosion-resistant, nonstaining, nonbleeding flashing, compatible with adjacent materials and of type recommended by manufacturer.

F. Weather Stripping: Manufacturer's standard replaceable weather stripping as follows:

1. Compression Weather Stripping: Molded neoprene complying with ASTM D 2000 requirements or molded PVC complying with ASTM D 2287 requirements.

2.4 ACCESSORIES

A. Flashing, Brake Metal and Closures: 0.050 inch thick aluminum, finish to match storefront system finish where exposed.

2.5 GLASS AND GLAZING MATERIALS

A. Glass and Glazing Materials: As specified in Section 08 8100.

B. Glazing gaskets and seals used for aluminum work shall be an integrated glazing system designed by the aluminum work manufacturer to produce a watertight assembly, and shall be physically and chemically compatible with each other and with adjacent materials.

1. Neoprene and EPDM materials shall not come in contact with silicone sealant materials.

2. Gaskets shall be designed, when in final compression form, to be compressed a minimum of 25 percent and a maximum of 40 percent, and to exert a pressure of between 4 pounds and 10 pounds pressure per linear inch.

3. All side light and transom glass shall be set with the same type and size of glazing gasket material.

C. Provide and set lead blocking for all window systems installed. Each glass panel supplied shall display a factory mark certifying each glass panel is manufactured of tempered glass. Plate glass and laminated glass will not be acceptable.

2.6 FLEXIBLE FLASHING MATERIALS

A. Flexible Flashing Materials for Openings: Du Pont FlexWrap self-adhere flashing membrane or equal.

2.7 SEALANT MATERIALS

A. Sealant and Backing Materials: As specified in Section 07 9200.

2.8 FABRICATION

A. General: Fabricate components that, when assembled, will have accurately fitted joints with ends coped or mitered to produce hairline joints free of burrs and distortion. After fabrication, clearly mark components to identify their locations in Project according to Shop Drawings.

1. Fabricate components with minimum clearances and shim spacing around perimeter of assembly, yet enabling installation and dynamic movement of perimeter seal.

2. Accurately fit and secure joints and corners. Make joints flush, hairline, and weatherproof. Sealant will not be allowed at exposed joints.

3. Prepare components to receive anchor devices. Fabricate anchors.

4. Arrange fasteners and attachments to conceal from view.

5. Prepare components with internal reinforcement of 1/4 inch thick galvanized steel mounting backing plates for door hardware and hinge hardware as per ASTM A36.

6. Exposed work shall be carefully matched to produce continuity of line, design and finish. Joints in exposed work, unless otherwise shown or required for thermal movement, shall be accurately fitted, rigidly secured with hairline contacts and sealed watertight.

7. Removable members such as glass stops shall be extruded and securely engaged into adjacent components as indicated by product manufacturer.

8. Face clearances between glass and stop shall comply with code requirements and glass manufacturer's recommendations.

9. All fasteners shall be of sufficient strength to support both horizontal wind load and vertical dead load, with a Factor of Safety of 1.5. They shall be spaced and be sized to develop the maximum strength of the members they secure or support. Washers, where required, shall be of the same material as the fastener. Unless otherwise shown or approved, fastening systems shall be concealed.

10. Install internal steel stiffeners within the window wall system as required to meet the windload/deflection requirements at the location of this project.

11. Sealants, gaskets, setting blacks, tapes and separators, where used, shall be physically and chemically compatible with each other and with adjacent materials. Items shall be installed so that they will not become dislodged during or after assembly of units.

12. Fabricate components to drain water passing joints and condensation and moisture occurring or migrating within the system to the exterior.

13. Welding: Weld components to comply with referenced AWS standard. Weld before finishing components to greatest extent possible. 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.

14. Glazing Channels: Provide minimum clearances for thickness and type of glass indicated according to FGMA's "Glazing Manual."

15. Metal Protection: Where aluminum will contact dissimilar metals, protect against galvanic action by applying sealant or tape recommended by manufacturer for this purpose. Where aluminum will contact concrete or masonry, protect against corrosion by painting contact surfaces with bituminous paint.

16. Entrances: Fabricate door framing in profiles indicated. Reinforce as required to support imposed loads. Factory assemble door frame units and factory install hardware to greatest extent possible. Reinforce door frame units as required for installing hardware indicated. Cut, drill, and tap for factory-installed hardware before finishing components.

2.9 SPECIAL REQUIREMENTS

A. Dissimilar Materials Protection: Use chromate gasketing to separate aluminum surfaces in contact with other metals, plaster or concrete, or heavy coat of alkali resistant bituminous paint. Aluminum need not be separated from stainless or galvanized steel.

2.10 ALUMINUM FINISHES

A. General: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

C. Finish designations prefixed by AA conform to the system established by the Aluminum Association for designating aluminum finishes.

D. Finish all exposed areas of aluminum and components as indicated.

1. An Architectural Class I color anodic coating conforming with AA-M12C22A44, coating not less than 0.7 mils thick.

    a. Anodized finish color shall be Colornodic:

        1) Color: **AB7 Standard Dark Bronze.**

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify dimensions, tolerances and method of attachment with other work.

B. Verify wall openings and adjoining air and vapor seal materials are ready to receive work of this Section.

3.2 INSTALLATION

A. Install window wall system in accordance with manufacturer's instructions and AAMA SFM-1-14. Manufacturer shall provide installation instructions and installer shall comply with these instructions.

B. Align assembly plumb and level, free of warp or twist. Maintain assembly dimensional tolerances, aligning with adjacent work.

C. Attach to structure to permit sufficient adjustment to accommodate construction tolerances and other irregularities.

D. Provide alignment attachments and shims to permanently fasten system to building structure.

E. Frames shall be anchored to structure with concealed fasteners appropriate for use with type of adjacent construction. Fasteners shall securely fasten frames to wall construction involved. Fasteners shall provide stiffness and rigidity to keep frames square, in accurate position without twisting, buckling or warping. Fasteners to framing substrate shall be the following minimums; greater as required by the window wall manufacturer or as conditions warrant:

    1. Metal Framing: #14 stainless steel self-tapping sheet metal screws at 12 inches on center all around by length as required to penetrate framing member 1/4 inch minimum.

F. Install perimeter flexible flashing membrane around all exterior openings in accordance with manufacturers' installation instructions.

G. Install perimeter metal flashings.

H. Install perimeter sealant to method required to achieve performance criteria and installation criteria described in Section 07 9200.

I. Set thresholds in bed of mastic and secure with mechanical fasteners, minimum three per threshold.

J. Refer to Section 08 7100 for hardware installation requirements.

K. Install glass in accordance with Section 08 8100, to glazing method required to achieve performance criteria.

3.3 TOLERANCES

A. Maximum Variation from Plumb: 0.06 inch every 3 feet non-cumulative or 0.06 inch per 10 feet, whichever is less.

B. Maximum Misalignment of Two Adjoining Members Abutting in Plane: 1/32 inch.

3.4 CLEARANCES

A. Top and sides of door shall have a minimum of 1/16 inch to a maximum of 1/8 inch clearance.

B. Bottom of door and threshold shall have a minimum of 1/8 inch to a maximum of 1/4 inch clearance.

C. All doorframes shall be measured with the minimum clearance of exact size or a maximum of 1/4 inch overall clearance to fit sides of opening to 1/8 inch at top of opening.

D. All installation clearances for door frame and door in either newly constructed openings or as replacement units for existing openings will by strictly adhered to. No other minimum or maximum clearances will be acceptable and will prove cause for total replacement of the opening at the sole expense to Contractor.

E. Mortise hardware shall fit flush with finished trim moldings and applied directly to recessed sidewalls of the door and or frame system. Cutouts in door or frame moldings shall require separate screw applied tabs or straps on which to mount concealed hardware per manufacturer's templates. Where shims and spaces are required for finished appearance, they shall provide full and solid bearing for the hardware.

3.5 FIELD QUALITY CONTROL

A. General: Comply with requirements of Division 01.

B. Testing Agency: Contractor shall engage a qualified testing agency to perform tests and inspections specified in this Article, and prepare test and inspection reports; all costs to be borne by Contractor.

C. Testing Services: Testing and inspecting of representative areas of aluminum-framed entrances and storefronts shall take place as installation proceeds to determine compliance of installed assemblies with specified requirements.

1. Water Spray Test: Before installation of interior finishes has begun, the aluminum-framed entrance and storefront system shall be tested according to AAMA 501.2 and shall not show evidence water penetration. Notify Architect to observe the spray tests.

a. Test Area: A minimum area of 50 feet by 1-story of aluminum-framed entrances and storefronts. Perform tests in each test area as directed by Architect.

b. Provide a minimum of two tests.

c. Prepare test and inspection reports. Copies of test report shall be provided to Owner, Architect and Project Inspector.

D. Manufacturer’s Field Services: Upon Owner’s Request, provide manufacturer’s field service consisting of product use recommendations and periodic site visit for inspection of product installation in accordance with manufacturer’s instructions.

E. Defective Work: Work will be considered defective when tests and inspections indicate that completed work does not conform to specified requirements. Repair or replace defective work as required, at no cost to Owner. If repair is deemed unacceptable by Owner, replace defective work with new components.

1. Additional tests and inspections, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

3.6 ADJUSTING

A. Adjust work under provisions of Division 01.

B. Adjust operating hardware for smooth operation.

3.7 CLEANING

A. Clean work under provisions of Division 01.

B. Remove protective material from pre-finished aluminum surfaces.

C. Wash down surfaces with a solution of mild detergent in warm water, applied with soft, clean wiping cloths. Take care to remove dirt from corners. Wipe surfaces clean.

D. Remove excess sealant by method acceptable to sealant manufacturer.

3.8 PROTECTION OF FINISHED WORK

A. Protect finished Work under provisions of Division 01.

B. Protect finished Work from damage.

END OF SECTION

SECTION 08 5113
ALUMINUM WINDOWS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Extruded aluminum windows; fixed.

1.2 RELATED REQUIREMENTS

A. Section 05 4100 - Structural Metal Stud Framing.

B. Section 07 6200 - Sheet Metal Flashing and Trims.

C. Section 07 9200 - Joint Sealants: Sealing joints between window frames and adjacent construction.

D. Section 08 4313 - Aluminum Entrances and Storefronts.

E. Section 08 8100 - Glazing

1.3 REFERENCE STANDARDS

A. AAMA/WDMA/CSA 101/I.S.2/A440 - North American Fenestration Standard/Specification for windows, doors, and skylights; 2017.

B. American Society for Testing and Materials (ASTM)

C. Aluminum Association (AA).

D. National Wood Window and Door Association (NWWDA)

E. California Association of Window Manufacturers(CAWM)

F. ASTM E1105 - Standard Test Method for Field Determination of Water Penetration of Installed Exterior Windows, Skylights, Doors, and Curtain Walls, by Uniform or Cyclic Static Air Pressure Difference; 2015.

1.4 SYSTEM DESCRIPTION

A. General: In addition to requirements shown or specified, comply with:

1. Applicable provisions of AAMA Windows and Sliding Glass Doors Manual for design, materials, fabrication and installation of component parts.

B. Performance Requirements: Each assembly shall be tested by a recognized testing laboratory or agency in accordance with specified test methods.

1. Conformance to C-AW80, AP-AW80 specifications in AAMA/WDMA/CSA101/I.S.2./A440.08

a. Air Infiltration: Accordance with ASTM E 283 at a static air pressure difference of 6.24 psf. Air infiltration shall not exceed 0.1 cfm per square foot.

b. Water Resistance: Accordance with ASTM E 331/ASTM E 547 at a static air pressure difference of 12 psf. No water leakage.

c. Uniform Load Structural: Uniform Load Structural Test: Aluminum window systems comply with AAMA/WDMA/CSA 101/I.S.2/A440-08, Voluntary specifications for aluminum windows. Guidelines for specified AW rated product.

d. Component testing: Accordance with procedures described in AAMA/WDMA/CSA 101/I.S.2/A440.08

e. Forced Entry Resistance: Conform to CAWM 301-90.

f. Forced-entry resistance; Conform to ASTM F588 at a performance level 10 rating.

g. Thermal Movements: Allow thermal movement resulting from the following maximum change (range) in ambient temperature.

h. 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.

i. Life cycle tested per AAMA 910

C. Warranty: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

1.5 QUALITY ASSURANCE

A. Single Source Responsibility:

1. Obtain entrances, storefronts, ribbon walls, window walls, curtain walls, window systems, and finish through one source from a single manufacturer.

B. Provide test reports from AAMA accredited laboratories certifying the performances as specified in 1.03.

1.6 WARRANTY

A. A. Warranted against failure and/or deterioration of metals due to manufacturing process for a period of two (2) years.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturers:

1. Arcadia, Inc., 2301 E Vernon, Vernon, CA. Telephone 323/269-7300, Fax 323/269-7390.

B. Acceptable Products:

1. Arcadia Inc., **T200 Series** (thermal) Heavy Commercial Fixed Windows, 2-inch depth with 1” insulated glazing.

2. Or equal.

2.2 MATERIALS

A. Extruded aluminum profiles 6063-T6 alloy and temper (ASTM B221 G.S. 10A-T6).

B. All framing members .125 minimum wall thickness.

C. Weatherstrip EPDM bulb type conforming to ASTM D2000 AA515 and shall be keyed into extruded grooves.

D. Back glazing two-sided adhesive, 15 lbs./ft.3 density, polyethylene tape. Glazing wedges shall be EPDM or Santoprene.

E. Thermal barrier material poured-in-place two part polyurethane.

2.3 SPECIAL REQUIREMENTS

A. Dissimilar Materials Protection: Use chromate gasketing to separate aluminum surfaces in contact with other metals, plaster or concrete, or heavy coat of alkali resistant bituminous paint. Aluminum need not be separated from stainless or galvanized steel.

2.4 FINISHES

A. General: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

C. Finish designations prefixed by AA conform to the system established by the Aluminum Association for designating aluminum finishes.

D. Finish all exposed areas of aluminum and components as indicated.

1. An Architectural Class I color anodic coating conforming with AA-M12C22A44, coating not less than 0.7 mils thick.

a. Anodized finish color shall be Colornodic:

1) Color: **AB7 Standard Dark Bronze.**

2.5 FABRICATION

A. Frame components mitered, reinforced extruded corner key, hydraulically crimped, and “cold welded.”

B. All ventilator extrusions tubular, each corner mitered, reinforced extruded corner key, hydraulically crimped, and “cold welded.”

C. All corners weather sealed with an elastomeric sealant.

2.6 FLEXIBLE FLASHING MATERIALS

A. Flexible Flashing Materials for Openings: Du Pont FlexWrap self-adhere flashing membrane or equal.

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine conditions and verify substrate conditions are acceptable for product installation.

B. Verify dimensions, tolerances and method of attachment with other work.

3.2 INSTALLATION

A. Install in accordance with approved shop drawings and manufacturers installation instructions.

B. Install perimeter flexible flashing membrane around all exterior openings in accordance with manufacturers' installation instructions.

C. Install perimeter metal flashings.

D. Install perimeter sealant to method required to achieve performance criteria and installation criteria described in Section 07 9200.

3.3 FIELD QUALITY CONTROL

A. Field test for water penetration in accordance with ASTM E1105 using Procedure B - cyclic static air pressure difference; test pressure shall not be less than 1.9 psf (91 Pa).

1. If any window fails, test additional windows at Contractor's expense.

B. Contractor's responsibility to make all necessary final adjustments to attain normal operation of each window and its mechanical hardware.

END OF SECTION

SECTION 08 6250
TUBULAR SKYLIGHTS

PART 1 GENERAL

1.1 SECTION INCLUDES.

A. Tubular Skylights

B. Integral Counter-Flashing.

C. Pre-Manufactured Curbs.

1.2 RELATED SECTIONS

A. Section 07 5419 - Single Ply Membrane Roofing.

B. Section 07 4113 - Metal Roof Panels.

C. Section 07 6200 - Flashing and Sheet Metal.

1.3 REFERENCES

A. ASTM E 84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2008a.

B. ASTM A 463/A 463M - Standard Specification for Steel Sheet, Aluminum Coated, by the Hot Dip Process; 2006.

C. ASTM A 653/A 653M - Standard Specification for Steel Sheet, Zinc Coated (Galvanized), by the Hot Dip Process; 2007.

D. ASTM E 283 - Test Method for Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen; 2004.

E. ASTM E 308 - Standard Practice for Computing the Colors of Objects by Using the CIE System; 2006.

F. ASTM E 330 - Structural Performance of Exterior Windows, Curtain Walls and Doors; 2002.

G. ASTM E 547 - Test Method for Water Penetration of Exterior Windows, Skylights, Doors and Curtain walls by Cyclic Air Pressure Difference; 2000.

H. ASTM D 635 - Test Method for Rate of Burning and/or Extent of Time of Burning of Self-Supporting Plastics in a Horizontal Position; 2006.

I. ASTM D-1929 - Test Method for Ignition Properties of Plastics; 1996 (2001).

J. UL 181 - Factory Made Air Ducts and Air Connectors

K. UL 790 - Standard for Tests for Fire Resistance of Roof Covering Materials; 2004.

L. ICBO/ICC AC-16 - Acceptance Criteria for Plastic Skylights; 2008.

1.4 PERFORMANCE REQUIREMENTS

A. Completed tubular daylighting device assemblies shall be capable of meeting the following performance requirements:

1. Air Infiltration Test: Air infiltration will not exceed 0.30 cfm/sf aperture with a pressure delta of 1.57 psf across the tube when tested in accordance with ASTM E 283.

2. Water Resistance Test: No uncontrolled water leakage at 10.5 psf pressure differential with water rate of 5 gallons/hour/sf when tested in accordance with ASTM E 547.

3. Uniform Load Test:

    a. No breakage, permanent damage to fasteners, hardware parts, or damage to make daylighting system inoperable or cause excessive permanent deflection of any section when tested at a Positive Load of 150 psf (7.18 kPa) or Negative Load of 70 psf (3.35 kPa).

    b. All units shall be tested with a safety factor of (3) for positive pressure and (2) for negative pressure, acting normal to plane of roof in accordance with ASTM E 330.

4. Fire Testing:

    a. When used with the Dome Edge Protection Band, all domes meet fire rating requirements as described in the 2006 International Building Code.

    b. Self-Ignition Temperature - Greater than 650 degrees F Per: U.B.C. Standard 26-6. See ASTM D-1929.

    c. Smoke Density - Rating no greater than 450 Per U.B.C. 8-1 (See ASTM Standard E 84) in way intended for use. Classification C.

    d. Rate of Burn and/or Extent - Maximum Burning Rate: 2.5 inches/min (62 mm/min) Classification CC-2: U.B.C. Standard 26-7. See ASTM D 635.

    e. Rate of Burn and/or Extent - Maximum Burn Extent: 1 inch (25 mm) Classification CC-1: U.B.C. Standard 26-7. See ASTM D 635.

1.5 SUBMITTALS

A. Product Data: Manufacturer's data sheets on each product to be used, including:

1. Preparation instructions and recommendations.

2. Storage and handling requirements and recommendations.

3. Installation methods.

B. Shop Drawings. Submit shop drawings showing layout, profiles and product components, including anchorage, flashings and accessories.

C. Test Reports: Independent testing agency or evaluation service reports verifying compliance with specified performance requirements.

1.6 QUALITY ASSURANCE

A. Manufacturer Qualifications: Engaged in manufacture of tubular daylighting devices for minimum 15 years.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Store products in manufacturer's unopened packaging until ready for installation.

B. Store and dispose of solvent-based materials, and materials used with solvent-based materials, in accordance with requirements of local authorities having jurisdiction.

1.8 PROJECT CONDITIONS

A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

1.9 WARRANTY

A. Daylighting Device: Manufacturer's standard warranty for 10 years.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturer: Solatube International, Inc., which is located at: 2210 Oak Ridge Way ; Vista, CA 92081; Toll Free Tel: 888-765-2882; Tel: 760-477-1120; Email: request info (commsales@solatube.com); Web: www.solatube.com.Contact:Carmel Architectural Sales at 714-630-7221.

B. Requests for substitutions will be considered in accordance with provisions of Section 01 2500.

2.2 TUBULAR DAYLIGHTING DEVICES

A. Tubular Daylighting Devices General : Transparent roof-mounted skylight dome and self-flashing curb, reflective tube, and ceiling level diffuser assembly, transferring sunlight to interior spaces; complying with ICBO/ICC AC-16.

B. SolaMaster Series: Solatube Model 750 DS, 21 inch (530 mm) Daylighting System:

1. Model:

a. **Solatube Model 750 DS-O Open Ceiling**. AAMA Type TDDOC.

C. Capture Zone:

1. Roof Dome Assembly: Transparent, UV and impact resistant dome with flashing base supporting dome and top of tube.

a. Outer Dome Glazing: **Type DA**, 0.125 inch (3.2 mm) minimum thickness injection molded acrylic classified as CC2 material; UV inhibiting (100 percent UV C, 100 percent UV B and 98.5 percent UV A), impact modified acrylic blend.

1) Raybender 3000: Variable prism optic molded into outer dome to capture low angle sunlight and limit high angle sunlight.

D. Roof Flashing Base: One piece, seamless, leak-proof flashing functioning as base support for dome and top of tube.

1. Base Material: Sheet steel, corrosion resistant conforming to ASTM A 653/A 653M or ASTM A 463/A 463M, 0.028 inch (0.7 mm) thick.

2. Base Style: **Type F08**, Self mounted, 8 inches (203 mm) high.

E. Curb: **Model RPC-3** as manufactured by Roof Products, Inc. with the following characteristics:

1. Frame Material: 18 gauge ASTM A653 G90 hot-dipped galvanized steel.

2. Corners: Mitered and welded with welds sealed and prime painted after fabrication.

3. Mounting Flange: 2 inches wide, integral to frame, and welded.

4. Wood Nailers: Factory installed, 2 x 2 pressure treated, continuous around top perimeter of frame.

5. Insulation: Factory installed 1-1/2 inch thick three pound density fiberglass insulation continuous around inside of frame.

6. Size and Height: As indicated on Drawings.

F. Tube Ring: Attached to top of base section; 0.090 inch (2.3 mm) nominal thickness injection molded high impact PVC; to prevent thermal bridging between base flashing and tubing and channel condensed moisture out of tubing.

G. Dome Seal: Adhesive backed weatherstrip 0.63 inch (16 mm) tall by 0.28 inch (7 mm).

H. Reflective Tubes: Aluminum sheet, thickness 0.018 inch (0.5 mm).

1. General:

    a. Interior Finish: Spectralight Infinity high reflectance specular finish on exposed reflective surface. Specular reflectance for visible spectrum (400 nm to 760 nm) greater than 99 percent. Total solar spectrum reflectance (400 nm to 2500 nm) less than 93 percent.

    b. Color: a* and b* (defined by CIE L*a*b* color model) shall not exceed plus 2 or be less than minus 2 as determined in accordance to ASTM E 308.

2. Top Tube Angle Adapter and Bottom Top Tube Angle Adapter Kit, **Type AK**.

    a. Reflective 30 degree adjustable top and bottom angle adapters (one each), 16 inches (406 mm) long

3. Extension Tube:

    a. Reflective extension tube, **Type EXX**, Notched for Open Ceiling diffuser attachment, 24 inches (610 mm) long

I. Diffuser Assemblies for Tubes Not Penetrating Ceilings (**Open Ceiling): Solatube Model 750 DS-O. 21 inch** (530 mm) diameter diffuser attached directly to bottom of tube.

1. Lens: Type L1, OptiView Fresnel lens design to maximize light output and diffusion. Visible Light Transmission shall be greater than 90 percent at 0.022 inch (0.6 mm) thick. Classified as CC2.'

2. Natural Effect Lens made of acrylic, classified as CC2, Class C, 0.060 inch (1.5 mm) thick, with open cell foam seal to minimize condensation and bug, dirt, and air-infiltration per ASTM E283.

3. Accessories:

    a. Wire Suspension Kit: Type E, Use the wire suspension kit when additional bracing to the structure.

    b. Daylight Dimmer: Type D Electro-mechanically actuated daylight valve; for universal input voltages ranging between 90 and 277 V at 50 or 60 Hz; maximum current draw of 50 ma per unit; controlled by low voltage, series Type T02: circuited, 4 conductor, size 22 cable; providing daylight output between 2 and 100 percent. Provide with dimmer switch and cable.

        1) Local Dimmer Control: Provide with dimmer switch and cable.

        2) Switch: Type SW, Manufacturer-specific low voltage DC DP/DT switch (white) as required to operate Daylight Dimmer.

        3) Cable: Type CA, Two conductor low voltage cable (500 feet) for multiple unit DC connection.

2.3 ACCESSORIES

A. Fasteners: Same material as metals being fastened, non-magnetic steel, non-corrosive metal of type recommended by manufacturer, or injection molded nylon.

B. Suspension Wire: Steel, annealed, galvanized finish, size and type for application and ceiling system requirement.

C. Sealant: Polyurethane or copolymer based elastomeric sealant as provided or recommended by manufacturer.

PART 3 EXECUTION

3.1 EXAMINATION

A. Do not begin installation until substrates have been properly prepared.

B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.2 PREPARATION

A. Clean surfaces thoroughly prior to installation.

B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

C. Coordinate all roof penetrations, tube runs, and diffuser terminations and confirm that they are compatible with the related architectural layouts prior to making roof penetrations for each classroom.

3.3 INSTALLATION

A. Install in accordance with manufacturer's printed instructions.

B. After installation of first unit, field test to determine adequacy of installation. Conduct water test in presence of Owner, Architect, or Contractor, or their designated representative. Correct if needed before proceeding with installation of subsequent units.

C. Installer qualifications: Must have minimum 5 years experience installing Solatube products or be a Solatube Certified Installer.

3.4 PROTECTION

A. Protect installed products until completion of project.

B. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION

SECTION 08 7100
DOOR HARDWARE

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Door hardware.
2. Storefront and entrance door hardware.

B. Related Divisions:

1. Division 06 – door hardware installation
2. Division 07 – sealant at exterior thresholds
3. Division 08 – metal doors and frames, interior aluminum frames, wood doors, integrated security systems, specialty doors, storefront and glazed curtainwall systems.
4. Division 10 – operable partitions
5. Division 21 – fire and life safety systems
6. Division 28 – security access systems

C. Specific Omissions: Hardware for the following is specified or indicated elsewhere.

1. Windows.
2. Cabinets, including open wall shelving and locks.
3. Signs, except where scheduled.
4. Toilet accessories, including grab bars.
5. Installation.
6. Rough hardware.
7. Conduit, junction boxes & wiring.
8. Folding partitions, except cylinders where detailed.
9. Sliding aluminum doors, except cylinders where detailed.
10. Access doors and panels, except cylinders where detailed.
11. Corner Guards.
12. 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 156.18 – Materials and Finishes.
2. BHMA – Builders Hardware Manufacturers Association

3. 2014 California Building Code

    a. Chapter 11B – Accessibility To Public Buildings, Public Accommodations, Commercial Buildings and Public Housing

4. DHI – Door and Hardware Institute

5. NFPA – National Fire Protection Association

    a. NFPA 80 2019 Edition – Standard for Fire Doors and Other Opening Protectives.

    b. NFPA 105 – Smoke and Draft Control Door Assemblies

    c. NFPA 252 – Fire Tests of Door Assemblies

6. UL – Underwriters Laboratories

    a. UL10C – Positive Pressure Fire Tests of Door Assemblies.

    b. UL 305 – Panic Hardware

7. WHI – Warnock Hersey Incorporated State of California Building Code

8. Local applicable codes

9. SDI – Steel Door Institute

10. WI – Woodwork Institute

11. AWI – Architectural Woodwork Institute

12. 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 six copies of schedule per D. Only submittals printed one sided will be accepted and reviewed. 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.

11. Point-to-point wiring diagrams.

12. Manufacturer's technical data and installation instructions for electronic hardware.

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. Items listed with no substitute manufacturers have been requested by Owner to meet existing standard.

G. 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 certified architectural hardware consultant (AHC), 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. Fire-Rated Openings: NFPA 80 compliant. Hardware UL10C (positive pressure) compliant for given type/size opening and degree of label. Provide proper latching hardware, non-flaming door closers, approved-bearing hinges, and resilient seals. Coordinate with wood door section for required intumescent seals. Furnish openings complete.

E. 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.

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. Locations for conduit and raceways as needed for electrical, electronic and electro-pneumatic hardware items. Fire/life-safety system interfacing. Point-to-point wiring diagrams plus riser diagrams to related trades.

6. Coordinate: flush top rails of doors at outswinging exteriors, and throughout where adhesive-mounted seals occur.

7. 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 warranty information:

C. Minimum warranties:

1.	Locksets**:**	Three years
2.	Extra Heavy Duty Cylindrical Lock:	Seven Years
3.	Exit Devices:	Three years mechanical
4.	Closers:	Thirty years mechanical
5.	Hinges:	One year
6.	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 2019 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. 2019 California Building Code Section 11B-309.4.

2. Force required to activate the operable parts: 5.0 pounds maximum, per 2019 California Building Code Section 11B-309.4.

3. Provide locks that allow doors to classrooms and any room with an occupancy of five or more persons to be locked from the inside per CBC 1010.1.11. The locks shall conform to the specification and requirements found in CBC Section 1010.1.9

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. For required fire doors, the minimum force allowable by the appropriate administrative authority shall not 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 leafs or fraction of eight, and one leaf of this bank is fitted with a low- or high-energy operator.

D. Door closing speed shall be as follows: CBC 11B-404.2.8

1. Closer shall be adjusted so that the required time to move a door from an open position of 90 degrees to a position of 12 degrees from the latch is 5 seconds minimum

E. Smooth surfaces at bottom 10 inches of push sides of doors, facilitating push-open with wheelchair footrests, per 2019 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.

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. 2019 California Building Code Section 11B-404.2.3.

1. Exception: doors not requiring full passage through the opening, that is, to spaces less than 24 inches in depth, may have the clear opening width reduced to 20 inches. Example: shallow closets.

2. Door closers and overhead stops: not less than 78 inches above the finished floor or ground, per 2019 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 2019 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). 2019 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 2019 California Building Code Section 11B-703.4.2.1

J. Door and door hardware encroachment: when door is swung fully-open into means-of-egress path, the door may not encroach/project more than 7 inches into the required exit width, with the exception of door release hardware such as lockset levers or panic hardware. These hardware items must be located no less than 34-inches and no more than 48-inches above the floor/ground. 2019 California Building Code, Section 1005.7.1.

1. In I-2 occupancies, latch release hardware is not permitted to project in the required exit width, regardless of its mounting height, per 2019 California Building Code, Section 1005.7.1 at Exception 1.

K. Hardware (including panic hardware) shall not be provided with "night latch" (NL) function for any accessible doors or gates unless the following conditions are met per DSA interpretation 10-08 DSA/AC (external), revised 4/28/09. Such conditions must be clearly demonstrated and indicated in the specifications:

L. Such hardware has dogging feature

M. It is dogged during the time the facility is open

N. Such dogging operation is performed only by employees as their job function (non-public use)

PART 2 PRODUCTS

2.1 MANUFACTURERS:

A. Listed acceptable alternate manufacturers**:** these will be considered; submit for review products with equivalent function and features of scheduled products.

ITEM**:**	MANUFACTURER**:**	ACCEPTABLE ALTERNATE**:**
Hinges	(IVE) Ives	Hager
Pivots	(IVE) Ives	Rixson
Key System	(SCH) Schlage	Owner standard
Mechanical Locks	(SCH) Schlage	Owner standard
Exit Devices	(VON) Von Duprin	Owner standard
Closers	(LCN) LCN	Owner standard
Silencers	(IVE) Ives	Rockwood, Trimco
Security Pulls	(TRI) Trimco	Owner standard
Kickplates	(IVE) Ives	Rockwood, Trimco
Stops & Holders	(TRI) Trimco	Owner standard
Thresholds	(ZER)Zero	Pemko
Seals & Bottoms	(ZER)Zero	Pemko

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. Doors 7'10" use 4 hinges and add 1 hinge for every foot thereafter

C. 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.

D. Conventional Hinges: Steel or stainless steel pins and approved bearings. Hinge open widths minimum, but of sufficient throw to permit maximum door swing.

1. Outswinging exterior doors: stainless steel hinges with non-removable (NRP) pins and security studs.

2. Stainless steel material exteriors and at doors subject to corrosive atmospheric conditions.

E. Pivots: high-strength forged bronze or stainless steel, tilt-on precision bearing and bearing pin.

1. Bottom and intermediate pivots: adjustability of minus 0.063 inch, plus 0.125 inch.

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. Deadbolts: stainless steel 1-inch throw.

9. Strikes: 16 gage curved steel, bronze or brass with 1 inch deep box construction, lips of sufficient length to clear trim and protect clothing.

10. Scheduled Lock Series and Design: Schlage L series, Design to be 06L

11. Certifications:

a. ANSI A156.13, 1994, Grade 1 Operational,

b. ANSI/ASTM F476-84 Grade 31 UL Listed.

12. Accessibility: Require not more than 5 lb to retract the latchbolt, or both, per CBC 2019 11B-404.2.7 and 11B-309.4.

B. Extra Heavy Duty Cylindrical Locks and Latches: as scheduled.

1. Chassis: cylindrical design, corrosion-resistant plated cold-rolled steel, through-bolted.

2. Locking Spindle: stainless steel, integrated spring and spindle design.

3. Latch Retractors: forged steel. Balance of inner parts: corrosion-resistant plated steel, or stainless steel.

4. Latchbolt: solid steel.

5. Backset: 2.75 inches typically, more or less as needed to accommodate frame, door or other hardware.

6. Lever Trim: accessible design, independent operation, spring-cage supported, minimum 2.00 inches clearance from lever mid-point to door face.

7. Strikes: 16 gage curved steel, bronze or brass with 1.00 inch deep box construction, lips of sufficient length to clear trim and protect clothing.

8. Lock Series and Design: Schlage ND series, Design to be Rhodes (RHO)

9. Certifications:

    a. ANSI A156.2, 1994, Series 4000, Grade 1.

    b. UL listed for A label and lesser class single doors up to 4 feet x 8 feet.

10. Accessibility: Require not more than 5 lb to retract the latchbolt or deadbolt, or both, per CBC 2019 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. Releasable in normal operation with 15-pound maximum operating force per UBC Standard 10-4, and with 32-pound maximum pressure under 250-pound load to the door.

8. Lever design to match locksets

9. Accessibility: Require not more than 5 lb to retract the latchbolt, per CBC 2019 11B-404.2.7 and 11B-309.4.

    a. Mechanical method: where touchpad directly retracts the latchbolt with 5 lb or less of force.

B. Specific features:

1. Non-Fire Rated Devices: cylinder dogging.

2. Lever Trim: breakaway type, forged brass or bronze escutcheon min. 0.130 inch thickness, compression spring drive, match lockset lever design.

2.5 CLOSERS

A. Surface Closers: 4040-XP

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 2019 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. Overhead Stops: Non-plastic mechanisms and finished metal end caps. Field-changeable hold-open, friction and stop-only functions.

C. 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.

D. 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.
2. Locate overhead stops for maximum possible opening. Consult with Owner for furniture locations. Minimum: 90deg stop / 95deg deadstop. Note degree of opening in submittal.

E. Thresholds: As scheduled and per details. Comply with CBC 2019 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. Fire-rated openings, 90-minutes or less duration: use thresholds to interrupt floor covering material under the door where that material has a critical radiant flux value less than 0.22 watts per square centimeter, per NFPA 253. Use threshold unit as scheduled. If none scheduled, include a 0.25in high 5in wide saddle in the bid, and request direction from Architect.

4. Fire-rated openings, 3-hour duration: Thresholds, where scheduled, to extend full jamb depth.

5. Acoustic openings: Set units in full bed of Division-7-compliant, leave no air space between threshold and substrate.

6. Plastic plugs with wood or sheet metal screws are not an acceptable substitute for specified fastening methods.

7. 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.

G. Silencers: Interior hollow metal frames, 3 for single doors, 4 for pairs of doors. Leave no unfilled/uncovered pre-punched silencer holes. Intent: door bears against silencers, seals make minimal contact with minimal compression – only enough to effect a seal. Provide where seals are not used

2.7 FINISH:

A. Generally: BHMA 626 Satin Chromium 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: All keying will be done by the Owner

B. Keys and cores: Construction cores and keys will be provided by the Owner and installed by the Contractor (OFCI)

C. Permanent Cores: All will be supplied and installed by Owner

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.

B. Locate hardware per SDI-100 and applicable building, fire, life-safety, accessibility, and security codes.

1. Notify Architect of code conflicts before ordering material.

2. Locate latching hardware between 34 inches to 44 inches above the finished floor, per California Building Code, Section 1008.1.9.2 and 1133B.2.5.2.

3. Locate panic hardware between 36 inches to 44 inches above the finished floor.

4. Where new hardware is to be installed near existing doors/hardware scheduled to remain, match locations of existing hardware.

C. Overhead stops: before installing, determine proposed locations of furniture items, fixtures, and other items to be protected by the overhead stop's action.

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. When hardware is to be attached to existing metal surface and insufficient reinforcement exists, use RivNuts, NutSerts or similar anchoring device for screws.

3. Use manufacturers' fasteners furnished with hardware items, or submit Request for Substitution with Architect.

4. Replace fasteners damaged by power-driven tools.

B. Locate floor stops no more that 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. Core concrete for exterior door stop anchors. Set anchors in approved non-shrink grout.

D. Locate overhead stops for minimum 90 degrees at rest and for maximum allowable degree of swing.

E. Drill pilot holes for fasteners in wood doors and/or frames.

F. Lubricate and adjust existing hardware scheduled to remain. Carefully remove and give to Owner items not scheduled for reuse.

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 delayed-action closers on fire-rated doors to fully close from fully-opened position in no more than 10 seconds.

4. Adjust door closers per 1.9 this section.

B. Inspection of fire door assemblies and means-of-egress panic-hardware doors: Per 2019 NFPA-80 5.2.1: hire an independent third-party inspection service to prepare a report listing these doors, and include a statement that there are zero deficiencies with the fire-rated assemblies and the openings with panic hardware. Certification, Testing and Quality Control shall be in accordance with Division 01 45 23 Testing and Inspection services. All doors hardware and installation will be inspected by a third party selected by the architect/owner

1. Div 01 45 23:

2. Per 2019 NFPA-80 5.2.1: Use a third party inspector not associated with the construction, supply or installation of this project to develop a field survey of the doors and hardware. Survey is to be done by a member certified as a FDAI (Fire Door Assembly Inspector), Certified AHC (Architectural Hardware Consultant) or a certified testing laboratory: UL or Intertek. Certified Inspectors may be found at DHI.org, Intertek, or CAFDI.org.

C. Fire-rated doors:

1. Wood doors: adjust to 0.125 inches clearance at heads, jambs, and meeting stiles.

2. Steel doors: adjust to 0.063 inches minimum to 0.188 inches maximum clearance at heads, jambs, and meeting stiles.

3. Adjust wood and steel doors to 0.75 inches maximum clearance (undercut) above threshold or finish floor material under door.

D. 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 and electrical, electronic and pneumatic hardware systems, 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.

3.8 HW SET: 012

3	EA	HINGE	3CB1HW 5 X 4.5	652	IVE
1	EA	PASSAGE	ND10S RHO	626	SCH
1	EA	CLOSER	4040XP	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW	630	IVE
1	EA	DOME STOP	W1211	626	TRI

3	EA	SILENCER	SR64	GRY	IVE

3.9 HW SET: 020

3	EA	HINGE	3CB1HW 5 X 4.5	652	IVE
1	EA	PRIVACY	ND40S RHO	626	SCH
1	EA	DOME STOP	W1211	626	TRI
3	EA	SILENCER	SR64	GRY	IVE

3.10 HW SET: 030

3	EA	HINGE	3CB1HW 5 X 4.5	652	IVE
1	EA	OFFICE LOCK	ND50JD RHO	626	SCH
1	EA	DOME STOP	W1211	626	TRI
3	EA	SILENCER	SR64	GRY	IVE

3.11 HW SET: 040

3	EA	HINGE	3CB1HW 5 X 4.5	652	IVE
1	EA	CLASSROOM LOCK	ND70JD RHO	626	SCH
1	EA	DOME STOP	W1211	626	TRI
3	EA	SILENCER	SR64	GRY	IVE

3.12 HW SET: 044

3	EA	HINGE	3CB1HW 5 X 4.5	652	IVE
1	EA	PRIVACY	ND40S RHO	626	SCH
1	EA	CLOSER	4040XP H	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW	630	IVE
1	EA	DOME STOP	W1211	626	TRI
3	EA	SILENCER	SR64	GRY	IVE

3.13 HW SET: 405

3	EA	HINGE	3CB1HW 5 X 4.5	630	IVE
1	EA	PRIVACY LOCKSET W/IND	L9496-J L283-722 06A	626	SCH
1	EA	DOME STOP	W1211	626	TRI
1	SET	PERIMETER SEALS	328AA HEAD AND JAMBS	AL	ZER
1	EA	DOOR SWEEP	339AA	CL	ZER
1	EA	THRESHOLD	AS DETAILED	AL	ZER

3.14 HW SET: 442.1

3	EA	HINGE	3CB1HW 5 X 4.5 NRP SEC STUD	630	IVE
1	EA	CLASSROOM LOCK	L9077-J 06A X L/OST	626	SCH
1	EA	SECURITY PULL	1096HA-SP	630	TRI
1	EA	CLOSER	4040XP EDA	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW	630	IVE

1	EA	FLOOR STOP	1265 (2 1/4" HIGH STRIKE)	626	TRI
1	SET	PERIMETER SEALS	328AA HEAD AND JAMBS	AL	ZER
1	EA	DOOR SWEEP	339AA	CL	ZER
1	EA	THRESHOLD	AS DETAILED	AL	ZER

3.15 HW SET: 442.2

3	EA	HINGE	3CB1HW 5 X 4.5 NRP SEC STUD	630	IVE
1	EA	CLASSROOM SEC LOCK	L9071-J 06A X L/OST	626	SCH
1	EA	SECURITY PULL	1096HA-SP	630	TRI
1	EA	CLOSER	4040XP EDA	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW	630	IVE
1	EA	FLOOR STOP	1265 (2 1/4" HIGH STRIKE)	626	TRI
1	SET	PERIMETER SEALS	328AA HEAD AND JAMBS	AL	ZER
1	EA	DOOR SWEEP	339AA	CL	ZER
1	EA	THRESHOLD	AS DETAILED	AL	ZER

3.16 HW SET: 443.1

3	EA	HINGE	3CB1HW 5 X 4.5 NRP SEC STUD	630	IVE
1	EA	CLASSROOM LOCK	L9077-J 06A X L/OST	626	SCH
1	EA	SECURITY PULL	1096HA-SP	630	TRI
1	EA	CLOSER	4040XP S-CUSH	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW	630	IVE
1	SET	PERIMETER SEALS	328AA HEAD AND JAMBS	AL	ZER
1	EA	DOOR SWEEP	339AA	CL	ZER
1	EA	THRESHOLD	AS DETAILED	AL	ZER

3.17 HW SET: 453.1

3	EA	HINGE	3CB1HW 5 X 4.5 NRP SEC STUD	630	IVE
1	EA	STOREROOM LOCK	L9080-J 06A X L/OST	626	SCH
1	EA	SECURITY PULL	1096HA-SP	630	TRI
1	EA	CLOSER	4040XP S-CUSH	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW	630	IVE
1	SET	PERIMETER SEALS	328AA HEAD AND JAMBS	AL	ZER
1	EA	DOOR SWEEP	339AA	CL	ZER
1	EA	THRESHOLD	AS DETAILED	AL	ZER

3.18 HW SET: 455.1

3	EA	HINGE	3CB1HW 5 X 4.5	630	IVE
1	EA	STOREROOM LOCK	L9080-J 06A X L/OST	626	SCH
1	EA	SECURITY PULL	1097HA	630	TRI
1	EA	CLOSER	4040XP	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW	630	IVE
1	EA	DOME STOP	W1211	626	TRI
1	SET	PERIMETER SEALS	328AA HEAD AND JAMBS	AL	ZER
1	EA	DOOR SWEEP	339AA	CL	ZER

1	EA	THRESHOLD	AS DETAILED	AL	ZER

3.19 HW SET: A032.7

1	EA	PIVOT SET	7215	626	IVE
2	EA	INTERMEDIATE PIVOT	7215 INT	626	IVE
1	EA	OFFICE LOCK	ND50JD RHO	626	SCH
1	EA	CLOSER	4040XP	689	LCN
1	EA	MOUNTING PLATE	4040-18	689	LCN
1	EA	DOME STOP	W1211	626	TRI

DOORS MUST BE WIDE STILE TO MOUNT LOCK
SEALS AND SWEEPS BY DOOR MANUFACTURER

3.20 HW SET: A482.1

1	EA	PIVOT SET	7215	626	IVE
1	EA	INTERMEDIATE PIVOT	7215 INT	626	IVE
1	EA	EXIT DEVICE	CDSI-AX-98-NL/OP-PA	626	VON
1	EA	IC RIM CYLINDER	20-057-J	626	SCH
1	EA	IC MORT CYL	20-061-J FOR DOGGING	626	SCH
1	EA	OFFSET DOOR PULL	8190-0 10" CTOC	630	IVE
1	EA	CLOSER	4040XP EDA	689	LCN
1	EA	MOUNTING PLATE	4040-18	689	LCN
1	EA	FLOOR STOP	1265 (2 1/4" HIGH STRIKE)	626	TRI
1	EA	THRESHOLD	AS DETAILED	AL	ZER

SEALS AND SWEEPS BY DOOR MANUFACTURER
DOORS MUST BE WIDE STILE TO MOUNT PANIC HARDWARE

3.21 HW SET: A482.5

1	EA	PIVOT SET	7215	626	IVE
1	EA	INTERMEDIATE PIVOT	7215 INT	626	IVE
1	EA	EXIT DEVICE	CDSI-AX-98-NL/OP-PA	626	VON
1	EA	IC RIM CYLINDER	20-057-J	626	SCH
1	EA	IC MORT CYL	20-061-J FOR DOGGING	626	SCH
1	EA	OFFSET DOOR PULL	8190-0 10" CTOC	630	IVE
1	EA	CLOSER	4040XP EDA	689	LCN
1	EA	MOUNTING PLATE	4040-18	689	LCN
1	EA	FLOOR STOP	1265 (2 1/4" HIGH STRIKE)	626	TRI
1	EA	THRESHOLD	AS DETAILED	AL	ZER

SEALS AND SWEEPS BY DOOR MANUFACTURER
DOORS MUST BE WIDE STILE TO MOUNT PANIC HARDWARE

3.22 HW SET: A582R.1

2	EA	PIVOT SET	7215	626	IVE
2	EA	INTERMEDIATE PIVOT	7215 INT	626	IVE
1	EA	MULLION	KR4954	689	VON
1	EA	EXIT DEVICE	CDSI-AX-98-EO-PA	626	VON
1	EA	EXIT DEVICE	CDSI-AX-98-NL/OP-PA	626	VON
1	EA	IC RIM CYLINDER	20-057-J	626	SCH
2	EA	IC MORT CYL	20-061-J FOR DOGGING	626	SCH
2	EA	OFFSET DOOR PULL	8190-0 10" CTOC	630	IVE
2	EA	CLOSER	4040XP EDA	689	LCN
2	EA	MOUNTING PLATE	4040-18	689	LCN
2	EA	FLOOR STOP	1265 (2 1/4" HIGH STRIKE)	626	TRI
1	EA	THRESHOLD	AS DETAILED	AL	ZER

SEALS AND SWEEPS BY DOOR MANUFACTURER
DOORS MUST BE WIDE STILE TO MOUNT PANIC HARDWARE

3.23 HW SET: A585R.1

2	EA	PIVOT SET	7215	626	IVE
2	EA	INTERMEDIATE PIVOT	7215 INT	626	IVE
1	EA	MULLION	KR4954	689	VON
1	EA	EXIT DEVICE	CDSI-AX-98-EO-PA	626	VON
1	EA	EXIT DEVICE	CDSI-AX-98-NL/OP-PA	626	VON
1	EA	IC RIM CYLINDER	20-057-J	626	SCH
2	EA	IC MORT CYL	20-061-J FOR DOGGING	626	SCH
2	EA	OFFSET DOOR PULL	8190-0 10" CTOC	630	IVE
2	EA	CLOSER	4040XP EDA	689	LCN
2	EA	MOUNTING PLATE	4040-18	689	LCN
2	EA	DOME STOP	W1211	626	TRI
1	EA	THRESHOLD	AS DETAILED	AL	ZER

SEALS AND SWEEPS BY DOOR MANUFACTURER
DOORS MUST BE WIDE STILE TO MOUNT PANIC HARDWARE

END OF SECTION

Door Schedule

Qty	Mark	Arch Door No.	HwSet	Mode	Width	Height	Thick	DrType	FrType	Rating	OUTSIDELOCATION	INSIDELOCATION
1	A100-1	A100-1	A582R.1	PR	6'0"	7'0"	1-3/4"	ALD	ALF	NON-RTD	EXTERIOR	LOBBY
1	A100-2	A100-2	A585R.1	PR	6'0"	7'0"	1-3/4"	ALD	ALF	NON-RTD	LOBBY	EXTERIOR
1	A101-1	A101-1	A482.5	SGL	3'6"	7'0"	1-3/4"	ALD	ALF	NON-RTD	EXTERIOR	CLASSROOM
1	A102-1	A102-1	A482.5	SGL	3'6"	7'0"	1-3/4"	ALD	ALF	NON-RTD	EXTERIOR	CLASSROOM
1	A103-1	A103-1	A482.5	SGL	3'6"	7'0"	1-3/4"	ALD	ALF	NON-RTD	EXTERIOR	CLASSROOM
1	A104-1	A104-1	A482.5	SGL	3'6"	7'0"	1-3/4"	ALD	ALF	NON-RTD	EXTERIOR	CLASSROOM
1	A110-1	A110-1	453.1	SGL	3'0"	7'0"	1-3/4"	HMD	HMF	NON-RTD	EXTERIOR	ELECTRIC
1	A111-1	A111-1	455.1	SGL	3'0"	7'0"	1-3/4"	HMD	HMF	NON-RTD	EXTERIOR	STORAGE
1	A112.1-1	A112.1-1	405	SGL	3'0"	7'0"	1-3/4"	HMD	HMF	NON-RTD	EXTERIOR	TOILET
1	A112.2-1	A112.2-1	405	SGL	3'0"	7'0"	1-3/4"	HMD	HMF	NON-RTD	EXTERIOR	TOILET
1	A112.3-1	A112.3-1	405	SGL	3'0"	7'0"	1-3/4"	HMD	HMF	NON-RTD	EXTERIOR	TOILET
1	A113-1	A113-1	442.2	SGL	3'0"	7'0"	1-3/4"	HMD	HMF	NON-RTD	EXTERIOR	FOOD SERVICE
1	A113-2	A113-2	442.2	SGL	3'0"	7'0"	1-3/4"	HMD	HMF	NON-RTD	EXTERIOR	FOOD SERVICE
1	A114-1	A114-1	443.1	SGL	3'0"	7'0"	1-3/4"	HMD	HMF	NON-RTD	EXTERIOR	LACTATION
1	A115-1	A115-1	030	SGL	3'0"	7'0"	1-3/4"	HMD	HMF	NON-RTD	RECEPTION	OFFICE
1	A115-2	A115-2	442.1	SGL	3'0"	7'0"	1-3/4"	HMD	HMF	NON-RTD	EXTERIOR	PRINCIPAL
1	A116-1	A116-1	443.1	SGL	3'0"	7'0"	1-3/4"	HMD	HMF	NON-RTD	EXTERIOR	INCENTIVE ROOM
1	A117-1	A117-1	443.1	SGL	3'0"	7'0"	1-3/4"	HMD	HMF	NON-RTD	EXTERIOR	WORK ROOM
1	A117.1-1	A117.1-1	040	SGL	3'0"	7'0"	1-3/4"	HMD	HMF	NON-RTD	WORK ROOM	STORAGE
1	A118-1	A118-1	A032.7	SGL	3'0"	8'0"	1-3/4"	HMD	HMF	NON-RTD	WELCOME CENTER	RECEPTION
1	A119-1	A119-1	020	SGL	3'0"	7'0"	1-3/4"	HMD	HMF	NON-RTD	RECEPTION	TOILET
1	A120-1	A120-1	030	SGL	3'0"	7'0"	1-3/4"	HMD	HMF	NON-RTD	RECEPTION	OFFICE
1	A121-1	A121-1	030	SGL	3'0"	7'0"	1-3/4"	HMD	HMF	NON-RTD	COMMONS	OFFICE
1	A122-1	A122-1	020	SGL	3'0"	7'0"	1-3/4"	HMD	HMF	NON-RTD	COMMONS	TOILET
1	A123-1	A123-1	020	SGL	3'0"	7'0"	1-3/4"	HMD	HMF	NON-RTD	COMMONS	TOILET
1	A124-1	A124-1	012	SGL	3'0"	7'0"	1-3/4"	HMD	HMF	NON-RTD	COMMONS	CONFERENCE
1	A125-1	A125-1	030	SGL	3'0"	7'0"	1-3/4"	HMD	HMF	NON-RTD	COMMONS	OFFICE
1	A126-1	A126-1	030	SGL	3'0"	7'0"	1-3/4"	HMD	HMF	NON-RTD	COMMONS	OFFICE
1	A127-1	A127-1	030	SGL	3'0"	7'0"	1-3/4"	HMD	HMF	NON-RTD	COMMONS	OFFICE
1	A128-1	A128-1	030	SGL	3'0"	7'0"	1-3/4"	HMD	HMF	NON-RTD	COMMONS	LOUNGE
1	A128-2	A128-2	443.1	SGL	3'0"	7'0"	1-3/4"	HMD	HMF	NON-RTD	EXTERIOR	STAFF LOUNGE
1	A128.1-1	A128.1-1	040	SGL	3'0"	7'0"	1-3/4"	HMD	HMF	NON-RTD	LOUNGE	STORAGE
1	A128.2-1	A128.2-1	040	SGL	3'0"	7'0"	1-3/4"	HMD	HMF	NON-RTD	LOUNGE	MDF
1	A129-1	A129-1	030	SGL	3'0"	7'0"	1-3/4"	HMD	HMF	NON-RTD	COMMONS	OFFICE
1	A133.1-1	A133.1-1	020	SGL	3'0"	7'0"	1-3/4"	HMD	HMF	NON-RTD	WELCOME CENTER	CHANGING ROOM
1	A135-1	A135-1	A482.1	SGL	3'0"	7'0"	1-3/4"	ALD	ALF	NON-RTD	EXTERIOR	HALL
1	A135-2	A135-2	A482.1	SGL	3'0"	7'0"	1-3/4"	ALD	ALF	NON-RTD	EXTERIOR	HALL
1	B105-1	B105-1	A482.5	SGL	3'6"	7'0"	1-3/4"	ALD	ALF	NON-RTD	EXTERIOR	CLASSROOM
1	B106-1	B106-1	A482.5	SGL	3'6"	7'0"	1-3/4"	ALD	ALF	NON-RTD	EXTERIOR	CLASSROOM

Door Schedule

1	B107-1	B107-1	A482.5	SGL	3'6"	7'0"	1-3/4"	ALD	ALF	NON-RTD	EXTERIOR	CLASSROOM
1	B108-1	B108-1	A482.5	SGL	3'6"	7'0"	1-3/4"	ALD	ALF	NON-RTD	EXTERIOR	CLASSROOM
1	B109-1	B109-1	044	SGL	3'0"	7'0"	1-3/4"	HMD	HMF	NON-RTD	CLASSROOM	PLATFORM
1	B109-2	B109-2	044	SGL	3'0"	7'0"	1-3/4"	HMD	HMF	NON-RTD	CLASSROOM	PLATFORM
1	B131-1	B131-1	405	SGL	3'0"	7'0"	1-3/4"	HMD	HMF	NON-RTD	EXTERIOR	TOILET
1	B132.1-1	B132.1-1	405	SGL	3'0"	7'0"	1-3/4"	HMD	HMF	NON-RTD	EXTERIOR	TOILET
1	B132.2-1	B132.2-1	405	SGL	3'0"	7'0"	1-3/4"	HMD	HMF	NON-RTD	EXTERIOR	TOILET
1	B132.3-1	B132.3-1	405	SGL	3'0"	7'0"	1-3/4"	HMD	HMF	NON-RTD	EXTERIOR	TOILET

SECTION 08 8000
GLAZING

PART 1 GENERAL

1.1 SUMMARY

A. The General Conditions and Division 1 are a part of this Section and the Contract for this Work and apply to this Section as if repeated fully herein.

B. This Section includes glazing for the following products, including those specified in other Sections where glazing requirements are specified by reference to this Section:

1. Aluminum Windows

2. Aluminum Entrances and Storefronts

3. Vision Lites

1.2 SECTION INCLUDES

A. Insulating glass units.

B. Glazing units.

C. Fire resistive glazing.

D. Glazing compounds and accessories.

1.3 RELATED SECTIONS

A. The following sections contain requirements that relate to this Section.

1. Section 07 9200 - Joint Sealants

2. Section 08 1113 - Steel Doors and Frames

3. Section 08 4113 – Aluminum Storefronts and Entrances

4. Section 08 5113 – Aluminum Windows.

1.4 DEFINITIONS: Manufacturer is used in this Section to refer to a firm that produces primary glass or fabricated glass as defined in the referenced glazing standard.

1.5 SYSTEM PERFORMANCE REQUIREMENT

A. General: Provide glazing systems that are produced, fabricated, and installed to withstand normal thermal movement, wind loading, and impact loading (where applicable), without failure including loss or glass breakage attributable to the following: defective manufacture, fabrication, and installation; failure of sealants or gaskets to remain watertight and airtight; deterioration of glazing materials; and other defects in construction.

B. Glass Design: Glass thicknesses indicated on Drawings are for detailing only. Confirm glass thicknesses by analyzing Project loads and in-service conditions. Provide glass lites for the various size openings in the thicknesses and strengths (annealed or heat-treated) to meet or exceed the following criteria:

1. Minimum glass thickness, nominally, of lites in exterior walls is 6.0 mm (0.23 inch).

2. Minimum glass thicknesses of lites, whether composed of annealed or heat-treated glass, are selected so the worst-case probability of failure does not exceed the following:

a. Determine minimum thickness of monolithic annealed glass according to ASTM E 1300. For other than monolithic annealed glass, determine thickness per glass manufacturer's standard method of analysis including applying adjustment factors to ASTM E 1300 based on type of glass.

C. Normal thermal movement results from the following maximum change (range) in ambient and surface temperatures acting on glass-framing members and glazing components. Base engineering calculation on materials' actual surface temperatures due to both solar heat gain and nighttime sky heat loss.

1. Temperature Change (Range): 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.

1.6 SUBMITTALS:

A. Product data for each glass product and glazing material.

B. Samples for verification purposes of 12-inch-square samples of each type of glass indicated except for clear monolithic glass products, and 12-inch-long samples of each color required (except black) for each type of sealant or gasket exposed to view. Install sealant or gasket sample between two strips of material representative in color of the adjoining framing system.

1.7 QUALITY ASSURANCE:

A. Labeling: Label each piece of glass and glazing and mirrors with manufacturer's name, and the grade or quality of the material. Labels shall be intact before and after installation. Fire-protection-rated glazing shall bear a label or other identification in accordance to CBC 715.4.6.3.

B. Comply with the following as a minimum requirement:

1. ASTM C864 - Standard Specification for Dense Elastomeric Compression Seal Gaskets, Setting Blocks, and Spacers.

2. ASTM C1036 - Standard Specification For Flat Glass.

3. ASTM C1048 - Standard Specification For Heat-Treated Flat Glass —Kind HS, Kind FT Coated and Uncoated Glass.

4. CPSC 16 CFR 1201 - Safety Standards for Architectural Glazing Materials issued by the Consumer Products Safety Commission.

5. GANA - Glazing Manual.

6. Insulating-Glass Certification Program: Permanently marked either on spacers or on at least one component lite of units with appropriate certification label of IGCC.

7. Safety Glass: Products complying with ANSI Z97.1 and testing requirements of 16 CFR Part 1201 for Category II materials. Comply with CBC Standard No. 54-2.

a. Subject to compliance with requirements, provide safety glass permanently marked with certification label of Safety Glazing Certification Council (SGCC) or other certification agency acceptable to authorities having jurisdiction

C. Qualifications of Installer: Minimum 5 years experience installing glass in projects of similar scope and complexity.

D. Single-Source Responsibility for Glass: Obtain glass from one source for each product indicated below:

1. Primary glass of each (ASTM C 1036) type and class indicated.

2. Heat-treated glass of each (ASTM C 1048) condition indicated.

E. Single-Source Responsibility for Glazing Accessories: Obtain glazing accessories from one source for each product and installation method indicated.

1. Preconstruction Compatibility and Adhesion Testing: Submit to sealant manufacturers, samples of each glass, gasket, glazing accessory, and glass-framing member that will contact or affect glazing sealants for compatibility and adhesion testing as indicated below:

    a. Use test methods standard with sealant manufacturer to determine if priming and other specific preparation techniques are required for rapid, optimum glazing sealants adhesion to glass and glazing channel substrates.

        1) Perform tests under normal environmental conditions during installation.

F. Schedule sufficient time to test and analyze results to prevent delay in the Work.

G. Delivery, Storage, and Handling: Protect glazing materials to comply with manufacturer's directions and as needed to prevent damage to glass and glazing materials from condensation, temperature changes, direct exposure to sun, or other causes.

H. Project Conditions: Environmental Conditions: Do not proceed with glazing when ambient and substrate temperature conditions are outside the limits permitted by glazing materials manufacturer or when glazing channel substrates are wet from rain, frost, condensation, or other causes.

1.8 WARRANTY

A. Insulating Glass Units: Provide a ten (10) year manufacturer warranty to include coverage for seal failure, interpane dusting or misting, including replacement of failed units.

B. Installer shall provide a 3 year labor warranty.

PART 2 PRODUCTS

2.1 GLASS PRODUCTS:

A. Tempered Glass: Tempered glass, conforming to CBC Section 2406. Tempered glass shall be cut to shape and size before tempering, and shall not be cut or trimmed after tempering. Lights not of proper shape and size shall not be used. Except for lights having one dimension greater than 72 inches, tong marks shall be on one of the the shorter edges. Where holes are required, limiting requirements, as to size and spacing and location in relation to edges and corners, shall be in accordance with recommendation of the glass manufacturer. Edges which shall be exposed in finished work shall be polished; other edges shall be seamed.

B. Fire-Resistive Glazing: Laminated glass made from two plies of clear, ceramic flat glass; 5/16-inch (8-mm) total nominal thickness; complying with testing requirements in 16 CFR 1201 for Category II materials.

2.2 ELASTOMERIC GLAZING SEALANTS

A. General: Provide products of type indicated, complying with the following requirements:

B. Compatibility: Select glazing sealants and tapes of proven compatibility with other materials they will contact, including glass products, seals of insulating glass units, and glazing channel substrates, under conditions of installation and service, as demonstrated by testing and field experience.

C. Suitability: Comply with sealant and glass manufacturer's recommendations for selecting glazing sealants and tapes that are suitable for applications indicated and conditions existing at time of installation.

D. Colors: Provide color of exposed joint sealants to comply with the following:

1. Provide selections made by Architect from manufacturer's full range of standard colors for products of type indicated.

E. Elastomeric Glazing Sealant Standard: Provide manufacturer's standard chemically curing, elastomeric sealants of base polymer indicated that comply with ASTM C 920 requirements indicated on each Elastomeric Glazing Sealant Product Data Sheet at the end of this Section, including those referencing ASTM classifications for Type, Grade, Class and Uses.

1. Additional Movement Capability: Where additional movement capability is specified in Elastomeric Glazing Sealant Product Data Sheet, provide products, when tested for adhesion and cohesion under maximum cyclic movement per ASTM C 719, with the capability to withstand the specified percentage change in the joint width existing at time of installation and remain in compliance with other requirements of ASTM C 920 for uses indicated.

F. Glazing Sealant for Fire-Resistant Glazing Products: Identical to product used in test assembly to obtain fire-resistive rating.

G. Glazing Tape: Closed cell polyvinyl chloride (PVC) foam, coiled on release paper over adhesive on two sides, maximum water absorption by volume of 2 percent. Glass panels that exceed 1,393 sq. inches for 90-minute ratings must be glazed with fire-rated glazing tape supplied by manufacturer.

2.3 Miscellaneous Glazing Materials:

A. General: Provide products of material, size, and shape complying with referenced glazing standard, requirements of manufacturers of glass and other glazing materials involved for glazing application indicated, and with a proven record of compatibility with surfaces contacted in installation.

B. Cleaners, Primers and Sealers: Type recommended by sealant or gasket manufacturer.

C. Setting Blocks: Elastomeric material with a Shore A durometer hardness of 85 plus or minus 5.

D. Spacers: Elastomeric blocks or continuous extrusions with a Shore A durometer hardness required by glass manufacturer to maintain glass lites in place for installation indicated.

2.4 GLAZING

A. Interior glazing (non-rated – clear):

1. 1/4-inch thick, clear, fully tempered float glass.

B. Exterior Glazing:

1. Sealed Insulating Glass Units: Low-E Tinted Insulating Glass - Dark-gray, low-reflective exterior appearance.

a. Basis of Design: **Graylite II + Solarban 60 (3) Clear** with solar control low-E Insulating glass unit by Vitro Architecural Glass or equal.

1) Outboard Lite: Graylite II, fully tempered, 1/4 inch thick.

(a) Tint: Gray.

2) Airspace: ½ inch

3) Inboard Lite: Solarban 60, Fully tempered float glass, 1/4 inch thick.

(a) Tint: Clear.

(b) Coating: Low-E (solar control type), on #3 surface.

4) Total Thickness: 1 inch.

5) Performance Values: VLT 7 percent; SHGC 0.13; shading coefficient 0.15; exterior reflectance 4 percent; U-value winter 0.29; U-value summer 0.27.

C. Fire-Resistive Glazing:

1. Laminated glass made from two plies of clear, ceramic flat glass; 5/16-inch (8-mm) total nominal thickness; complying with testing requirements in 16 CFR 1201 for Category II materials.

2. Products: Subject to compliance with requirements, provide one of the following:

a. Nippon Electric Glass Co., Ltd. (distributed by Technical Glass Products); FireLite Plus.

b. Or Equal.

3. Impact Safety Resistance: ANSI Z97.1 and CPSC 16CFR1201 (Cat. I and II).

a. Fire-rating: As indicated on door and window schedules on drawings.

b. Listed and labeled by Underwriters Laboratories, Inc.® and Underwriters Laboratories of Canada. File number for labeled fire-rated assemblies is R13377. Tests performed in accordance with UL 9, UL 10B, UL 10C, ASTM E2074, ASTM E2010, CSFM 43.7, NFPA 80, NFPA 252, NFPA 257, UBC 43.2, UBC 43.4, UBC 7-2, UBC 7-4. Approved for use in Los Angeles: LARR 25798

c. Labeling: Permanently label each piece of FireLite®Plus with the FireLite® logo, UL logo and fire rating in sizes up to 3,325 sq. in., and with the FireLite label only for sizes that exceed the listing (as approved by the local authority having jurisdiction).

d. Fire Rating: Fire rating listed and labeled by UL for fire rating scheduled at opening locations on drawings, when tested in accordance with ASTM E2074-00 and ASTM E2010-01.

e. Provide at all door openings in fire rated walls.

f. Provide at all window openings in fire rated interior walls.

PART 3 EXECUTION

3.1 Examination:

A. Examine glass framing for compliance with the following:

1. Manufacturing and installation tolerances, including those for size, squareness, offsets at corners.

2. Presence and functioning of weep system.

3. Minimum required face or edge clearances.

4. Effective sealing between joints of glass-framing members.

a. Do not proceed with glazing until unsatisfactory conditions have been corrected.

5. Preparation: Clean glazing channels and other framing members receiving glass immediately before glazing. Remove coatings that are not firmly bonded to substrates.

6. Glazing, General:

a. Comply with combined recommendations of manufacturers of glass, sealants, gaskets, and other glazing materials, except where more stringent requirements are indicated, including those in referenced glazing publications.

b. Glazing channel dimensions as indicated on Drawings provide necessary bite on glass, minimum edge and face clearances, and adequate sealant thicknesses, with reasonable tolerances. Adjust as required by Project conditions during installation.

c. Protect glass from edge damage during handling and installation as follows:

1) Use a rolling block in rotating glass units to prevent damage to glass corners. Do not impact glass with metal framing. Use suction cups to shift glass units within openings; do not raise or drift glass with a pry bar. Rotate glass lites with flares or bevels on bottom horizontal edges so edges are located at top of opening, unless otherwise indicated by manufacturer's label.

2) Remove damaged glass from Project site and legally dispose of off site. Damaged glass is glass with edge damage or other imperfections that, when installed, weaken glass and impair performance and appearance.

3) Apply primers to joint surfaces where required for adhesion of sealants, as determined by preconstruction sealant-substrate testing.

4) Install elastomeric setting blocks in sill rabbets, sized and located to comply with referenced glazing standard, unless otherwise required by glass manufacturer. Set blocks in thin course of compatible sealant suitable for heel bead.

5) Do not exceed edge pressures stipulated by glass manufacturers for installing glass lites.

6) Provide spacers for glass sizes larger than 50 united inches (length plus height) as follows:

(a) Locate spacers inside, outside, and directly opposite each other. Install correct size and spacing to preserve required face clearances, except where gaskets and glazing tapes are used that have demonstrated ability to maintain required face clearances and comply with system performance requirements.

(b) Provide 1/8-inch 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.

7) Provide edge blocking to comply with requirements of referenced glazing publications, unless otherwise required by glass manufacturer.

8) Set glass lites in each series with uniform pattern, draw, bow, and similar characteristics.

7. Sealant Glazing (Dry):

a. Install continuous spacers between glass lites and glazing stops to maintain glass face clearances and to prevent sealant from extruding into glass channel weep systems until sealants cure. Secure spacers in place and in position to control depth of installed sealant relative to edge clearance for optimum sealant performance.

b. Force sealants into glazing channels to eliminate voids and to ensure complete bond of sealant to glass and channel surfaces.

c. Provide a substantial wash away from glass. Install pressurized gaskets to protrude slightly out of channel to eliminate dirt and moisture pockets.

8. Protection and Cleaning:

a. Protect exterior glass from breakage immediately after installation by attaching crossed streamers to framing held away from glass. Do not apply markers to glass surface. Remove non-permanent labels, and clean surfaces.

b. Protect glass from contact with contaminating substances resulting from construction operations including weld splatter. If, despite such protection, contaminating substances do come into contact with glass, remove them immediately as recommended by glass manufacturer.

c. Examine glass surfaces adjacent to or below exterior concrete at frequent intervals during construction, but not less than once a month, for build-up of dirt, scum, alkali deposits, or stains, and remove as recommended by glass manufacturer.

d. Remove and replace glass that is broken, chipped, cracked, abraded, or damaged in any way, including natural causes, accidents and vandalism, during construction period.

e. Wash glass on both faces in each area of Project not more than 4 days prior to date scheduled for inspections that establish date of Substantial Completion. Wash glass as recommended by glass manufacturer.

END OF SECTION

SECTION 08 9100
LOUVERS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Louvers, frames, and accessories.

1.2 RELATED REQUIREMENTS

A. Section 05 4100 - Structural Metal Stud Framing.

B. Section 074213 - Metal Wall Panels.

C. Section 07 6200 - Sheet Metal Flashing and Trims.

D. Section 07 2500 - Weather Barriers: Sealing frames to weather barrier installed on adjacent construction.

E. Section 07 4646 - Fiber Cement Siding

F. Section 07 6200 - Sheet Metal Flashing and Trim.

G. Section 07 9200 - Joint Sealants: Sealing joints between frames and adjacent construction.

H. Section 09 2400 - Portland Cement Plastering.

1.3 REFERENCE STANDARDS

A. AAMA 2604 - Voluntary Specification, Performance Requirements and Test Procedures for High Performance Organic Coatings on Aluminum Extrusions and Panels (with Coil Coating Appendix); 2017a.

B. AMCA 500-L - Laboratory Methods of Testing Louvers for Rating; 2012.

C. AMCA 511 - Certified Ratings Program for Air Control Devices; 2010.

D. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2017.

E. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate; 2014.

F. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes; 2014.

1.4 SUBMITTALS

A. Product Data: Provide data describing design characteristics, maximum recommended air velocity, design free area, materials and finishes.

B. Shop Drawings: Indicate louver layout plan and elevations, opening and clearance dimensions, tolerances; head, jamb and sill details; blade configuration, screens, blankout areas required, and frames.

C. Test Reports: Independent agency reports showing compliance with specified performance criteria.

1.5 WARRANTY

A. Provide five year manufacturer's warranty against distortion, metal degradation, and connection failures of louver components.

1. Finish: Include twenty year coverage against degradation of exterior finish.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Wall Louvers:

1. Airolite Company, LLC: www.airolite.com.
2. Construction Specialties, Inc: www.c-sgroup.com.
3. Pottorff: www.pottorff.com.
4. Ruskin
5. Equal.

2.2 LOUVERS

A. Louvers: Factory fabricated and assembled, complete with frame, mullions, and accessories; AMCA Certified in accordance with AMCA 511.

1. Wind Load Resistance: Design to resist positive and negative wind load as required by code without damage or permanent deformation.
2. Intake Louvers: Design to allow maximum of 0.01 oz/sq ft water penetration at calculated intake design velocity based on design air flow and actual free area, when tested in accordance with AMCA 500-L.
3. Drainable Blades: Continuous rain stop at front or rear of blade aligned with vertical gutter recessed into both jambs of frame.
4. Screens: Provide insect screens at intake louvers and bird screens at exhaust louvers.

B. Stationary Louvers, Type Sightproof and Drainable: Inverted "V" blade, extruded aluminum construction.

1. Louvers shall be sightproof and drainable **Louver Type K605D by Airolite or equal**. Louvers shall be 5-inches (127 mm) deep and assembled entirely from extruded aluminum components. Blades and frames shall be 0.081-inch (2 mm) thick aluminum, alloy 6063-T5. Blades shall be horizontal, inverted-V type with a center hook and spaced 2-inches (50.8 mm) on center.
2. Mounting Type: As indicated on drawings.
3. Mounting Flanges: At head/sill and jambs, welded construction.
4. Free Area: 50 percent, minimum.
5. Aluminum Finish: High performance organic coatings.

2.3 MATERIALS

A. Extruded Aluminum: ASTM B221 (ASTM B221M).

B. Finishes: Polyvinylidene Fluoride Coating, Minimum 70 percent Kynar 500/Hylar 500 resin, two coat finish, complying with AAMA 2604.

2.4 LOUVER SCREENS

A. Wire Mesh, Square, Stainless Steel, Type 304, Mill Finish, Woven - Plain Weave, 0.0466 inch by 0.0466 inch opening, Square, 0.009 inch thick wire diameter, 70% open area.

B. Frame: Stainless steel, 1/2 inch deep "U".

2.5 ACCESSORIES

A. Blank-Off Panels: Same material as louver, painted black on exterior side; provide where duct connected to louver is smaller than louver frame, sealing off louver area outside duct.

B. Fasteners and Anchors: Stainless steel.

C. Flashings: Of same material as louver frame, formed to required shape, single length in one piece per location.

D. Sealant for Setting Sills and Sill Flashing: Non-curing butyl type.

E. Sealant: use type, as specified in Section 07 9200.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that prepared openings and flashings are ready to receive this work and opening dimensions are as indicated on shop drawings.

3.2 INSTALLATION

A. Install louver assembly in accordance with manufacturer's instructions.

B. Install louvers level and plumb.

C. Install flashings and align louver assembly to ensure moisture shed from flashings and diversion of moisture to exterior.

D. Secure louver frames in openings with concealed fasteners.

E. Install perimeter sealant and backing rod in accordance with 07 9200.

F. Coordinate with installation of mechanical ductwork.

G. Frame screen on four sides and screw to face of louver.

3.3 ADJUSTING

A. Adjust operable louvers for freedom of movement of control mechanism. Lubricate operating joints.

3.4 CLEANING

A. Clean surfaces and components.

END OF SECTION

SECTION 09 2116
GYPSUM BOARD ASSEMBLIES

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Gypsum board:

1. Interior gypsum wallboard.
2. Exterior gypsum board panels for wall, ceilings and soffits.
3. Tile backing panels.
4. Accessories.

1.2 RELATED SECTIONS

The following sections contain requirements that relate to this Section.

A. Section 05 1600 - Sure Board Panel

B. Section 05 4100 - Structural Metal Framing

C. Section 07 2115 - Board Insulation

D. Section 07 2500 - Weather Barriers.

1.3 REFERENCES

A. The publications listed below form a part of this Section to the extent referenced. The publications are referred to in the text by the basic designation only. Refer to Division 01 for definitions, acronyms, and abbreviations.

B. Unless otherwise noted, standards, manuals, and codes refer to the latest edition of such standards, manuals, and codes.

C. Referenced Standards:

1. ANSI A108.11– Interior Installation of Cementitious Backer Units.
2. ANSI A118.1– Dry-Set Portland Cement Mortar.
3. ANSI A118.4 – Latex-Portland Cement Mortar.
4. ANSI A118.9 – Test Methods and Specifications for Cementitious Backer Units.
5. ASTM B117 – Standard Practice for Operating Salt Spray (Fog) Apparatus.
6. ASTM C473 – Standard Test Method for Physical Testing of Gypsum Panel Products.
7. ASTM C475/C475M – Standard Specification for Joint Compound and Joint Tape for Finishing Gypsum Board.
8. ASTM C840 – Standard Specification for Application and Finishing of Gypsum Board.
9. ASTM C954 – Standard Specification for Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Steel Studs From 0.033 in. (0.84 mm) to 0.112 in. (2.84 mm) in Thickness.
10. ASTM C1002 – Standard Specification for Steel Self-Piercing Tapping Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs.

11. ASTM C1047 – Standard Specification for Accessories for Gypsum Wallboard and Gypsum Veneer Base.
12. ASTM C1177/C1177M – Standard Specification for Glass Mat Gypsum Substrate for Use as Sheathing.
13. ASTM C1278/C1278M – Standard Specification for Fiber-Reinforced Gypsum Panel.
14. ASTM C1325 – Standard Specification for Non-Asbestos Fiber-Mat Reinforced Cement Interior Substrate Sheets.
15. ASTM C1396/C1396M – Standard Specification for Gypsum Board.
16. ASTM D226 – Standard Specification for Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing.
17. ASTM D1117 – Standard Guide for Evaluating Nonwoven Fabrics.
18. ASTM D2103 – Standard Specification for Polyethylene Film and Sheeting.
19. ASTM D3273 – Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber.
20. ASTM E96 – Standard Test Methods for Water Vapor Transmission of Materials.
21. ASTM E695 – Standard Method for Measuring Relative Resistance of Wall, Floor, and Roof Construction to Impact Loading.
22. GA-214 – Recommended Levels of Gypsum Board Finish.
23. GA-216 – Application and Finishing of Gypsum Board.
24. GA-253 – Application of Gypsum Sheathing.
25. GA-600 – Fire Resistance Design Manual.
26. UL Fire Resistance Directory.

1.4 SUBMITTALS

A. General: Submit in accordance with Division 01.

B. Product Data: Submit manufacturer’s descriptive literature and product specification for each product.

1.5 QUALITY ASSURANCE

A. Qualifications:

1. Manufacturer Qualifications: Firm specializing in manufacturing products specified in this Section with a minimum 5 years experience.
2. Installer Qualifications: Firm specializing in installing work specified in this Section acceptable to manufacturer with experience on at least 5 projects of similar nature in past 3 years.
3. Regulatory Requirements: Comply with requirements of CBC Chapter 25.
4. Coordinate work in this Section with work in related Sections.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver products in manufacturer's original containers, dry and undamaged, with seals and labels intact.

B. Storage and Protection: Store materials in a dry secure place; neatly stacked to prevent sagging or damage to edges, ends, and surfaces. Protect from weather, surface contaminants, corrosion, construction traffic, and other potential damage.

1.7 ENVIRONMENTAL REQUIREMENTS

A. Interior Environmental Requirements:

1. Maintain room temperature at not less than 40 degrees F during application of gypsum board, except when adhesive is used for the attachment of gypsum board. Maintain room temperature at not less than 50 degrees F for bonding of adhesive, joint treatment, texturing, and decoration for 48 hours prior to and continuously thereafter until completely dry.

2. Provide adequate ventilation during installation and curing period.

3. Prevent exposure to excessive or continuous moisture before, during, and continuously after installation. Eliminate sources of moisture immediately.

4. Protect gypsum board from direct exposure to rain, snow, sunlight, or excessive weather conditions.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturers:

1. USG – United States Gypsum Company, Chicago, IL 60606; toll free: 800.874.4968; phone: 312.606.4000; fax: 312.606.5566; URL: <http://www.usg.com/> .

2. National Gypsum Co., Charlotte, NC 28211; phone: 704.365.7300; fax: 800.329.6421; URL: <http://www.nationalgypsum.com/> .

3. GP-Gypsum – Georgia-Pacific Corp., Atlanta, GA 30303; toll free: 800.824.7503; phone: 404.652.4000; fax: 404.230.5624; URL: <http://www.gp.com/> .

4. Pabco Gypsum, Newark, CA 94560; phone: 510.792.9555; fax: 510.794.8725; URL: <http://pabcogypsum.paccoast.com/> .

5. Certainteed Corporation, Valley Forge, PA; toll free: 800-233-8990; URL: www.certainteed.com <http://www.certainteed.com>.

6. Substitutions: Under provisions of Division 01.

2.2 SUSTAINABLE BUILDING DESIGN REQUIREMENTS

A. Provide sealants that meet VOC requirements of Bay Area Air Quality Management District (BAAQMD) Regulation 8, Rule 51.

2.3 INTERIOR GYPSUM WALLBOARD

A. **Shear Walls: Refer to Section 05 1600 - Sure Board Panel and structural drawings for location of shear wall with Sure Board panels.**

B. Panel Size: Provide in maximum lengths and widths available that will minimize joints in each area and correspond with support system indicated.

C. Gypsum Board: ASTM C 1396/C 1396M. With moisture- and mold-resistant core and paper surfaces.

1. Core: 5/8 inch (15.9 mm), Type X.

2. Long Edges: Tapered.

3. Mold Resistance: ASTM D 3273, score of 10 as rated according to ASTM D 3274

4. Acceptable Products:

    a. Sheetrock Brand Mold Tough Gypsum Panels manufactured by USG,

    b. DensArmour Plus Interior Guard manufactured by G-P Gypsum,

    c. Gold Bond Brand XP Wallboard manufactured by National Gypsum,

    d. Or Equal.

D. Moisture Resistant Gypsum Board: ASTM C1396/C1396M; 5/8 inch thick Type X, moisture and mold resistant core, encased in moisture resistant paper facers; maximum permissible length; ends square cut, tapered edges.

1. Average water absorption after 2-hour immersion per ASTM C473: 5 percent or less.

2. Mold and mildew resistance per ASTM D3273: Minimum average score 10.

3. Locations: A**t vertical surfaces of non-tiled restroom walls except where cement plaster walls are noted.**

4. Acceptable Products:

    a. Sheetrock Brand Mold Tough Gypsum Panels manufactured by USG,

    b. DensArmour Plus Interior Guard manufactured by G-P Gypsum,

    c. Gold Bond Brand XP Wallboard manufactured by National Gypsum,

    d. Or Equal.

2.4 EXTERIOR GYPSUM PANELS FOR WALLS, CEILINGS AND SOFFITS

A. **Shear Walls: Refer to Section 05 1600 - Sure Board Panel and structural drawings for location of shear wall with Sure Board panels.**

B. Panel Size: Provide in maximum lengths and widths available that will minimize joints in each area and correspond with support system indicated.

C. Core: 5/8 inch (15.9 mm), Type X.

D. Long Edges: Tapered.

E. Mold Resistance: ASTM D 3273, score of 10 as rated according to ASTM D 3274

F. Glass Mat Faced Sheathing: Glass mat faced gypsum substrate as defined in ASTM C1177/C1177M.

G. Paper-Faced Sheathing: Gypsum sheathing board as defined in ASTM C1396/C1396M, moisture resistant type with water repellent paper faces.

H. Acceptable Products:

1. Glass Mat Faced Products:

    a. Georgia-Pacific Gypsum; DensGlass Fireguard Sheathing.

    b. American Gypsum Company; M-Glass Exterior Sheathing Type X.

    c. National Gypsum Company; Gold Bond eXP Sheathing.

2.5 TILE BACKING PANELS

A. Panel Size: Provide in maximum lengths and widths available that will minimize joints in each area and correspond with support system indicated.

B. Location: Vertical surfaces behind thinset tile.

C. Mold Resistance: Score of 10, when tested in accordance with ASTM D3273.

D. ANSI Cement-Based Board: Non-gypsum-based; aggregated Portland cement panels with glass fiber mesh embedded in front and back surfaces complying with ANSI A118.9 or ASTM C1325.

1. Thickness: 5/8 inch.

E. Acceptable products:

1. Durock Brand Cement Board by United States Gypsum Co.,

2. PermaBase Cement Board by National Gypsum Co.,

3. Or Equal.

F. Accessories:

1. Screws: No. 6 gauge by sufficient length to penetrate 3/8 inch into steel framing, self-drilling, ribbed wafer head or bugle head screws; minimum 500 hour corrosion resistant finish per ASTM B117.

2. Jointing Tape: Alkali-resistant fiberglass mesh tape; 2 inch wide (interior applications); 4 inch wide (exterior applications).

3. Bonding and Jointing Materials: ANSI A118.1, dry-set Portland cement mortar; or ANSI A118.4, latex-portland cement mortar.

4. Moisture Retarding Membrane: 4 mil polyethylene sheet, ASTM D2103, Type 13300; or 15 pound roofing felt, ASTM D226, Type I.

2.6 JOINT TREATMENT MATERIALS

A. General: Comply with ASTM C 475.

B. Joint Tape:

1. Interior Gypsum Wallboard: Paper.

2. Exterior Gypsum Soffit Board: Paper.

3. Glass-Mat Gypsum Sheathing Board: 10-by-10 glass mesh.

4. Tile Backing Panels: As recommended by panel manufacturer.

5. Joint Compound for Interior Gypsum Wallboard: For each coat use formulation that is compatible with other compounds applied on previous or for successive coats.

a. Prefilling: At open joints, rounded or beveled panel edges, and damaged surface areas, use setting-type taping compound.

b. Embedding and First Coat: For embedding tape and first coat on joints, fasteners, and trim flanges, use drying-type, all-purpose compound.

1) Use setting-type compound for installing paper-faced metal trim accessories.

c. Fill Coat: For second coat, use setting-type, sandable topping compound.

d. Finish Coat: For third coat, use drying-type, all-purpose compound.

6. Joint Compound for Exterior Applications:

a. Exterior Gypsum Soffit Board: Use setting-type taping and setting-type, sandable topping compounds.

b. Glass-Mat Gypsum Sheathing Board: As recommended by manufacturer.

7. Joint Compound for Tile Backing Panels:

a. Glass-Mat, Water-Resistant Backing Panel: As recommended by manufacturer.

b. Cementitious Backer Units: As recommended by manufacturer.

2.7 ACCESSORIES

A. Corner Bead, Edge Trim, Decorative Dividers: ASTM C1047; zinc-coated sheet steel.

B. Control Joints: ASTM C1047; roll-formed zinc joint with removable protected opening; provided in accordance with UL fire rated assemblies. Acceptable product: Zinc Control Joint No. 093 manufactured by USG, or accepted equal.

C. Screws:

1. ASTM C1002, Type S or Type A; bugle head; self drilling and self tapping screws for light gauge steel framing (less than 0.033 inch thick).

2. ASTM C954; bugle head; self-drilling and self tapping screws for heavy gauge steel framing (0.033 inch to 0.112 inch thick).

3. ASTM C1002 Type W or Type A; bugle head; provide sufficient length to provide a minimum 3/4 inch penetration into wood framing members.

4. Jointing Tape: ASTM C475/C475M; 2 inch wide heavy duty paper joint tape.

5. Joint Compound: ASTM C475/C475M.

6. Primer-Surfacer (used in lieu of skim coat in a Level 5 finish): High-build interior coating finish applied with an airless sprayer. Products: Sheetrock Brand Primer-Surfacer Tuff-Hide manufactured by USG, ProForm Brand Surfacer/Primer manufactured by National Gypsum, or accepted equal. Note: walls applied with primer-surfacer do not require drywall paint primer prior to application of finish coats.

7. Acoustical Sealant: Refer to Section 07 92 00.

8. Firestop Putty Pads for Electrical Boxes: Intumescent moldable firestop putty pad. Acceptable products: SSP4S 7.25 inches by 7.25 inches or SSP9S 9 inches by 9 inches manufactured by Specified Technologies Inc. (STI), Somerville, NJ; 800-992-1180, www.stifirestop.com <http://www.stifirestop.com/>, or accepted equal.

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine job site conditions and verify field dimensions.

B. Verify framing for acceptable placement, spacing, and tolerance (alignment and plumb).

C. Verify that framing and furring are securely attached.

D. Verify that all blocking, headers, and supports are in place to support plumbing fixtures, grab bars, towel racks, shelves, and similar items.

E. Verify that insulation is secured.

F. Verify firestopping work, refer to Section 07 84 00.

G. Begin installation only when unacceptable conditions have been corrected.

3.2 FIRESTOPPING AND SEALANTS

A. Install intumescent moldable pads over backs and sides of all electrical junction and utility boxes at fire rated walls.

B. Apply acoustical sealant at partitions per sealant manufacturer's instructions. Refer to Section 07 92 00.

3.3 GYPSUM BOARD INSTALLATION

A. Install gypsum board to framing and furring members in accordance with manufacturer's recommendations, GA-216 or ASTM C840, and as specified in this Section.

B. Install gypsum board with separate panels in moderate contact, do not force in place. Stagger end joints of adjoining panels. Neatly fit abutting end and edge joints.

C. Install gypsum board in most economical direction, using maximum practical lengths, with edges occurring over firm bearing. Install 1/4 inch (nominal) above rough floor or curb. Cut out gypsum board as required to make neat close joints around openings.

D. In vertical applications, provide lengths required to reach full height of vertical surfaces in one continuous piece.

E. Where gypsum board is carried full height to structure above, provide for deflection of structure by undercutting board 3/8 inch (nominal) and sealing top edge of board to substrate with a continuous bead of sealant to form an elastic closure.

F. Use screws to fasten gypsum board to framing.

G. Treat cut edges and holes in moisture resistant gypsum board per manufacturer's recommendations.

H. Place corner beads at all exterior corners. Use longest practical length. Place edge trims where gypsum board abuts dissimilar materials.

I. Control Joints: Install consistent with lines of building spaces and as a minimum, install as follows:

1. Where a partition, wall, or ceiling traverses a construction joint (expansion, seismic, or building control element) in the base building structure.

2. Where a wall or partition runs in an uninterrupted straight plane exceeding 30 linear feet.

3. In interior ceilings with perimeter relief so that linear dimensions between control joints do not exceed 50 feet and total area between control joints does not exceed 2500 square feet.

4. In interior ceilings without perimeter relief so that linear dimensions between control joints do not exceed 30 feet and total area between control joints does not exceed 900 square feet.

5. In exterior ceilings and soffits so that linear dimensions between control joints do not exceed 30 feet and total area between control joints do not exceed 900 square feet.

6. Where ceiling framing members change direction.

7. Where a partition transitions from floor-supported framing to overhead hung framing.

3.4 FIRE-RESISTANT ASSEMBLIES

A. Install fire rated assemblies using materials, application methods including types and spacing of fasteners, and framing in accordance with the specified UL Fire Resistive Design Number, GA-600 File Number, or CBC Table 720.

B. Completely seal joints of fire-rated gypsum board enclosures in accordance with UL or GA listed assembly requirements. Seal penetrations through rated partitions and ceilings in accordance with tested systems. Refer to Section 07 84 00.

3.5 GYPSUM SHEATHING INSTALLATION

A. Install gypsum sheathing in accordance with GA-253 and manufacturer's instructions.

B. End joints, if required should be offset; joints should fit snugly and flashing installed around all openings.

C. Install maximum lengths possible to minimize number of joints. Edge joints must be located parallel to and with vertical orientation on framing. End joints of adjacent lengths of sheathing must be staggered.

D. Attach gypsum sheathing to frame with screws. Drive fasteners so as to bear tight against and flush with surface of sheathing. Do not countersink fasteners. Fasteners must be located at least 3/8 inches from edges and ends of sheathing panels.

E. Do not leave exposed surfaces of gypsum sheathing unprotected beyond the manufacturer's recommendation without a weather barrier cladding.

3.6 CEMENTITIOUS BACKER BOARD INSTALLATION

A. Install cementitious backer boards in accordance with ANSI A108.11 and manufacturer's instructions at walls to receive tiling.

B. Install moisture retarding membrane. Place and fasten boards per manufacturer's instructions.

C. Apply boards with ends and edges closely butted but not forced together. Center end or edge joints on framing and stagger joints in adjacent rows.

D. Fasten boards to framing using specified fasteners. Drive fasteners into field of board first, working toward ends and edges. Hold boards in firm contact with framing while driving fasteners. Space fasteners maximum 8 inches on center with perimeter fasteners at least 3/8 inch from ends and 5/8 inch from edges.

E. Drive screws so bottoms of heads are flush with surface of boards to provide firm panel contact with framing. Do not overdrive screws and replace any screws that are stripped.

F. Provide additional blocking where required to permit proper attachment. Edges or ends of unit parallel to framing shall be continuously supported.

3.7 JOINT TREATMENT AND FINISHING

Schedule of Finishes					
Level	Joints	Interior Angles Accessories	Accessories	Fasteners	Surface
1	Tape set in compound	Tape set in joint compound			Tool marks and ridges acceptable
2	Tape set in joint compound and one separate coat of joint compound	Tape embedded in joint compound and wiped to leave a thin coat of compound over tape, and one separate coat	Covered by one separate coat of joint compound	Covered by one separate coat of joint compound	Free from excess joint compound. Tool marks and ridges acceptable.
3	After taping, cover with two separate coats of joint compound	After taping, cover with one separate coat of joint compound	Covered by 3 separate coats of joint compound	Covered by 3 separate coats of joint compound	Smooth and free of tool marks and ridges *

Schedule of Finishes					
4	After taping, cover with 2 separate coats of joint compound	After taping, cover with one separate coat of joint compound	Covered by 3 separate coats of joint compound	Covered by 3 separate coats of joint compound	Smooth and free of tool marks and ridges *
5	After taping, cover with 2 separate coats of joint compound	After taping, cover with one separate coat of joint compound	Covered by 3 separate coats of joint compound	Skim coat of joint compound applied to entire surface.	Surface free from tool marks and ridges. *
*At completion of specified taping and finishing, install one coat of high solids primer as specified hereafter					

A. All Levels: Install tape bedding compound, tape, and finishing cement on joints in wallboard as required for specified levels of finish.

B. Levels 2 through 5:

1. Install joint cement and finishing cement over screw heads. Treat all inside corners with joint cement, tape, and finishing cement. Treat outside corners with corner beads and finishing cement.

2. Provide metal casing beads at all edges of gypsum wallboard, which abut ceiling, wall, or column finish, and elsewhere as required, such as openings, offsets, etc. Install all exposed joints, trims, and attachments non-apparent following installation of paint or other finishes. If joints and fasteners are visibly apparent, correct defects as required.

3. Seal raw edges of plumbing openings and boards that have been cut to fit with sealing compound brushed on.

4. When entire installation is completed and before installation of finish materials by other trades, correct and repair broken, dented, scratched or damaged wallboard.

C. Levels 3 and 4: Install one coat of high solids primer over entire surface.

D. Level 5: Install one coat of skim coat over entire surface, followed by one coat of high solids primer over entire surface.

3.8 REQUIRED LEVELS OF FINISH

A. Unless otherwise indicated or specified, levels of finish required shall be as follows:

1. Level 1: Plenum areas above ceilings, insides of shafts, and other concealed areas. Taping to be as required for fire rated assemblies.

2. Level 2: Wallboard backing for high moisture areas (Restrooms and Janitor Rooms) to be covered with a water resistant surface other than tile, vinyl or paint, i.e stainless steel cladding etc.

3. Level 3: Backing for marker boards, tackable wall panels and adhered acoustic tiles.

4. Level 4: Exposed, painted wallboard in all spaces, unless noted otherwise above.

B. Glass-Mat Gypsum Sheathing Board: Finish according to manufacturer's written instructions for use as exposed soffit board.

C. Cementitious Backer Units: Finish according to manufacturer's written instructions.

3.9 TOLERANCES

A. Maximum variation from true flatness: 1/4 inch in 10 feet in any direction.

B. Maximum surface variation of substrate for walls to receive ceramic tile: Refer to Section 09 30 00.

3.10 CLEANING AND PROTECTION

A. Cleaning and Repair: Clean surfaces that have been spotted or soiled during wallboard application.

B. Defective Work: Remove and replace defective work that cannot be satisfactorily repaired with no additional cost to the Owner.

C. Protection: Protect installed work against damage from other construction work.

D. Upon completion of the work under this Section, remove all surplus material, rubbish and debris from the premises and leave floors broom clean.

END OF SECTION

SECTION 09 2400
PORTLAND CEMENT PLASTERING

PART 1 GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Exterior Gypsum Sheathing.

2. Metal lath and furring.

3. Portland cement plastering with fiber.

B. Related Sections: The following sections contain requirements that relate to this Section.

1. Section 05 4100 - Structural Metal Framing.

2. Section 07 2115 - Board Insulation

3. Section 07 2500 - Weather Barriers.

1.2 SYSTEM DESCRIPTION

A. **Continuous Insulation Under Cement Plaster: Three-coat, 7/8" thick cement plaster with fiberglass reinforcing mesh on metal lath over board insulation over weather barrier over exterior gypsum sheathing or structural shear panel on metal studs.**

1.3 SUBMITTALS

A. General: Submit the following in accordance with Conditions of Contract and Division 1 Specification Sections.

B. Product data consisting of manufacturer's product specifications and installation instructions for each product, including data showing compliance with the requirements.

C. Samples for initial selection purposes in form of actual units or sections of units at least 12 inches square showing full range of colors, textures, and patterns available for each type of finish indicated.

1. Where finish involves normal color and texture variations, include sample sets composed of two or more units showing full range of variations expected.

2. Include similar samples of material for joints and accessories involving color selection.

D. Field-Constructed Mock-Up: Prior to installation of plaster work, fabricate panels for each type of finish and application required to verify selections made under sample submittals and to demonstrate aesthetic effects of application as well as qualities of materials and erection. Build mock-ups to comply with the following requirements, using materials indicated for final unit of Work.

1. Locate mock-ups on site in location and size indicated or, if not indicated, directed by Architect.

2. Erect 4-foot-by-4-foot-by-full-thickness mock-up in presence of Architect using materials, including lath and support system, indicated for final work.

3. Demonstrate the proposed range of aesthetic effects including color, texture, and workmanship to be expected in completed work.

4. Obtain Architect's acceptance of mock-ups before start of plaster work.

5. Retain and maintain mock-ups during construction in undisturbed condition as a standard for judging completed plaster work.

    a. When directed, demolish and remove mock-ups from Project site.

E. Material Certificates: Submit producer's certificate for each kind of plaster aggregate indicated evidencing that materials comply with requirements.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials in original packages, containers, or bundles bearing brand name and identification of manufacturer.

B. Store materials inside, under cover, and in manner to keep them dry, protected from weather, direct sunlight, surface contamination, aging, corrosion, and damage from construction traffic and other causes. Neatly stack gypsum lath flat to prevent deformation.

C. Handle gypsum lath to prevent damage to edges, ends, or surfaces. Protect metal corner beads and trim from being bent or damaged.

1.5 PROJECT CONDITIONS

A. Protect contiguous work from soiling, spattering, moisture deterioration and other harmful effects that might result from plastering.

PART 2 PRODUCTS

2.1 **EXTERIOR GYPSUM SHEATHING**

A. **Gypsum Sheathing: Minimum 5/8-inch Dens-Glass Gold Exterior Sheathing Board manufactured by Georgia Pacific, containing a silicone treated water-resistant core and with embedded glass both sides, complying with CBC Section 2511, table 25-G and ASTM C 1177.**

2.2 WEATHER BARRIERS

A. Weather Resistive Barrier: Refer to Section 07 2500. One (1) layer Dupont Tyvek CommercialWrap or equal. Provide seam tape per manufacturer recommendation.

B. Flashing Membrane for Openings: Du Pont FlexWrap self-adhere flashing membrane or equal.

C. Water Repellant Backing for Horizontal Surfaces: W.R. Grace & Co., "Bituthene 4000" sheet, 0.060 inch thick, consisting of polyethylene sheet and rubberized asphalt, self-adhering.

2.3 BOARD INSULATION

A. Coninuous Rigid Board Insulation: Refer to Section 07 2115.

2.4 LATH AND LATH ACCESSORIES

A. Metal Lath: Self furred grooved expanded metal flat diamond mesh; weighing 3.4 pounds per square yard; continuous horizontal grooves 1/4 inch deep at 6-3/16 inches on center; galvanized finish as manufactured by ClarkDietrich Building Systems, Cemco, Amico or accepted equal.

    1. Tie and String Wire: 18 gage for metal framing; galvanized.

    2. Lath Attachment Devices: Devices of material and type required by referenced standards and recommended by lath manufacturer for secure attachment of lath to framing members and of lath to lath and ensuring a ¼" gap between lath and building paper.

3. Acceptable Alternative Metal Lath: Structa Mega Lath as manufactured by Structa Wire Corporation with the following characteristics:

    a. Weight: 1.95 pounds per square yard.

    b. No. 17 gauge x No. 16 gauge galvanized cold-rolled steel wire welded to form 0.7 inch x 1.5 inch openings.

    c. Six secondary cold-rolled flat longitudinal wires spaced nominally every 5-3/8 inches to form a twin track.

    d. Furring:

        1) Width of Furring Leg: 1/4 inch.

        2) Furring Height: 1/4 inch to underside of cross wire.

        3) Furring Spacing: 2-1/8 inch on center.

        4) Every cross wire is furred.

4. Metal Lath corner reinforcement at exterior corners: Self furring expanded metal flat diamond mesh; weighing 3.4 pounds per square yard; galvanized finish as manufactured by ClarkDietrich Building Systems, Cemco, Amico or accepted equal.

5. Expanded Corner Bead: Formed steel, minimum 26 gauge thick, shaped to permit complete embedding in plaster; galvanized finish; No. 1A as manufactured by ClarkDietrich Building Systems, Cemco, Amico or accepted equal.

6. Casing Beads: Formed steel, minimum 26 gauge thick; of longest possible length; sized and profiled to suit application; galvanized finish; No. 66 casing bead (with expanded flange at CMU/concrete only) as manufactured by ClarkDietrich Building Systems, Cemco, Amico or accepted equal.

7. Weep Screeds: Formed steel, minimum 26 gauge thick; square flange, 3-1/2 inch high leg, of longest possible length; sized and profiled to suit application; galvanized finish; No. 7 foundation sill screed as manufactured by ClarkDietrich Building Systems, Cemco, Amico or accepted equal.

8. Control Joints: Formed steel; minimum 26 gauge accordion profile, expanded metal flanges each side; of longest possible length; sized and profiled to suit application; galvanized finish; No. XJ 15-3, as manufactured by ClarkDietrich Building Systems, Cemco, Amico or accepted equal.

9. Expansion Joints: Formed steel, minimum 26 gauge thick; of longest possible length; sized and profiled to suit application; galvanized finish; No. 40 adjustable expansion joint as manufactured by ClarkDietrich Building Systems, Cemco, Amico or accepted equal.

10. Reveal Expansion Joint: Extruded aluminum with rubber gasket and built-in weep; Part No. EXPW 75-75 manufactured by Flannery, Inc., San Fernando, CA 91340; phone: 818.837.7585; fax: 818.837.1155; URL: <http://www.flannerytrim.com/> , or accepted equal.

11. Strip Mesh at horizontal surfaces and corners of openings: Expanded metal flat diamond; weighing 3.4 pounds per square yard; galvanized finish; 4 inches wide as manufactured by ClarkDietrich Building Systems, Cemco, Amico or accepted equal.

12. Soffit Vent: 26 gauge, ASTM: A653 LFQ galvanized finish, perforated with 1/8 inch Vent Holes, Series SVR Soffit Vent/Reveal Screed as manufactured by Stockton Products, Amico or accepted equal.

13. Soffit Drip Mold: No. 5 stucco stop, galvanized finish, as manufactured by ClarkDietrich Building Systems, Cemco, Amico or accepted equal.

14. Channel Screeds: Extruded aluminum alloy 6063 T5, clear anodized finish, Model No. PCS-100-75 as manufactured by Fry Reglet or accepted equal. Top leg of horizontal screed shall have 3/16 inch diameter weep holes spaced at 6 inches on center. Provide factory fabricated intersections, corners and end caps compatible with the channel screed specified.

15. Substitutions: Under provisions of Division 01.

2.5 LATH ANCHORAGES

A. Anchorages at metal framing: Install galvanized # 8 wafer head screws at 6 inches on center vertically at each stud x length as required for embedment into framing members.

1. ASTM C954, self-drilling and self tapping screws for heavy gauge steel framing (0.033 inch to 0.112 inch thick).

2. ASTM C1002, self drilling and self tapping screws for light gauge steel framing (less than 0.033 inch thick).

2.6 PORTLAND CEMENT PLASTER MATERIALS

A. Portland cement, ASTM C 150, Type I or II.

B. Factory-Prepared Finish Coat: Factory prepared **integrally colored finish coat**, Portland Cement base as manufactured by La Habra or equal. Custom color selection by Architect.

C. Application of color selections: on any one wall surface the contractor shall anticipate the application of two colors separated by a plaster accessory.

D. Lime: Special hydrated lime for finishing purposes, ASTM C 206, Type S, or special hydrated lime for masonry purposes, ASTM C 207, Type S.

E. Aggregate: ASTM C 897.

2.7 MISCELLANEOUS MATERIALS

A. Fiber for Base Coat: Alkaline-resistant glass or polypropylene fibers, 1/2 inch (13 mm) long, free of contaminants, manufactured for use in cement plaster.

B. Water for Mixing and Finishing Plaster: Drinkable and free of substances capable of affecting plaster set or of damaging plaster, lath, or accessories.

C. Bonding Agent for Portland Cement Plaster: ASTM C 932.

D. Acoustical Sealant: ASTM C 919, nonoxidizing, skinning paintable types for exposed applications; nondrying, nonhardening, nonstaining, nonbleeding, gunnable-type sealant complying with requirement specified in Division 7 Section "Joint Sealers" for concealed applications.

2.8 PORTLAND CEMENT PLASTER MIXES AND COMPOSITIONS

A. General: Comply with ASTM C 926 for portland cement plaster base and finish coat mixes as applicable to plaster bases, materials, and other requirements indicated.

1. Fiber Content: Add fiber to base-coat mixes after ingredients have mixed at least two minutes. Comply with fiber manufacturer's written instructions for fiber quantities in mixes, but do not exceed 1 lb of fiber/cu. yd. (0.6 kg of fiber/cu. m) of cementitious materials.

B. Portland Cement Plaster Base Coat Mixes and Compositions: Proportion materials for respective base coats in parts by volume for cementitious materials and in parts by volume per sum of cementitious materials for aggregates to comply with the following requirements for each method of application and plaster base indicated. Adjust mix proportions below within limits specified to attain workability.

1. Base-Coat Mixes for Use over Metal Lath: Scratch and brown coats for three-coat plasterwork as follows:

    a. Scratch Coat: 1 part portland cement, 0 to 3/4 parts lime, 2-1/2 to 4 parts sand.

    b. Brown Coat: 1 part portland cement, 0 to 3/4 parts lime, 3 to 5 parts sand.

C. Factory-Prepared Portland Cement Finish Coats: Add water only; comply with finish coat manufacturer's directions.

2.9 MIXING

A. Mechanically mix cementitious and aggregate materials for plasters to comply with applicable referenced application standard and with recommendations of plaster manufacturer.

PART 3 EXECUTION

3.1 INSTALLATION OF LATHING AND FURRING, GENERAL

A. Portland Cement Plaster Lathing and Furring Installation Standard: Install lathing and furring materials indicated for portland cement plaster to comply with ASTM C 1063.

3.2 GYPSUM SHEATHING INSTALLATION

A. Install gypsum sheathing in accordance with GA-253 and manufacturer’s instructions.

B. End joints, if required should be offset; joints should fit snugly and flashing installed around all openings.

C. Install maximum lengths possible to minimize number of joints. Edge joints must be located parallel to and with vertical orientation on framing. End joints of adjacent lengths of sheathing must be staggered.

D. Attach gypsum sheathing to frame with screws. Drive fasteners so as to bear tight against and flush with surface of sheathing. Do not countersink fasteners. Fasteners must be located at least 3/8 inches from edges and ends of sheathing panels. Fasteners shall be long enough to penetrate through metal framing no less than 1/4-iinch.

E. Do not leave exposed surfaces of gypsum sheathing unprotected beyond the manufacturer’s recommendation without a weather barrier cladding.

3.3 WEATHER BARRIERS:

A. Exterior cement plaster (Metal Lath): Prior to installation of metal lath,install board insulation. Install and tape board insulation per manufacturer recommendations.

B. Provide weather resistive barrier over gypsum sheathing. Install per manufacturer recommendations.

C. Provide self-adhere flashing membrane around windows, doors and penetration openings. Install per manufacturer recommendations.

D. Install single ply self-adhesive waterproofing membrane per manufacturer‘s recommendations in horizontal surfaces, and where indicated on the Drawings.

3.4 LATH AND ACCESSORIES INSTALLATION

A. Install metal plaster bases and accessories in conformance with ASTM C1063. All vertically placed accessories shall be installed continuously; breaks shall occur only at horizontally placed accessories where they intersect vertically placed accessories.

B. Lath shall be installed as specified in Section 2510 and Table 2507.2 of the CBC for wire fabric lath. The lath shall be installed with the cross wires parallel to the framing and shall be attached with fasteners at the furring crimps.

C. Attach metal lath to framing members at maximum 6 inches on center.

D. Lath shall stand off substrate immediately behind the lath a minimum of 1/4 inch.

E. Continuously reinforce internal angles with additional layer of lath, 6 inches wide minimum, except where the metal lath returns 3 inches from corner to form the angle reinforcement. Fasten at perimeter edges only.

F. Place corner bead with mesh at corners. Attach with fasteners as recommended by manufacturer, spaced not more than 18 inches on center. Fasten at outer edges only.

G. Place minimum 4 inch wide strip mesh diagonally at corners of lathed openings. Secure rigidly in place. Extend minimum 8 inches diagonally each direction from point of corner.

H. Place casing beads at terminations of plaster finish. Butt and align ends. Secure rigidly in place.

I. Install accessories to lines and levels.

3.5 CONTROL JOINTS

A. At stud framing, locate exterior control joints not more than every 10 feet in each direction. Install on top of metal lath and attach by wiring to metal lath.

3.6 EXPANSION JOINTS

A. At stud framing, locate exterior expansion joints at building expansion joints. Cut the metal lath and install the metal lath over the flanges of the expansion joint. Fasten only one flange of the expansion joint to the framing; allow the other flange to float.

3.7 PORTLAND CEMENT PLASTER APPLICATION

A. Apply plaster in accordance with CBC Section 2510 and ASTM C926.

B. Apply scratch coat to a nominal thickness of 3/8 inch over metal reinforcement. Cover metal reinforcement.

1. After application, lightly score scratch coat horizontally.

2. If brown coat cannot be applied within four hours, keep scratch coat moist for a minimum of 48 hours before applying brown coat.

3. Apply brown coat to a nominal thickness of 3/8 inch over scratch coat. Rod brown coat straight and true in all directions.

4. Moist cure brown coat for a minimum of seven days before applying finish coat.

C. Finish Coat:

1. At exterior corners, the finish coat shall be applied so that the nose wire is covered with a minimum of 1/8 inch of plaster.

2. Light Dash finish: Machine-apply finish-coat in 2 coats evenly and uniformly to produce finish matching Architect's sample.

3. Smooth finish: Steel trowel finish coat in 2 coats evenly and uniformly to produce finish matching Architect's sample.

a. Location: Wall surfaces adjacent to handrails.

3.8 CUTTING AND PATCHING

A. Cut, patch, point up, and repair plaster as necessary to accommodate other work and to restore cracks, dents, and imperfections. Repair or replace work to eliminate blisters, buckles, excessive crazing and check cracking, dry outs, efflorescence, sweat outs, and similar defects and where bond to the substrate has failed.

B. Sand smooth-troweled finishes lightly to remove trowel marks and arises.

3.9 CLEANING AND PROTECTION

A. Remove temporary protection and enclosure of other work. Promptly remove plaster from door frames, windows, and other surfaces that are not to be plastered. Repair floors, walls, and other surfaces that have been stained, marred, or otherwise damaged during the plastering work. When plastering work is completed, remove unused materials, containers, and equipment and clean floors of plaster debris.

B. Provide final protection and maintain conditions, in a manner suitable to Installer that ensure plaster work's being without damage or deterioration at time of Substantial Completion.

END OF SECTION

SECTION 09 3000
TILING

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Porcelain Tiles.

B. Ceramic Tiles.

C. Stone Thresholds.

D. Grout and Mortar.

1.2 RELATED REQUIREMENTS

A. Section 07 9200 - Joint Sealers.

B. Section 09 2116 - Gypsum Board Assemblies.

C. Section 09 2400 - Portland Cement Plastering.

D. Section 10 2800 - Toilet Accessories

1.3 REFERENCES

A. American National Standards Institute:

1. ANSI A108.1 - Glazed Wall Tile, Ceramic Mosaic Tile, Quarry Tile and Paver Tile Installed with Portland Cement Mortar.

2. ANSI A108.3 - Quarry and Paver Tile Installed with Portland Cement Mortar.

3. ANSI A108.10 - Installation of Grout in Tilework.

4. ANSI A118.1 - Dry-Set Portland Cement Mortar.

5. ANSI A118.3 - Chemical Resistant, Water Cleanable, Tile Setting and Grouting Epoxy and Water Cleanable Tile-Setting Epoxy Adhesive.

6. ANSI A118.6 - Ceramic Tile Grouts.

7. ANSI A137.1 - Ceramic Tile.

B. ASTM International:

1. ASTM C150 - Standard Specification for Portland Cement.

2. ASTM C1028 - Static Coefficient of Friction of Ceramic Tile and Other Like Surfaces by the Horizontal Dynometer Pull Meter Method.

C. TCNA - Tile Council of North America:

D. TCNA - Handbook for Ceramic Tile Installation.

1.4 PERFORMANCE REQUIREMENTS

A. Ceramic Tile Flooring surfaces shall be stable, firm, and slip resistant and shall comply with Section 11B-302.

B. Dynamic coefficient of friction (DCOF): For tile installed on floor surfaces, provide products with the following values as determined by testing identical products per DCOF AcuTest, ASTM A137.1

1. Minimum 0.42 (wet)

C. Static coefficient of friction (SCOF): For tile installed on floor surfaces, provide products with the following values as determined by testing identical products per ASTM C1028.

1. Minimum 0.60 (wet)

1.5 SUBMITTALS

A. Shop Drawings: Submit drawings indicating tile layout, color arrangement, perimeter conditions, junctions with dissimilar materials, control and expansion joints, and setting details for each room or area to receive tile.

B. Product Data: Submit manufacturer's data describing products. Submit instructions for application of grouts and adhesives.

C. Samples: Submit full size sample tiles for each color and type of tile, showing color range, size and texture.

D. Manufacturer's Certificate: Certify products meet or exceed specified requirements.

1.6 QUALITY CONTROL

A. Perform Work in accordance with TCNA Handbook and ANSI A108 Series/A118 Series.

B. Manufacturer: Company specializing in manufacturing products specified in this section with minimum ten years documented experience.

C. Installer: Company specializing in performing Work of this section with minimum five years documented experience.

1.7 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.

1.8 EXTRA MATERIALS

A. Supply quantity of full-size units equal to minimum of 3 percent of amount installed, for each type, composition, color, pattern, and size.

B. Provide in original unbroken containers plainly marked with type and quantity of contents, and area of installation.

1.9 WARRANTY

A. Manufacturer: Provide manufacturer's lifetime warranty for epoxy mortar and grout setting system.

PART 2 - PRODUCTS

2.1 MANUFACTURER

A. Tile Manufacturers:

1. Dal-Tile Corp.

2. Or Equal.

B. Setting Materials:

1. Laticrete

2. Custom Building Products

3. Or Equal

2.2 MATERIALS, GENERAL

A. General: Provide tile that complies with ANSI A137.1 for types, compositions and other characteristics indicated. Provide tile in the locations and of the types, colors, and pattern indicated on the Drawings. Tile shall also be provided in accordance with the following:

1. Factory Blending: For tile exhibiting color variations within the ranges selected, blend tile in the factory and package so tile taken from one package shows the same range of colors as those taken from other packages.

2. Factory Applied Temporary Protective Coatings: Protect exposed surfaces of tile against adherence of mortar and grout by precoating with a continuous film of petroleum paraffin wax applied hot. Do not coat unexposed tile surfaces.

2.3 TILE MATERIALS

A. Unpolished Porcelain Floor Tile:

1. Basis of Design Product: DalTile Corp., **Colorbody Porcelain; Uniform Concrete Series, unpolished.**

2. Composition: Through-color porcelain.

3. Module: 12 by 24 inch nominal.

4. Thickness: 7/16 inch nominal.

5. Face: plain with square edge.

6. Base: Matching cove base (**6 inch high by 12 inch wide**) and corner shapes in sizes and color coordinated with field and accent tiles.

7. Tile Colors: **TL-3: Dark Gray, UC15.**

8. Grout Color: Refer to Section 09 9900 - Colors

9. Locations:

a. Restrooms

b. Alcove at drinking fountain.

B. Glazed Ceramic Wall Tile:

1. Basis of Design Product: DalTile Corp., **Classic, Color Wheel Collection; semi-gloss.**

2. Module: 3 by 6 inch nominal.

3. Thickness: 5/16 inch nominal.

4. Face: plain with cushion edges.

5. Tile Colors - Refer to drawings for tile patterns:

a. **T-1 (Accent): Sunflower DH50**

b. **T-2 (Field): White 0100**

6. Grout Color: Refer to Section 09 9900 - Colors.

7. Trim Units: Coordinated with sizes and coursing of adjoining flat tile where applicable and matching characteristics of adjoining flat tile. Provide shapes as follows, selected from manufacturer's standard shapes:

a. Wainscot Cap: **Quarter Round, module size 1”x6” to match field color.**

b. External Corners for Thin-Set Mortar Installations: Surface bullnose, same size as adjoining flat tile.

c. Internal Corners: Field-butted square corners. For cap use angle pieces designed to fit with stretcher shapes.

d. External Corners for Portland Cement Mortar Installations: Bullnose shape with a radius of at least 3/4 inches, unless otherwise noted.

e. Internal Corners: Field-Butted square corners, except for coved base and cap angle pieces designed to member with stretcher shapes.

8. Locations:

a. Restrooms

b. Alcove at drinking fountain.

2.4 SETTING MATERIALS

A. Latex Portland Cement Mortar: Prepackaged, one-part, high performance, latex polymer modified dry-set, thin-set mortar. Meets or exceeds ANSI A118.4.

1. Products:

a. Custom Building Products MegaFlex Fortified Thin-Set Mortar.

b. Laticrete 254 Platinum Multipurpose Thin-Set Mortar.

c. Mapei Ultraflex 3.

d. Or Equal.

B. Latex Modified Crack Isolation Mortar: Prepackaged, one-part, high performance, lightweight latex polymer modified dry-set, thin-set mortar. Meets or exceeds ANSI A118.4.

1. Products:

a. Custom Building Products MegaLite Crack Prevention Mortar.

b. Laticrete 255 MultiMax.

c. Mapei Ultralite Mortar.

d. Or Equal.

C. Mortar Bed:

1. Materials:

a. Cement: Portland cement, ASTM C150 Type I.

b. Aggregate: ASTM C144, clean, graded, and passes a 16-mesh screen.

c. Hydrated Lime: ASTM C206, Type S or ASTM C207, Type S.

d. Water: Clean and potable.

2. Mortar Mix: Comply with ANSI A108.1A Section A-4.1a.2.

3. Mortar Bed Reinforcing Mesh: ASTM A82 and ASTM A185; galvanized welded wire fabric; 16 gauge wire; 2 inch by 2 inch mesh.

2.5 GROUTING MATERIALS

A. Epoxy Grout: 100 percent solids epoxy grout; stainless, non-sagging, water cleanable; conforming to ANSI A118.3.

1. Products:

a. Laticrete Spectralock Pro Premium.

b. Custom Building Products CEGLite Commercial Epoxy Grout.

c. Mapei Kerapoxy IEG.

d. Or Equal.

2.6 SEALANTS

A. Latex siliconized sealant, non-sanded, in conformance with ASTM C920, Type S, Grade NS, Class 25, Uses NT, M and G. Color to match grout color.

1. Products:

a. Custom Building Products PolyBlend Ceramic Tile Caulk.

b. Laticrete Premium Tub and Tile Caulk.

c. Mapei Keracaulk.

d. Color Caulk, Inc. Latex Siliconized Sealant.

e. Or Equal.

2.7 MEMBRANES

A. Crack Isolation Membrane: Trowel applied or self-adhering sheet membrane; load bearing; bonded; conforming to ANSI A118.12.

1. Products:

a. Custom Building Products Fracture Free.

b. Laticrete Blue 92.

c. Mapei Mapelastic 2, Crack Isolation Membrane, flexible thin, 40-mil lightweight, load-bearing, fabric-reinforced “peel-and-stick” crack-isolation membrane.

d. Or Equal.

B. Interior Waterproof Membrane: Trowel applied, liquid, load bearing; bonded; conforming to ANSI A118.10.

1. Products:

a. Custom Building Products Custom 9240 Waterproofing and Crack Prevention Membrane. Self-curing liquid elastomeric membrane with reinforcing fabric.

b. Laticrete 9235 Waterproofing Membrane with Microban. Self-curing liquid elastomeric membrane with reinforcing fabric forming a flexible, seamless waterproof membrane bonded to the substrate. Contains an antimicrobial protection to inhibit growth of mold and mildew.

c. Mapei Mapelastic 400, premixed, flexible, thin, ultra fast-drying waterproofing membrane.

d. Or Equal.

C. Exterior Waterproof Membrane: Liquid-applied elastomeric waterproofing material that cures to form a monolithic membrane; conforming to ANSI A118.10.

1. Products:

a. Custom Building Products RedGard Waterproofing and Crack Prevention Membrane.

b. Laticrete Hydro Ban.

c. Mapei Mapelastic HPG.

d. Or Equal.

2.8 THRESHOLDS

A. General: Fabricate to sizes and profiles indicated or required to provide transition between adjacent floor finishes.

B. Granite Thresholds: ASTM C 615, with polished finish.

1. Description: Uniform, in profile shown on drawing, one inch thick minimum by width of door or opening, color to be selected by Architect from manufacture in standard colors.

2.9 ACCESSORIES

A. Expansion Joints: Dilex-EZ 6+9 manufactured by Schlüter-Systems L.P., or equal.

B. Movement Joint Strips

1. Strips shall have profile with integrated rigid, recycled PVC, trapezoid-perforated anchoring legs, connected by a 3/16 inch (5 mm) wide soft CPE movement zone that forms the visible surface.

a. Model: Schluter®-DILEX-BWS by Schluter System or equal.

b. Color: To be selected by Architect from manufacturer's standard.

c. Height: As required.

C. Neutralizers, Primers and Sealers: As recommended by adhesive manufacturer.

2.10 Cleaning, Finishing and Sealing materials: As recommended by tile manufacturer.

A. Grout Sealer: Heavy-duty, Zero VOC, oil and water stain resistant sealer, Protectosil Aqua-Trete SG, by Degussa Corporation, (800) 828-0919, www.protectosil.com.

B. Floor Tile Sealer: Custom Building Products; Product: Aqua Mix - Sealer's Choice™ Gold.

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine job site conditions and verify field dimensions. Verify substrate is plumb, level, true to line and square.

B. Substrate surface conditions shall conform to the requirements of ANSI A108 for the type of substrate specified and for workmanship.

C. Maximum surface variation of substrate shall not exceed maximum limits as specified in specific TCA Methods or as follows, whichever is more stringent.

Types	Walls	Floors
Latex Portland Cement Mortar	1/8 inch in 8 feet	1/8 inch in 10 feet

Epoxy	1/8 inch in 8 feet	1/8 inch in 10 feet
Mortar Bed	1/4 inch in 10 feet	1/4 inch in 10 feet

D. Tile work shall not be started until roughing in for mechanical and electrical work has been completed and tested, and built-in items requiring waterproofing membrane has been installed and tested.

E. Begin installation only when unacceptable conditions have been corrected.

3.2 PREPARATION

A. Fill cracks, holes, and depressions in concrete substrates for tile floors installed with adhesives or thin-set mortar with trowelable leveling and patching compound specifically recommended by tile setting material manufacturer.

B. For tile exhibiting color variations, verify that tile has been factory blended and packaged so tile units taken from one package shown same range of colors as those taken from other packages. If not factory blended, either return to manufacturer or blend tiles at Project site before installing.

C. Protection:

1. Comply with closing of spaces to traffic and protection requirements of ANSI A108.1, Article 1.5, Sub-articles A-1.5.1, A-1.5.2 and A-1.5.2.1.

2. Protect adjacent work, surfaces and equipment from effects of tile installation procedures.

D. Tile Layout:

1. General: Comply with ANSI A108.1, Article A-3.3, unless otherwise specified herein.

2. Center fields and patterns on areas so that no tile is less than half size.

3. For heights stated in feet and inches, maintain full courses to nearest attainable height without cutting tile.

4. Locate precisely expansion joints and accessories before tile is installed.

E. Prepare substrate surfaces for mortar installation.

3.3 INSTALLATION

A. General:

1. Install in accordance with TCA Handbook for Ceramic Tile Installation and ANSI A108.

2. Install tiles as per accepted shop drawings. Do not interrupt tile pattern through openings.

3. In areas requiring floor and wall tiles, floor tile installation shall not begin until after wall tiles have been installed.

4. Allow waterproofing membrane to cure before flood testing.

5. Cut and fit tile tight to penetrations through tile. Form corners and bases neatly. Align floor, base and wall joints.

6. Place tile joints uniform in width, subject to variance in tolerance allowed in tile size. Make joints watertight, without voids, cracks, excess mortar or excess grout.

7. Provide grout joint spacing in accordance with tile manufacturer's recommendations.

8. Install movement joints as specified in this Section.

9. Sound tile after setting. Replace hollow sounding units.

10. Allow tile to set prior to grouting: Minimum of 48 hours for thin-set methods and 78 hours for mortar bed methods.

B. **Installation Methods – Interior Walls:**

Method	Substrate/Application	Setting Material
TCNA Method W244C, ANSI A108.5, A108.6, and A108.11.	Metal/Wood Studs; Cementitious backer board; thin set application; epoxy grout.	Latex Portland cement mortar.

C. **Installation Methods – Exterior Walls:**

Method	Substrate/Application	Setting Material
TCNA Method W244E, ANSI A108.5, and A108.6	Weather barrier; cementitious backer board, thin set application; epoxy grout.	Latex Portland cement mortar.

D. **Installation Methods – Interior Floors:**

Method	Substrate/Application	Setting Material
TCNA Method F114; ANSI A108.1B.	Concrete slab-on-grade; cement mortar bed (thickset) with cleavage membrane; epoxy grout	Latex Portland cement mortar.

E. **Installation Methods – Exterior Floors:**

Method	Substrate/Application	Setting Material
TCNA Method F101; ANSI A118.3, A118.4, and A118.6.	Concrete slab-on-grade; waterproof membrane; Cement mortar bed (thickset); epoxy grout	Latex Portland cement mortar.

3.4 JOINTS

A. Joint Widths at Floors: Install tile on floors in the joint width recommended by the tile manufacturer.

B. Joint Widths at Walls: Install tile on walls in the joint width recommended by the tile manufacturer.

C. Expansion Joints:

1. Provide expansion joints at locations in the following locations as a minimum requirement:

a. At control joints and expansion joints in substrate material,

b. Where substrate material changes to separate different materials,

c. Over construction joints,

d. Where tile abuts restraining surfaces, such as perimeter walls, curbs, and columns and at intervals of 24 to 36 feet each way in large interior floor areas and 12 to 16 feet in large exterior areas exposed to direct sunlight or moisture.

e. Expansion joints shall extend through setting-beds and fill.

3.5 INSTALLATION - GROUT

A. Epoxy Grout: Install in accordance with manufacturer's printed instructions and ANSI A108.6.

1. Before grouting, ensure all tiles are firmly in place. Clean tile surfaces; remove paper and glue from face of mounted tiles. Remove spacers, strings, ropes, and pegs.

2. Clean open tile joints. Remove excess setting materials present in the open grout joints.

3. Mix grout in accordance with manufacturer's instructions.

4. Apply grout firmly into open joints using a hard rubber float.

5. Remove all excess epoxy grout from the tile surface with a rubber squeegee or rubber trowel before it loses plasticity and begins to set.

6. Immediately perform final clean up in accordance with manufacturer's instructions.

3.6 CLEANING AND PROTECTING

A. Clean as recommended by manufacturer. Do not use materials or methods which may damage finish surface or surrounding construction.

B. Protect installed tile finish surfaces from damage during construction. Provide protective covering as required to ensure installed tile finish will not be damaged by work of other trades.

END OF SECTION

SECTION 09 5113
ACOUSTICAL PANEL CEILINGS

PART 1 - GENERAL

1.1 SECTION INCLUDES:

A. Acoustical Tile Ceiling including metal suspension system.

B. Acoustical Units (ACT)

1.2 RELATED REQUIREMENTS:

A. Section 09 2900 - Gypsum Board.

B. Division 23 - HVAC.

C. Division 26 - Electrical.

1.3 REFERENCE STANDARDS

A. ASTM C635 - Standard Specification for the Manufacture, Performance, and Testing of Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings.

B. ASTM C636 - Standard Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels.

C. ASTM E84 - Standard Method for Surface Burning Characteristics of Building Materials.

D. ASTM E580 - Standard Practice for Application of Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels in Areas Subject to Earthquake Ground Motions.

E. 2015 International Building Code - Section 1613, 1704, 1705, & 1706.

F. 2013 California Building Code, chapters 8, 16, 16A and 25.

G. ASCE/SEI American Society of Civil Engineers 7-10: Minimum Design Loads for Buildings and Other Structures.

H. CISCA Ceilings & Interior Systems Construction Association.

1. Ceiling Systems Handbook

2. Seismic Construction Handbook

I. International Code Council ICC-ES Evaluation Report ESR-1222 issued December 2016.

1.4 SUBMITTALS

A. Product Data: Provide data on suspension system components and ceiling tiles.

B. Shop Drawings: Indicate grid layout and related dimensioning.

C. Maintenance Materials: Furnish ten extra ceiling tiles for Owner's use in maintenance projects.

D. Product Test Reports: Provide test reports for each acoustical ceiling panel, performed by NVLAP certified testing agency.

E. Evaluation Reports: For each ceiling suspension system, submit ICC-ES 1222 report showing compliance.

1.5 QUALITY ASSURANCE

A. Ceiling systems shall consist of lay-in acoustical ceiling panels by a single manufacturer and suspension systems by a single manufacturer for the entire project.

B. Qualifications of Installer: Minimum five years of experience in installing acoustical ceiling systems of the types specified.

1.6 DELIVERY, STORAGE AND HANDLING

A. Deliver materials to the Project site in original sealed packages.

B. Storage: Store materials in building area where they will be installed, in original package. Keep clean and free from damage due to water or deteriorating elements.

C. Handle in a manner to prevent damage during storage and installation.

1.7 PROJECT CONDITIONS

A. Installation of acoustical ceiling system shall not begin until the building is enclosed, permanent heating and cooling is in operation, and residual moisture from concrete work has dissipated. Building areas to receive ceilings shall be free of construction dust and debris.

B. Environmental Requirements: Maintain temperature in space at 55 degrees F or above for 24 hours before, during, and after installation of materials.

C. Scheduling:

1. Before concealing Work of other sections, verify required tests and inspections have been completed.

2. Coordinate with related Work of other sections. Coordinate location and symmetrical placement of air distribution devices, electrical devices, and penetrations with related Work section.

1.8 WARRANTY

A. Manufacturer shall provide a 10 year material warranty.

B. Installer shall provide a two year installation warranty.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Armstrong World Industries. Basis of Design

B. USG Corporation.

C. CertainTeed Ceilings Corp.

2.2 SEISMIC PERFORMANCE REQUIREMENTS

A. Seismic Performance: Suspended grids and ceiling panels shall be installed in accordance to ASTM C636, ASTM E580 (including approved alternate methods).

B. Ceiling design shall comply with ASCE/SEI American Society of Civil Engineers 7-10: Minimum Design Loads for Buildings and Other Structures

2.3 METAL SUSPENSION SYSTEM FOR ACOUSTICAL CEILING PANEL

A. Narrow Face, Capped, Double Web, Cold Rolled Steel Suspension System: Main and Cross Tees as defined by ASTM C635, commercial quality pretreated and painted hot-dipped galvanized cold-rolled steel, exposed surfaces prefinished in manufacturer's standard corrosion resistant enamel paint finish:

1. Basis of Design: Subject to compliance with project requirements, the design is based on the following: USG Interiors, LLC, “USG DONN® Brand DX/DXL™ 15/16" Acoustical Suspension System”.
2. Structural Classification: heavy duty.
3. Tee Profile: Narrow Face 15/16” (22 mm) wide.
4. Tee Height: 1 1/2” (38 mm).
5. Grid Module: 2’ X 4’.
6. Fire Rating: Class A.
7. Color: standard flat white 050
8. Seismic Criteria:
    a. Reference Seismic standards per ASTM E580 and CISCA guidelines.
    b. Seismic Design Category as defined by the IBC (International Building Code): D-F.

B. Accessories.

1. Wall molding: Inside Corner: Field-mitered joints at wall molding. Prefabricated corner cap; formed to 90° angle; hemmed edge; size and finish to match wall molding. Outside Corner: Prefabricated corner cap; formed to 90° angle; hemmed edge; size and finish to match wall molding.
    a. Angle shape; 2 in. mounting flange by 1 in. vertical flange; hemmed edges; exposed surface pre-finished to match suspension system components. Available Product: M20SM.
2. Shadow Molding: Formed steel section; exposed surfaces prefinished to match suspension system components.
    a. 9/16” thick exposed flange; 3/8” x 3/8” reveal; 7/8” vertical flange; Available Product: MS174.
    b. 1 1/4” exposed flange; 9/32” x 3/4” reveal; 7/8” vertical flange; Available Product: MS274.
3. Seismic Attachment Clip: Used to attach tees ends to perimeter angle for seismic design C D E F categories.
    a. Available products: ACM7.
4. Molding Attachment Clip: 2 in. thick x 1/2 in. thick x 1-5/8 in.; for Fineline Suspension System. Used to attach cross tees and main tees to walls/ wall molding.
    a. Molding Attachment Clip: 9/16 in. thick for SQ panels or FL panels, Available products: MAC2
5. Stabilizer bars:
    a. Panels with a length equal to or greater than 60” shall require stabilizer bars at the midpoint to secure suspension grid to the ceiling panel. Reference USG ceiling literature for more information.
6. Seismic Separation joint accessories: Tee sleeves to accommodate movement: Snap fit sleeve, prefinished to match suspension system components.
    a. For 15/16” DX/DXL Suspension System; Available products: TFS-1.

7. Four way Seismic Separation joint clip: Connects 4 way intersection: Snap fit sleeve with optional screw/fixing holes.

    a. Available products: DH4.

8. Compression Posts for bracing of ceiling applications:

    a. Available products: Adjustable 18" to 30" [VSA 18/30], Adjustable 30" to 48" [VSA 30/48], Adjustable 48" to 84" [VSA 48/84], Adjustable 84" to 102" [VSA 84/102], Adjustable 102" to 120" [VSA 102/120], Adjustable 120" to 144" [VSA 102/144].

C. Suspension System Attachment devices.

1. Hanger Wire: Galvanized carbon steel; soft temper; pre-stretched; yield stress load at least three times the design load but not less than 12-gauge.

    a. Spacing and gauge per IBC, UL and CISCA design.

    b. Supplied and installed by ceilings subcontractor.

2.4 ACOUSTICAL CEILING PANELS

A. Acoustical ceiling panels shall be class A in accordance to ASTM E1264.

B. Acoustical panels shall meet the following surface-burning characteristics when tested in accordance to ASTM E84 for Class A materials:

1. Maximum Flame Spread: 25.

2. Maximum Smoke Developed: 50.

C. Mold and Mildew Resistance: Panels and faces shall be treated with a biocide paint additive or an antimicrobial solution to inhibit mold and mildew.

D. Acoustical Panels - 24 inch by 48 inch

1. Panel Name: USG Item #562, Fissured pattern ceiling tile.

2. Panel Size: 2-foot by 4-foot.

3. Panel Thickness: 5/8 inch.

4. Edge Detail: Square Lay-in.

5. Light Reflectance: 0.90, complying with ASTM E1477.

6. CAC: 35, UL Classified, complying with ASTM E1414.

7. NRC: Minimum 0.75, UL Classified, complying with ASTM C423.

8. Color: White.

PART 3 - EXECUTION

3.1 PREPARATION

A. Furnish layouts for inserts, clips or other supports and struts required to be installed by the Work of other trades that depend on the suspended ceiling system for support.

B. Coordinate related Work to ensure completion prior to installation of clips or fasteners.

3.2 INSTALLATION OF SUSPENSION SYSTEMS

A. Rigidly secure system, including integral mechanical and electrical components, for maximum deflection of 1:360.

B. Install after major above-ceiling work is complete. Coordinate the location of hangers with other work.

C. Hang suspension system independent fo walls, columns, ducts, pipes and conduit. Where carrying members are spliced, avoid visible displacement of face plane of adjacent members.

D. Where ducts or other equipment prevent the regular spacing of hangers, reinforce the nearest afected hangers and related carrying channels to span the extra distance.

E. Do not support components on main runners or cross runners if weight causes total dead load to exceed deflection capability.

F. Support fixture loads using supplementary hangers located within 6 inches of each corner, or support components independently.

G. Do not eccentrically load system or induce rotation of runners.

H. Perimeter Molding: Install at intersection of ceiling and vertical surfaces and at junction with other interruptions.

1. Use longest practical lengths.

2. Overlap and rivet corners.

3.3 INSTALLATION OF ACOUSTICAL PANELS

A. Install acoustical units in accordance with manufacturer's instructions.

B. Fit acoustical units in place, free from damaged edges or other defects detrimental to appearance and function.

C. Fit border trim neatly against abutting surfaces.

D. Install units after above ceiling work is complete.

E. Install acoustical units level, in uniform plane, and free from twist, warp and dents.

F. Cutting Acoustical Units:

1. Cut to fit irregular grid and perimeter edge trim.

2. Make field cut edges of same profile as factory edges.

3. Where round obstructions occur, provide preformed closures to match perimeter molding.

4. Install hold-down clips on each panel to retain panels tight to grid system.

3.4 CLEANING

A. General: After installation of acoustical material has been completed, clean surfaces of the material, removing any dirt or discolorations. Replace panels as required.

B. Acoustical Panels: Minor abraded spots and cut edges shall be touched up with the same paint as was used for factory applied finish of the lay-in panels.

C. Remove and replace work that can not be successfully cleaned and repaired to eliminate evidence of damage.

3.5 CLEAN UP

A. Remove rubbish, debris, and waste materials and legally dispose off of the Project site.

END OF SECTION

SECTION 09 6519
RESILIENT TILE FLOORING

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Resilient Plank flooring.

B. Installation accessories:

1. Adhesives.

2. Finishes and cleaners.

3. Waterproofing membrane.

C. Resilient Base & Accessories

1.2 RELATED REQUIREMENTS

A. Section 01 6116 - Volatile Organic Compound (VOC) Content Restrictions: SCS FloorScore certification documentation.

B. Section 01 7419 - Construction Waste Management and Disposal.

C. Section 07 9200 - Joint Sealants.

D. Section 09 9900 - Colors

1.3 REFERENCE STANDARDS

A. ASTM F710 - Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring; 2011.

B. ASTM F1869 - Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride; 2016a.

C. ASTM F2170 - Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using in situ Probes; 2017.

1.4 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Manufacturer's documentation for flooring and accessories:

1. Technical Data.

2. Installation and Maintenance.

3. Warranty.

4. Reclamation Program.

5. Safety Data Sheets (SDS) for accessories.

C. Verification Samples: Submit two samples, 4 by 4 inch in size illustrating color and pattern for each resilient flooring product specified.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Upon receipt, immediately remove any shrink-wrap and check materials for damage and that the material is of the correct style, color, quantity and run number(s).

B. Store all materials flat and off of the floor in an acclimatized, weather-tight space between 65 to 85 degrees F.

C. Do not double stack pallets.

1.6 FIELD CONDITIONS

A. Acclimate material at jobsite between 65 to 85 degrees F and 35 percent to 85 percent relative humidity for 48 hours prior to installation. Temperature and relative humidity should also be maintained at the same levels during installation, and after installation.

B. Spread unopened cartons no more than 6 cartons high and at least 4 inches apart.

C. Keep away from heating and cooling ducts and direct sunlight.

D. If permanent HVAC is not operational, temporary means should be used to maintain the recommended temperature and relative humidity levels.

E. Close areas to traffic during installation of flooring and accessories.

1.7 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than ten years of documented experience.

1.8 WARRANTY

A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.

1.9 EXTRA MATERIALS

A. Deliver to Owner extra materials from same production run as products installed. Package products with protective covering and identify with descriptive labels. Comply with Division 1 closeout submittals requirements.

1. Quantity: Furnish quantity of flooring units equal to 10 percent of amount installed. Karndean Delivery, Storage and Protection: Comply with Owner's requirements for delivery, storage and protection of extra materials.

1.10 PERFORMANCE REQUIREMENTS

A. Flooring surfaces shall be stable, firm, and slip resistant and shall comply with CBC Section 11B-302.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Basis of Design: **Armstrong Flooring Inc.**

B. Or Equal.

2.2 RESILIENT TILE FLOORING

A. **Standard Excelon Imperial Texture Tile Flooring.** See floor plans for locations.

1. Description: Tile composed of polyvinyl chloride resin, plasticizers, fillers, stabilizers and pigments with colors and texture dispersed uniformly throughout its entire thickness.
2. Vinyl composition tile shall conform to the requirements of ASTM F 1066, "Standard Specification Vinyl Composition Floor Tile", Class 2, through-pattern
3. Pattern and color: VCT-1: **Mid Grayed Blue 51875**
4. Size: 12 in. x 12 in.
5. Thickness: 1/8 in.

B. **Premium Excelon Raffia Stream Tile Flooring.** See floor plans for locations.

1. Description: Tile composed of polyvinyl chloride resin, plasticizers, fillers, stabilizers and pigments with colors and texture dispersed uniformly throughout its entire thickness.
2. Vinyl composition tile shall conform to the requirements of ASTM F 1066, "Standard Specification Vinyl Composition Floor Tile", Class 2, through-pattern
3. Pattern and color: VCT-2: **Earth 55926**
4. Size: 12 in. x 24 in.
5. Thickness: 1/8 in.

C. **Rubber Stair Treads with Integral Risers.** See floor plans for locations.

1. Description: An unbacked, nonlayered, homogeneous tread with integrated riser and stair nose. The colors and pattern detail are dispersed uniformly throughout the thickness of the product. Colors are insoluble in water and resistant to cleaning agents and light.
2. The tile shall conform to the requirements of ASTM F 2169, Type TP, Class 2.
3. Pattern and color: VCT-ST: **Pebble R4CPD**
4. Size: 20 in. x 50.25 in.
5. Thickness: 1/8 in.

2.3 ACCESSORIES

A. Moldings, Transition and Edge Strips: Metal.

B. Adhesive:

1. Manufacturer's recommended adhesive as follows.

a. Karndean DrySet Roll-on Adhesive.

b. Karndean K-95 HM.

c. Karndean K-Spray Spray Adhesive.

2. Moisture readings higher than approved by the adhesive shall use a moisture mitigation system.

C. Portland based cementitious base leveler or patch. Gypsum based not acceptable unless properly prepared.

2.4 MOISTURE BARRIER MEMBRANE

A. Moisture Barrier Membrane:

1. KOVARA 95 as manufactured by GCP Applied Technologies.

a. Material: Three-layer composite construction of a HDPE bottom layer, glass mat middle layer, and gray mineral top layer.

b. Thickness: 0.024 inches (0.61 mm).

c. Resistant to heavy rolling loads.

d. No VOC content.

e. Does not support mold or mildew growth.

f. Provides resistance to 95 percent relative humidity.

g. Tapes: As recommended by Manufacturer.

2.5 RESILIENT WALL BASE

A. Acceptable Manufacturers:

1. Basis of Design: Armstrong Flooring

2. Burke Flooring

3. Roppe Corp

4. Tarkett
5. OR equal
    a. Substitutions: Under provisions of Division 01.

B. Wall Base Materials:

1. Wall Base: ASTM F1861, Type TP, (Thermoplastic rubber).
2. Meet ASTM E84 Class II Fire Resistane Requirement.
3. Style: Style A - Straight (flat or toeless) at carpet flooring. Top set Style B - Cove (base with toe) at vinyl floors.
4. Height: 4 inches, unless otherwise indicated.
5. Thickness: 1/8 inch, minimum.
6. Finish: Satin.
7. Lengths: Roll or coils in manufacturer's standard length.
8. Color: **See 09 9900-COLORS**
9. Accessories: Premolded external corners and internal corners.

PART 3 EXECUTION

3.1 EXAMINATION - SEE ALSO SECTION 01 7000.

A. Install flooring and accessories after other operations (including painting) have been completed.

B. Acceptance of Conditions: Carefully examine all installation areas with installer/applicator present, for compliance with requirements affecting work performance.

1. Verify that field measurements, product, adhesives, substrates, surfaces, structural support, tolerances, levelness, temperature, humidity, moisture content level, pH, cleanliness and other conditions are as required by the manufacturer, and ready to receive work.

C. Verify that substrate is contaminant-free, including old adhesives and abatement chemicals.

D. Test substrates as required by manufacturer to verify proper conditions exist.

1. Concrete:
    a. Check for concrete additives such as fly ash, curing compounds, hardeners, or other surface treatments that may prevent proper bonding of floor coverings.
    b. Moisture testing: Perform either the In-Situ Relative Humidity (RH) test (ASTM F2170) or Moisture Vapor Emission Rate (MVER) test (ASTM F1869). Refer to the Manufacturer's Installation Guide/Manual for the maximum allowable substrate moisture content. Substrates above the maximum allowable moisture content will require a moisture mitigation system.
    c. Perform alkalinity testing per ASTM F710 to verify pH level is between 7 to 10.
    d. Check substrate for absorbency per manufacturer's recommendations.
    e. Perform bond testing per ASTM F710 to determine compatibility of adhesive to concrete substrate.

E. Verify that required floor-mounted utilities are in correct location.

3.2 PREPARATION

A. Flooring installation should not begin until all site conditions have been assessed, testing has been completed and subfloor conditions have been approved.

B. Prepare per manufacturer's written instructions, Section 01 7000, and as follows:

1. Using Portland based cementitious base leveler or patch fill and cover all seams, nail heads, voids, cracks, and expansion joints. Achieve smooth, even, firmly attached substrate for best finish results. Gypsum based underlayment not acceptable with Karndean Luxury Vinyl Flooring unless it is first properly prepared.

a. Encapsulate any gypsum with a premium latex primer/sealer recommended by gypsum manufacturer.

b. Cement slabs can be floated or repaired using Portland cement based compound. Follow patch manufacturers' instructions.

c. Once substrate flatness is achieved, 3/16 inch (5 mm) in 10 feet (mm in 3 m), continue with the next step.

2. Prepare substrates to ensure proper adhesion of Luxury Vinyl Plank & Tile. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3. Concrete Substrates: The Contractor shall verify to the Owner and installer a minimum of 30 days prior to the scheduled resilient flooring installation the following substrate conditions. All substrate testing shall be documented and submitted to the Architect and Owner before commencement of the flooring installation.

a. Verify that substrates are dry, free of debris, and that all surfaces have properly cured.

4. Remove substrate coatings and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by manufacturer. Do not use solvents.

a. Alkalinity and Adhesion Testing: Perform tests recommended by manufacturer. Proceed with installation only after substrates pass testing.

b. Moisture Testing: Perform ASTM 1869 Calcium Chloride or ASTM 2170 In-Situ RH test and record results. Choose proper adhesive or moisture mitigation systems to meet manufacturers' specifications for moisture content. Proceed with installation only after substrates meet specifications.

3.3 INSTALLING RESILIENT TILES AND PLANKS

A. General:

1. Permanent HVAC system shall be turned on and set to a minimum of 65 degrees F (20 degrees C) for a minimum of 48 hours prior to, during and 48 hours after installation.

2. All products shall be allowed to acclimate at least 24 hours before installation. This means product shall be placed in the same room as the install that is taking place and removed from its factory packaging.

3. Install waterproofing membrane per manufacturer's instruction.

4. Material shall be visually inspected prior to installation.

5. Ensure that all recommendations for sub-floor and jobsite conditions are met prior to beginning the installation. Once the installation is started, Contractor and installer have accepted those conditions.

6. Install in accordance with manufacturer's installation instructions for each product type and application specified.

B. Layout and Installation:

1. Position planks so the end seams are no closer than the width of the plank being installed. Maintain this approach to staggering the planks throughout the entire installation while keeping a random appearance.
2. Center tiles or planks in rooms and hallways so borders are not less than half a tile or plank when possible.
3. Cut edges shall always be installed against a wall.
4. Install using tile and plank installation techniques recommended by manufacturer.
5. Install tiles, planks, borders and feature strips in locations and configurations indicated on the Drawings.

C. Product Application:

1. Install in accordance with adhesive recommendations on the label or data sheet.
2. Refer to manufacturer's literature for selection criteria for applicator, type.
3. Using proper applicator, apply adhesive in accordance with label on adhesive.
4. For LooseLay installations only, spread a 4 inch (100 mm) wide band of adhesive around the perimeter of the area designated as an extreme condition area. An additional 4 inch (100 mm) band shall be spread at approximately 10 foot (3 m) intervals, forming a grid pattern.
5. For transitional areas, from LooseLay to another floor covering of a different height, a 4 inch (100 mm) band of adhesive should be spread across the length of the transition.

3.4 CLEANING

A. Wipe off any adhesive on floor as installation proceeds. Wait 48 hours before applying the cleaning and maintenance products.

B. Prior to installation of permanent fixtures or furniture, remove all dirt, debris, or residual adhesive and clean the floor. If desired, a protective covering may be applied at this time. Specific products and instructions are available from the manufacturer.

3.5 PROTECTION

A. Protect installed products until completion of project.

B. Touch-up, repair or replace damaged products before Substantial Completion.

3.6 MAINTENANCE

A. Comply with manufacturer's instructions for proper cleaning and maintenance of the products.

END OF SECTION

SECTION 09 6813
TILE CARPETING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Carpet tile, fully adhered.

B. Resilient Base.

1.02 REFERENCE STANDARDS

A. ASTM D2859 - Standard Test Method for Ignition Characteristics of Finished Textile Floor Covering Materials; 2006 (Reapproved 2011).

B. ASTM F710 - Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring; 2011.

C. CRI (CIS) - Carpet Installation Standard; Carpet and Rug Institute; 2011.

D. CRI (GLA) - Green Label Testing Program - Approved Adhesive Products; Carpet and Rug Institute; Current Edition.

E. CRI (GLP) - Green Label Plus Testing Program - Certified Products; www.carpet-rug.org; current edition.

1.03 PERFORMANCE REQUIREMENTS

A. Carpet shall be securely attached and shall have a firm cushion, pad, or backing of no cushion or pad. It shall have a level loop, textured loop, level cut pile, or level cut/uncut pile texture. Pile height shall be ½" maximum. CBC Section 11B-302.2.

B. Exposed edges shall be fastened to floor surfaces and shall have trims on the entire length. Carpet edges shall comply with CBC Section 11B-303.

C. Carpet shall meet testing requirements of ASTM E648 and ASTM E662.

1. Provide products with the critical radiant flux classification of Class 1 (CRF: 0.45 w/sq. cm or higher), as determined by testing identical products per ASTM E648 by an independent testing and inspecting agency acceptable to authorities having jurisdiction.

2. Provide products with specific optical density smoke rating of less than 450, as determined by testing identical products per ASTM E662 by an independent testing and inspecting agency acceptable to authorities having jurisdiction.

1.04 SUBMITTALS

A. Product Data: Provide data on specified products, describing physical and performance characteristics; sizes, patterns, colors available, and method of installation.

B. Samples: Submit two carpet tiles illustrating color and pattern design for each carpet color selected.

C. Maintenance Data: Include maintenance procedures, recommended maintenance materials, and suggested schedule for cleaning.

1.05 MAINTENANCE MATERIALS

A. Furnish the following for Owner's use in maintenance of project.

1. Extra Carpet Tiles: One carton of each color and pattern installed.

1.06 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing specified carpet tile with minimum five years documented experience.

B. Installer Qualifications: Company specializing in installing carpet tile with minimum three years documented experience and approved by carpet tile manufacturer.

1.07 FIELD CONDITIONS

A. Store materials in area of installation for minimum period of 24 hours prior to installation.

1.08 WARRANTY

A. Special Warranty for Carpet Tiles: Manufacturer's standard form in which manufacturer agrees to repair or replace components of carpet tile installation that fail in materials or workmanship within specified warranty period.

1. Warranty Period: 10 Year.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Tarkett as the basis of design; Shaw Industries Group, Inc.

B. Equal

2.02 MATERIALS

A. Tile Carpeting: Conforming to the following criteria:

1. Product Worklife Balance Tile, 59340
2. Tile Size: 24 by 24 inch nominal.
3. Primary Backing: Non-woven synthetic fiber.
4. Construction: Stratatec Patterned Loop
5. Gauge: 5/64 inch.
6. Stitches per inch: 39.4
7. Pile Height: 0.187 inch.
8. Fiber System: Dynex SD® Nylon(Permanent Stain Resistance)
9. Color and Pattern:_____.
    a. Color: Harbouring Desire 40485
10. Surface Flammability Ignition: Pass ASTM D2859 (the "pill test").
11. VOC Content: Provide CRI (GLP) certified product; in lieu of labeling, independent test report showing compliance is acceptable.
12. Primary Backing Material: ethos modular.

2.03 ACCESSORIES

A. Sub-Floor Filler: White premix latex; type recommended by flooring material manufacturer.

B. Edge Strips: Embossed aluminum, color as selected by Architect.

C. Adhesives: Acceptable to carpet tile manufacturer, compatible with materials being adhered; maximum VOC of 50 g/L; CRI Green Label certified; in lieu of labeled product, independent test report showing compliance is acceptable.

D. Resilient Wall Base and Transition Strips:

1. Resilient Base:

a. Burke, Color: Navy - 875.

b. Height: 4 inches.

c. Thickness: 0.125 inch.

d. Finish: Satin.

e. Length: Roll

2. Transition Strips: Provide manufacturer recommended transition strips.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that sub-floor surfaces are smooth and flat within tolerances specified for that type of work and are ready to receive carpet tile.

3.02 PREPARATION

A. Remove sub-floor ridges and bumps. Fill minor or local low spots, cracks, joints, holes, and other defects with sub-floor filler.

B. Apply, trowel, and float filler to achieve smooth, flat, hard surface. Prohibit traffic until filler is cured.

C. Vacuum clean substrate.

3.03 INSTALLATION

A. Starting installation constitutes acceptance of sub-floor conditions.

B. Install carpet tile in accordance with manufacturer's instructions.

C. Blend carpet from different cartons to ensure minimal variation in color match.

D. Cut carpet tile clean. Fit carpet tight to intersection with vertical surfaces without gaps.

E. Lay carpet tile in square pattern, with pile direction parallel to next unit, set parallel to building lines.

F. Fully adhere carpet tile to substrate.

G. Trim carpet tile neatly at walls and around interruptions.

H. Complete installation of edge strips, concealing exposed edges.

3.04 CLEANING

A. Remove excess adhesive without damage, from floor, base, and wall surfaces.

B. Clean and vacuum carpet surfaces.

END OF SECTION

SECTION 09 9113
EXTERIOR PAINTING

PARTS 1 - GENERAL

1.1 SUMMARY:

A. Section Includes: Painting and finishing of all exterior items and surfaces, unless otherwise indicated or listed under exclusions below:

1. Paint all exposed surfaces, except as otherwise indicated, whether or not colors are designated. Include field painting of exposed exterior plumbing, mechanical and electrical work, except as indicated below.

2. Surface preparation, priming, and finish coats specified in this Section are in addition to shop priming and surface treatment specified in other Sections.

B. Work Included:

1. The intent and requirements of this Section is that all work, items and surfaces which are normally painted and finished in a building of this type and quality, shall be so included in this contract, whether or not said work, item or surface is specifically called out and included in the schedules and notes on the drawings, or is, or is not, specifically mentioned in these specifications.

C. The following general categories of work and items that are included under other sections shall not be a part of this section:

1. Shop prime painting of structural and miscellaneous iron or steel.

2. Shop prime painting of hollow metal work.

3. Shop finished items.

D. Related Sections:

1. Section 09 9113: Interior Painting

2. Section 09 9900: Colors

1.2 SUBMITTALS:

A. Product Data: Submit complete manufacturer's descriptive literature and specifications in accordance with the provisions of Section 013000.

1. Materials List: Submit complete lists of materials proposed for use, giving the manufacturer's name, catalog number, and catalog cut for each item when applicable. When required, provide a list of paint and coating materials proposed for use, which equates such materials with the design-basis products specified.

B. Samples: In accordance with provisions of Section 013000, submit, on 8-1/2 inch by 11 inch hardboard, samples of each color, gloss, texture and material selected by the Architect from standard colors available for the coatings required.

1. For natural and stained finishes, provide sample on each type and quality of wood used on the project.

C. Manufacturer's Instructions: Submit the manufacturer's current recommended methods of installation, including relevant limitations, safety and environmental cautions, application rates, and composition analysis.

1.3 QUALITY ASSURANCE:

A. Regulatory Requirements: Comply with applicable codes and regulations of governmental agencies having jurisdiction including those having jurisdiction over airborne emissions and industrial waste disposal. Where those requirements conflict with this Specification, comply with the more stringent provisions.

B. Regulatory changes may affect the formulation, availability, or use of specified coatings. Confirm availability of coatings to be used prior to job going out to bid and before start of painting project.

1. Comply with the current applicable regulations of the California Air Resources Board (CARB) and the Environmental Protection Agency (EPA).

2. Comply with South Coast Air Quality Management District (SCAQMD) Rule 1113. A copy of this regulation can be obtained from http://www.aqmd.gov/rules/reg/reg11/r1113.pdf.

C. Field Sample: When and as directed by the Architect, apply one complete coating system for each color, gloss and texture required. When approved, the sample panel areas will be deemed incorporated into the Work and will serve as the standards by which the subsequent Work of this Section will be judged.

1.4 DELIVERY, STORAGE, AND HANDLING:

A. Storage and Protection: Use all means necessary to protect the materials of this Section before, during, and after installation.

B. Deliver materials to job site in new, original, and unopened containers bearing manufacturer's name and trade name. Store where directed in accordance with manufacturer's instructions.

1.5 PROJECT CONDITIONS:

A. Do not apply exterior materials during fog, rain or mist, or when inclement weather is expected within the dry time specified by the manufacturer. No exterior or interior painting shall be done until the surfaces are thoroughly dry and cured. Do not apply paint when temperature is below 50o F. Avoid painting surfaces when exposed to direct sunlight.

PART 2 - PRODUCTS

2.1 MANUFACTURERS:

A. Manufacturer's catalog names and number of paint types in this Section herein are based on products manufactured or distributed by the Dunn-Edwards Corporation and are the basis of design against which the Architect will judge equivalency. The quantity of titanium dioxide, the use of clays, aluminum silicate, talc and the purity of acrylic materials are a few of the criteria which will be used by the Architect in determining equivalency of materials.

B. Substitutions: Requests for substitutions will be considered in accordance with provisions of Section 016000 Product Requirements. When submitting request for substitution, provide complete product data specified above under Submittals, for each substitute product.

C. Acceptable Manufacturers, unless otherwise noted:

1. Dunn-Edwards Corporation Paints or equal.

2.2 MATERIALS:

A. Paints: Provide ready-mixed, except field catalyzed coatings. Pigments shall be fully ground maintaining soft paste consistency, capable of being readily and uniformly dispersed to complete homogeneous mixture. Paints shall have good flowing and brushing properties and be capable of drying or curing free of streaks and sags.

B. Accessory Materials: Linseed oil, shellac, solvents, and other materials not specified but required to achieve required finishes shall be of high quality and approved by manufacturer.

C. Colors shall be selected from color chip samples provided by manufacturer of paint system approved for use. Match approved samples for color, texture and coverage.

D. Colors: Contractor shall anticipate the following variety of colors throughout project:

1. Plaster: 2 primary colors and 2 accent colors
2. Metal: 2 colors

Refer to Section 09 9900 - Colors for color selections.

E. 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).

F. Restricted Components: Paints and coatings shall not contain any of the following.

1. Acrolein.
2. Acrylonitrile.
3. Antimony.
4. Benzene.
5. Butyl benzyl phthalate.
6. Cadmium.
7. Di (2-ethylhexyl) phthalate.
8. Di-n-butyl phthalate.
9. Di-n-octyl phthalate.
10. 1,2-dichlorobenzene.
11. Diethyl phthalate.
12. Dimethyl phthalate.
13. Ethylbenzene.
14. Ethylene Glycol.
15. Formaldehyde.
16. Hexavalent chromium.
17. Isophorone.
18. Lead.
19. Mercury.
20. Methyl ethyl ketone.
21. Methylene chloride.
22. Naphthalene.
23. Toluene (methylbenzene).

24. 1,1,1-trichloroethane.

25. Vinyl chloride.

2.3 MIXES:

A. Mix, prepare, and store painting and finishing materials in accordance with manufacturer's directions.

PART 3-EXECUTION

3.1 EXAMINATION:

A. Examine surfaces to be painted before beginning painting work. Work of other trades that has been left or installed in a condition not suitable to receive paint, stain other specified finish shall be repaired or corrected by the applicable trade before painting. Painting of defective or unsuitable surface implies acceptance of the surfaces.

B. Beware of a condition known as critical lighting. This condition causes shadows that accentuate even the slightest surface variations. A pigmented sealer will provide tooth for succeeding decorative coating, but "does not" equalize smoothness or surface texture. Any corrective action to drywall must be done by the drywall contractor prior to decorating.

3.2 PROTECTION:

A. Protect previously installed work and materials, which may be affected by Work of this Section.

1. Protect prefinished surfaces, lawns, shrubbery and adjacent surfaces against paint and damage.

2. Furnish sufficient drop cloths, shields, and protective equipment to prevent spray or splatter from fouling surfaces not being painted.

3. Protect surfaces, equipment, and fixtures from damage resulting from use of fixed, movable and hanging scaffolding, planking, and staging.

B. Provide wet paint signs, barricades, and other devices required to protect newly finished surfaces. Remove temporary protective wrappings provided by others for protection of their work after completion of painting operations.

3.3 PREPARATION:

A. Perform preparation and cleaning procedures in strict accordance with coating manufacturer’s instructions for each substrate condition.

B. Concrete and Masonry: Surfaces shall be dry, clean, and free of dirt, efflorescence, encrustation, and other foreign matter. Glazed surfaces on concrete shall be roughened or etched to uniform texture.

C. Ferrous Metal: Clean oil, grease, and foreign matter with solvent. Surface shall be primed within 3 hours after preparation.

D. Sand and scrape metal to remove loose primer and rust.

E. Non-Ferrous Metal: Chemically or solvent clean and then treat with an etching-type solution if recommended by the finish manufacturer. Cleaned and retreated Non-Ferrous Metal shall be primed the same day that cleaning has been performed.

F. Wood Surfaces: Remove dust, grit and foreign matter. Sand surfaces and dust clean. Spot coat knots, pitch streaks, and sappy section with pigmented stain sealer when surfaces are to be painted. Fill nail holes, cracks and other defects after priming and spot prime repairs when fully cured.

G. Remove hardware and accessories, machined surfaces, plates, lighting fixtures and similar items in place and not-to-be-finish painted, or provide surface-applied protection. Reinstall removed items upon completion of work in each area.

H. Existing surfaces to be recoated shall be thoroughly cleaned and deglossed by sanding or other means prior to painting. Patched and bare areas shall be spot primed with same primer as specified for new work.

I. Thoroughly backpaint all surfaces of exterior and interior finish lumber and millwork, including doors and window frames, trim, cabinetwork, etc., which will be concealed after installation. Backpaint items to be painted or enameled with the priming coat. Use a clear sealer for backpriming where transparent finish is required.

J. Bare and covered pipes, ducts, hangers, exposed steel and ironwork, and primed metal surfaces of equipment installed under mechanical and electrical work shall be cleaned prior to priming.

K. Preparation of other surfaces shall be performed following specific recommendations of the coatings manufacturer.

L. Bond breakers and curing agents shall be removed and the surface cleaned before primers, sealers or finish paints can be applied.

M. All drywall surfaces shall be completely dry and dust free before painting. Skim coated drywall shall be sealed with a sealer recommended by the paint manufacturer for this surface. Use the appropriate light or medium tack masking tape.

3.4 APPLICATION:

A. Apply painting and finishing materials in accordance with the manufacturer's recommendations.

1. The number of coats specified is the minimum that shall be applied. Apply additional coats when undercoats, stains or other conditions show through final paint coat, until paint film is of uniform finish, color and appearance.

B. Apply each material at not less than the manufacturer's recommended spreading rate:

C. Apply prime coat to surface which is required to be painted or finished.

D. Finish exterior doors on tops, bottoms, and edges same as exterior faces, after fitting.

E. Sand lightly and dust clean between succeeding coats.

3.5 CLEANING, TOUCH-UP AND REFINISHING:

A. Carefully remove all spattering, spots and blemishes caused by work under this section from surfaces throughout the project.

B. Upon completion of painting work remove all rubbish, paint cans, and accumulated materials resulting from work in each space or room. All areas shall be left in a clean, orderly condition.

C. Runs, sags, misses, holidays, stains and other defects in the painted surfaces, including inadequate coverage and mil thickness shall be satisfactorily touched up, or refinished, or repainted as necessary.

3.6 FINISH SCHEDULE

A. Apply all materials in accordance with manufacturer’s instructions on properly prepared surfaces and foundation coats. All intermediate undercoats must be tinted to approximate the final color.

1. Architect will issue a color schedule prior to start of painting to designate the various colors and locations required for the work.

B. Exterior Systems:

1. Portland Cement Plaster/Stucco/Fiber Cement Panels

Eggshell - Modified Copolymer / 100%Acrylic

a. First Coat: FLEX-PRIME, Flexible Masonry Primer (FPSL00)

b. Second Coat: SPARTASHIELD, Exterior 100% Acrylic Eggshell Paint (SSHL30)

c. Third Coat: SPARTASHIELD, Exterior 100% Acrylic Eggshell Paint (SSHL30)

2. Ferrous Metal

Semi-Gloss - Alkyd Emulsion / 100% Acrylic

a. First Coat: BLOC-RUST Rust-Preventative Metal Primer (BRPR00-1-WH)

b. Second Coat: Aristoshield Alkyd Emulsion Semi-gloss Paint (ASHL50)

c. Third Coat: Aristoshield Alkyd Emulsion Semi-gloss Paint (ASHL50)

3. Non-Ferrous Metal

Semi-Gloss - Alkyd / 100% Acrylic

a. Pretreatment: SUPREME CHEMICAL, METAL CLEAN AND ETCH (ME 01)

b. First Coat: Ultra-Grip Premium Non-Ferrous Metal Primer (GAPR00)

c. Second Coat: Aristoshield Alkyd Emulsion Semi-gloss Paint (ASHL50)

d. Third Coat: Aristoshield Alkyd Emulsion Semi-gloss Paint (ASHL50)

3.7 Refer to Section 07 1900: Water Repellents for exposed, non-painted CMU and concrete walls and seatings.

END OF SECTION

SECTION 09 9123
INTERIOR PAINTING

PARTS 1 - GENERAL

1.1 SUMMARY:

A. Section Includes: Painting and finishing of all interior items and surfaces, unless otherwise indicated or listed under exclusions below:

1. Paint all exposed surfaces, except as otherwise indicated, whether or not colors are designated. Include field painting of exposed exterior and interior plumbing, mechanical and electrical work, except as indicated below.

2. Surface preparation, priming, and finish coats specified in this Section are in addition to shop priming and surface treatment specified in other Sections.

B. Work Included:

1. The intent and requirements of this Section is that all work, items and surfaces which are normally painted and finished in a building of this type and quality, shall be so included in this contract, whether or not said work, item or surface is specifically called out and included in the schedules and notes on the drawings, or is, or is not, specifically mentioned in these specifications.

C. The following general categories of work and items that are included under other sections shall not be a part of this section:

1. Shop prime painting of structural and miscellaneous iron or steel.

2. Shop prime painting of hollow metal work.

3. Shop finished items.

D. The Room Finish Schedules indicated on the drawings indicates the location of interior room surfaces to be painted or finished. The schedule indications are general and do not necessarily define the detail requirements. Include all detailed refinements and further instructions as may be given for the required complete finishing of all spaces and rooms.

E. Related Sections:

1. Section 09 9113: Exterior Painting

2. Section 09 9900: Colors

1.2 SUBMITTALS:

A. Product Data: Submit complete manufacturer's descriptive literature and specifications in accordance with the provisions of Section 01 3000.

1. Materials List: Submit complete lists of materials proposed for use, giving the manufacturer's name, catalog number, and catalog cut for each item when applicable. When required, provide a list of paint and coating materials proposed for use, which equates such materials with the design-basis products specified.

B. Samples: In accordance with provisions of Section 013000, submit, on 8-1/2 inch by 11 inch hardboard, samples of each color, gloss, texture and material selected by the Architect from standard colors available for the coatings required.

1. For natural and stained finishes, provide sample on each type and quality of wood used on the project.

C. Manufacturer's Instructions: Submit the manufacturer's current recommended methods of installation, including relevant limitations, safety and environmental cautions, application rates, and composition analysis.

1.3 QUALITY ASSURANCE:

A. Regulatory Requirements: Comply with applicable codes and regulations of governmental agencies having jurisdiction including those having jurisdiction over airborne emissions and industrial waste disposal. Where those requirements conflict with this Specification, comply with the more stringent provisions. Regulatory changes may affect the formulation, availability, or use of specified coatings. Confirm availability of coatings to be used prior to job going out to bid and before start of painting project.

1. Comply with the current applicable regulations of the California Air Resources Board (CARB) and the Environmental Protection Agency (EPA).

2. Comply with South Coast Air Quality Management District (SCAQMD) Rule 1113. A copy of this regulation can be obtained from http://www.aqmd.gov/rules/reg/reg11/r1113.pdf.

B. Field Sample: When and as directed by the Architect, apply one complete coating system for each color, gloss and texture required. When approved, the sample panel areas will be deemed incorporated into the Work and will serve as the standards by which the subsequent Work of this Section will be judged.

1.4 DELIVERY, STORAGE, AND HANDLING:

A. Storage and Protection: Use all means necessary to protect the materials of this Section before, during, and after installation.

B. Deliver materials to job site in new, original, and unopened containers bearing manufacturer's name and trade name. Store where directed in accordance with manufacturer's instructions.

1.5 PROJECT CONDITIONS:

A. Do not apply exterior materials during fog, rain or mist, or when inclement weather is expected within the dry time specified by the manufacturer. No exterior or interior painting shall be done until the surfaces are thoroughly dry and cured. Do not apply paint when temperature is below 50o F. Avoid painting surfaces when exposed to direct sunlight.

PART 2 - PRODUCTS

2.1 MANUFACTURERS:

A. Manufacturer's catalog names and number of paint types in this Section herein are based on products manufactured or distributed by the Dunn-Edwards Corporation www.dunnedwards.com <http://www.dunnedwards.com/> and are the basis of design against which the Architect will judge equivalency. The quantity of titanium dioxide, the use of clays, aluminum silicate, talc and the purity of acrylic materials are a few of the criteria which will be used by the Architect in determining equivalency of materials.

B. Substitutions: Requests for substitutions will be considered in accordance with provisions of Section 016000 Product Requirements. When submitting request for substitution, provide complete product data specified above under Submittals, for each substitute product.

C. Acceptable Manufacturers, unless otherwise noted:

1. Dunn-Edwards Corporation Paints or equal.

2.2 MATERIALS:

A. Paints: Provide ready-mixed, except field catalyzed coatings. Pigments shall be fully ground maintaining soft paste consistency, capable of being readily and uniformly dispersed to complete homogeneous mixture. Paints shall have good flowing and brushing properties and be capable of drying or curing free of streaks and sags.

B. Accessory Materials: Linseed oil, shellac, solvents, and other materials not specified but required to achieve required finishes shall be of high quality and approved by manufacturer.

C. Colors shall be selected from color chip samples provided by manufacturer of paint system approved for use. Match approved samples for color, texture and coverage.

D. Colors: Contractor shall anticipate the following variety of colors throughout project:

1. Wallboard: 4 colors
2. Metal: 2 colors

Refer to Section 09 9900 - Colors for color selections.

E. 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).

F. Restricted Components: Paints and coatings shall not contain any of the following.

1. Acrolein.
2. Acrylonitrile.
3. Antimony.
4. Benzene.
5. Butyl benzyl phthalate.
6. Cadmium.
7. Di (2-ethylhexyl) phthalate.
8. Di-n-butyl phthalate.
9. Di-n-octyl phthalate.
10. 1,2-dichlorobenzene.
11. Diethyl phthalate.
12. Dimethyl phthalate.
13. Ethylbenzene.
14. Ethylene Glycol.
15. Formaldehyde.
16. Hexavalent chromium.
17. Isophorone.
18. Lead.
19. Mercury.

20. Methyl ethyl ketone.

21. Methyl isobutyl ketone.

22. Methylene chloride.

23. Naphthalene.

24. Toluene (methylbenzene).

25. 1,1,1-trichloroethane.

26. Vinyl chloride.

2.3 MIXES:

A. Mix, prepare, and store painting and finishing materials in accordance with manufacturer's directions.

PART 3-EXECUTION

3.1 EXAMINATION:

A. Examine surfaces to be painted before beginning painting work. Work of other trades that has been left or installed in a condition not suitable to receive paint, stain other specified finish shall be repaired or corrected by the applicable trade before painting. Painting of defective or unsuitable surface implies acceptance of the surfaces.

B. Beware of a condition known as critical lighting. This condition causes shadows that accentuate even the slightest surface variations. A pigmented sealer will provide tooth for succeeding decorative coating, but "does not" equalize smoothness or surface texture. Any corrective action to drywall must be done by the drywall contractor prior to decorating.

3.2 PROTECTION:

A. Protect previously installed work and materials, which may be affected by Work of this Section.

1. Protect prefinished surfaces, lawns, shrubbery and adjacent surfaces against paint and damage.

2. Furnish sufficient drop cloths, shields, and protective equipment to prevent spray or splatter from fouling surfaces not being painted.

3. Protect surfaces, equipment, and fixtures from damage resulting from use of fixed, movable and hanging scaffolding, planking, and staging.

B. Provide wet paint signs, barricades, and other devices required to protect newly finished surfaces. Remove temporary protective wrappings provided by others for protection of their work after completion of painting operations.

3.3 PREPARATION:

A. Perform preparation and cleaning procedures in strict accordance with coating manufacturer’s instructions for each substrate condition.

B. Concrete and Masonry: Surfaces shall be dry, clean, and free of dirt, efflorescence, encrustation, and other foreign matter. Glazed surfaces on concrete shall be roughened or etched to uniform texture.

C. Ferrous Metal: Clean oil, grease, and foreign matter with solvent. Surface shall be primed within 3 hours after preparation.

D. Sand and scrape metal to remove loose primer and rust.

E. Non-Ferrous Metal: Chemically or solvent clean and then treat with an etching-type solution if recommended by the finish manufacturer. Cleaned and retreated Non-Ferrous Metal shall be primed the same day that cleaning has been performed.

F. Wood Surfaces: Remove dust, grit and foreign matter. Sand surfaces and dust clean. Spot coat knots, pitch streaks, and sappy section with pigmented stain sealer when surfaces are to be painted. Fill nail holes, cracks and other defects after priming and spot prime repairs when fully cured.

G. Remove hardware and accessories, machined surfaces, plates, lighting fixtures and similar items in place and not-to-be-finish painted, or provide surface-applied protection. Reinstall removed items upon completion of work in each area.

H. Existing surfaces to be recoated shall be thoroughly cleaned and deglossed by sanding or other means prior to painting. Patched and bare areas shall be spot primed with same primer as specified for new work.

I. Thoroughly backpaint all surfaces of exterior and interior finish lumber and millwork, including doors and window frames, trim, cabinetwork, etc., which will be concealed after installation. Backpaint items to be painted or enameled with the priming coat. Use a clear sealer for backpriming where transparent finish is required.

J. Bare and covered pipes, ducts, hangers, exposed steel and ironwork, and primed metal surfaces of equipment installed under mechanical and electrical work shall be cleaned prior to priming.

K. Preparation of other surfaces shall be performed following specific recommendations of the coatings manufacturer.

L. Bond breakers and curing agents shall be removed and the surface cleaned before primers, sealers or finish paints can be applied.

M. All drywall surfaces shall be completely dry and dust free before painting. Skim coated drywall shall be sealed with a sealer recommended by the paint manufacturer for this surface. Use the appropriate light or medium tack masking tape.

3.4 APPLICATION:

A. Apply painting and finishing materials in accordance with the manufacturer's recommendations.

1. The number of coats specified is the minimum that shall be applied. Apply additional coats when undercoats, stains or other conditions show through final paint coat, until paint film is of uniform finish, color and appearance.

B. Apply each material at not less than the manufacturer's recommended spreading rate:

C. Apply prime coat to surface which is required to be painted or finished.

D. Finish exterior doors on tops, bottoms, and edges same as exterior faces, after fitting.

E. Sand lightly and dust clean between succeeding coats

3.5 CLEANING, TOUCH-UP AND REFINISHING:

A. Carefully remove all spattering, spots and blemishes caused by work under this section from surfaces throughout the project.

B. Upon completion of painting work remove all rubbish, paint cans, and accumulated materials resulting from work in each space or room. All areas shall be left in a clean, orderly condition.

C. Runs, sags, misses, holidays, stains and other defects in the painted surfaces, including inadequate coverage and mil thickness shall be satisfactorily touched up, or refinished, or repainted as necessary.

3.6 FINISH SCHEDULE

A. Apply the following finishes to the surfaces specified on the finish schedule or on the drawings.

B. Apply all materials in accordance with manufacturer's instructions on properly prepared surfaces and foundation coats. All intermediate undercoats must be tinted to approximate the final color.

1. Architect will issue a color schedule prior to start of painting to designate the various colors and locations required for the work.

C. Interior Systems:

1. Gypsum Board

Eggshell - Acrylic Copolymer /Acrylic

a. First Coat: VINYLASTIC® Premium Interior Wall Sealer VNPR00-1

b. Second Coat: SPARTAZERO® Low Odor | Zero VOC Interior Eggshell Paint SZRO30

c. Third Coat: SPARTAZERO® Low Odor | Zero VOC Interior Eggshell Paint SZRO30

Semi-Gloss - Zero VOC / Modified Copolymer / 100% Acrylic

d. First Coat: VINYLASTIC® Premium Interior Wall Sealer VNPR00-1

e. Second Coat: SPARTAZERO® Low Odor | Zero VOC Interior Semi-gloss Paint SZRO50

f. Third Coat: SPARTAZERO® Low Odor | Zero VOC Interior Semi-gloss Paint SZRO50

2. Ferrous Metal

Semi-Gloss - Zero VOC / Acrylic Urethane / 100% Acrylic

a. First Coat: ULTRASHIELD® Interior/Exterior DTM Gray Primer ULDM00

b. Second Coat: SPARTAZERO® Low Odor | Zero VOC Interior Semi-gloss Paint SZRO50

c. Third Coat: SPARTAZERO® Low Odor | Zero VOC Interior Semi-gloss Paint SZRO50

3. Non-Ferrous Metal

Semi-Gloss - Zero VOC / Acrylic Urethane / 100% Acrylic

a. Pretreatment: SUPREME CHEMICAL, METAL CLEAN AND ETCH (ME 01)

b. First Coat: ULTRASHIELD® Interior/Exterior DTM Gray Primer ULDM00

c. Second Coat: SPARTAZERO® Low Odor | Zero VOC Interior Semi-gloss Paint SZRO50

d. Third Coat: SPARTAZERO® Low Odor | Zero VOC Interior Semi-gloss Paint SZRO50

END OF SECTION

SECTION 09 9900
COLORS

PART 1 GENERAL

1.1 SUMMARY

A. The General Conditions and Division 1 are a part of this Section and the Contract for this Work and apply to this Section as if repeated fully herein. This section is intended to supplement the provisions of the General Conditions, and to supplement criteria established elsewhere in these documents for the basis of acceptance or rejection of requests for substitution.

1.2 COLOR SELECTION PROCESS

A. All colors will be selected by the Architect. Materials and products have been specified partly based upon the availability of colors desired by the architect as being compatible with the overall color palate for the project. A preliminary color palate has been developed based upon the materials and products specified. Although requests for substitution are encouraged in order to generate competition and equal opportunity among suppliers, the basis for acceptance or rejection of a request for substitution may rest with the availability of colors compatible with the palate. Based upon the availability of colors within the items specified or allowed as substitution a final color palate will be developed after completion of the substitution period.

1.3 REMAINING COLORS

A. Material colors not indicated below will be selected upon submittal of manufactures standard colors complying with each applicable specification.

PART 2 PRODUCTS

2.1 NOT APPLICABLE

PART 3 EXECUTION

3.1 NOT APPLICABLE

APPENDIX: FINISH LIST

END OF SECTION

FINISH LIST
GATEWAY ANNEX SCHOOL
VENTURA COUNTY OFFICE OF EDUCATION

Specification Section	Specification Name	Material ID	Manufacturer	Product Name/Series/Model	Color/Finish	Location	Remarks
08 4313	Aluminum Framed Entrances and Storefronts		Arcadia		Clear AC-2		
08 8000	Glazing	B	3M	Fasara	Milky Milky Light Grey 2H2MAMML	Storefront SF1	See A701
08 8000	Glazing	C	3M	Fasara	Cross Hairline Milky SH2CHML	Storefront SF1	See A701
09 3000	Ceramic Tile	T-1	Daltile	Portfolio Colorbody Porcelain	Dove Grey PF04 Matte	Restroom Walls	Field
09 3000	Ceramic Tile	T-2	Daltile	Portfolio Colorbody Porcelain	Skyline Blend PF12	Restroom Walls	Accent
09 3000	Ceramic Tile	T-3	Daltile	Portfolio Colorbody Porcelain	Ash Grey PF05 Matte	Restroom Floor	See A601
09 3000	Ceramic Tile	T-4				Kitchen Floor	See A601
09 6519	Resilient Tile Flooring	VCT-1	Armstrong	Standard Excelon Imperial Texture	Mid Grayed Blue 51875	Classroom Floor	See A601
09 6519	Resilient Tile Flooring	VCT-2	Armstrong	Premium Excelon Raffia Stream	Earth 55926	Platform Floor	See A601
09 6519	Resilient Tile Flooring	VCT-ST	Armstrong	Integrated Stair Treads	Pebble R4CPD	Platform Stairs	
09 6519	Resilient Tile Flooring	B-1	Burke	Rubber 4" Cove Base	323 Blue Bonnet		Base
09 6519	Resilient Tile Flooring	B-2	Burke	Rubber 4" Cove Base	660 Rocky	Platform	Base
09 6813	Tile Carpeting	CPT-1	Shaw Industries Group, Inc	Worklife Balance Tile, 59340	Harbouring Desire 40485		See A601
09 9113/ 09 9123	Exterior Painting/ Interior Painting	PT-1	Dunn Edwards		Whisper DEW340	Walls	Field
09 9113/ 09 9123	Exterior Painting/ Interior Painting	PT-2	Dunn Edwards		Slumber DE5860	Doors, exposed columns & beams	Accent
09 9113	Exterior Painting	PT-3	Dunn Edwards		Lemon Punch De5398		Accent

SECTION 10 1101
VISUAL DISPLAY BOARDS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Porcelain Enamel Marker Walls.

B. Tackable Panels.

C. Accessories.

1.2 RELATED REQUIREMENTS

A. Section 05 4100 - Structural Metal Stud Framing: Blocking and supports.

B. Section 09 2116 - Gypsum Board Assemblies: Concealed supports in metal stud walls.

1.3 REFERENCE STANDARDS

A. ASTM A424/A424M - Standard Specification for Steel, Sheet, for Porcelain Enameling; 2009a.

B. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2015a.

C. ASTM F793/F793M - Standard Classification of Wall Coverings by Use Characteristics; 2015.

1.4 SUBMITTALS

A. Product Data: Provide manufacturer's data on markerboard, trim, and accessories.

B. Shop Drawings: Indicate wall elevations, dimensions, joint locations, track head and sill details, sliding board sections and mounting details.

C. Samples: Submit two samples 2 by 2 inch in size illustrating materials and finish, color and texture of marker wall, tackable panel and trims.

D. Test Reports: Show compliance to specified surface burning characteristics requirements.

E. Manufacturer's printed installation instructions.

1.5 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

1.6 WARRANTY

A. Provide life time warranty for markerboard to include warranty against discoloration due to cleaning, crazing or cracking, and staining.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Visual Display Boards - Marker Walls:

1. Claridge Products and Equipment, Inc: www.claridgeproducts.com.

2. Polyvision Corporation (Nelson Adams): www.polyvision.com.

3. Or Equal.

B. Tackable Panels:

1. Koroseal Interior Products: www.koroseal.com.

2. Or Equal.

2.2 MARKER WALLS

A. Manufacturer: **Claridge Products and Equipment, Inc; LCS Porcelain Marker Walls as basis-of-design.**

1. Color: White.

2. Face Sheet: Porcelain enamel on steel, laminated to core, 0.024 inch (24 gage).

3. Core: Medium density fiberboard core, 7/16 inch thick, laminated to face sheet.

4. Backing: Manufacturer's standard moisture barrier backing, laminated to core.

5. Size: As indicated on drawings.

6. Perimeter Frame: 3/4-inch Extruded aluminum, with concealed fasteners.

7. Frame Finish: Anodized, satin.

8. Joints: Butt panels together for continuous writing surface. Use concealed spline joints.

9. Accessories: Provide aluminum and vinyl magnetic chalk tray; 12-inch long.Satin finish.

2.3 TACKABLE PANELS

A. Manufacturer: **Koroseal Interior Products; Walltalkers, Tac-Wall as basis-of-design.**

1. Surface materials: Uni-color, resilient, homogeneous, tackable linoleum surface consisting of linseed oil, granulated cork, rosin binders, and dry pigments calendared onto natural jute backing. Color shall extend through thickness of material.

2. Width: 48 inch wide roll.

3. Gauge: 1/4 inch. ± 90 lineal foot rolls. Flexible enough to bend around a 2-3/4 inch diameter cylinder.

4. Backing: Jute backing.

5. Size: Refer to drawings.

6. Color/Pattern: **Harbor 06.**

B. Accessories:

1. Adhesive: Solvent-free, SBR type linoleum adhesive (L-910W) per manufacturer's recommendation.

2. Sealant/Caulk: Color to match tackable surface finish color.

3. J-Trim: 1/4" clear satin anodized aluminum.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that field measurements are as indicated.

B. Verify that internal wall blocking is ready to receive work and positioning dimensions are as indicated on shop drawings.

C. Verify that wall outlets have been installed and face of outlet box is flush with face of board.

3.2 INSTALLATION - Marker Walls

A. Install marker walls in accordance with manufacturer's instructions.

B. Cut openings for wall swithces and electrical outlets.

C. Secure units level and plumb.

D. Butt Joints: Install with tight hairline joints.

E. Carefully cut holes in boards for thermostats, wall switches, and other devices..

3.3 INSTALLATION - Tackable Panels

A. Install tackable wall panels in accordance with manufacturer's recommendations on specified substrates with concealed attachments.

B. Cut sheets to size including 2 to 3 inches of overage. Allow sheets to lay flat for at least 24 hours prior to the application. Mark roll direct on the backside of each sheet. Hang sheets in sequence as cut from the roll, do not reverse every other sheet.

C. Permanent HVAC system should be set to 68º F (20º C) for at least 72 hours prior to, during, and after the installation.

D. Back roll each sheet prior to the installation to release curl memory.

E. For seamed applications, using a seam and strip cutter remove the factory edge of one sheet. Using the same tool, overlap and trace cut the mating edge of the second sheet. Repeat this step for as many sheets as required for the job.

F. Scribe, cut, and fit material to butt tightly to adjacent surfaces, built-in casework, and permanent fixtures and pipes.

G. Apply adhesive (only enough to hang one sheet at a time) with a 1/16 inch trowel to the area to receiving the sheet.

H. Work from top to bottom then side to side. Roll sheet firmly into adhesive for positive contact and to remove air bubbles.

I. Remove adhesive residue immediately.

J. Joints shall be butt jointed.

K. Install j-trim around perimeter of tackable surface. Fasten to wall and tackable surface with adhesive and concealed fasteners per manufacturer's recommendation.

3.4 CLEANING

A. Clean board surfaces in accordance with manufacturer's instructions.

B. Cover with protective cover, taped to frame.

C. Remove temporary protective cover at Date of Substantial Completion.

D. Clean wallcovering using a sponge with a neutral pH cleaning solution. Do not use abrasive cleaners. Rinse thoroughly with water and let dry before using.

E. Remove excess adhesive using methods and materials recommended by manufacturer.

END OF SECTION

SECTION 10 1400
SIGNAGE

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Interior and Exterior Accessibility and Identification Signs.
2. Directional Signage.
3. Dimensional Characters.
4. Dedication Plaque.

1.2 SUBMITTALS

A. Shop Drawings: Submit Shop Drawings indicating sign style, lettering, overall dimensions and quantities. Submit floor plans showing locations for each sign.

B. Signage Schedule: Provide information sufficient to completely define each sign for fabrication, including room number, room name, other text to be applied, sign and letter sizes, fonts, and colors.

1. When room numbers to appear on signs differ from those on the drawings, include the drawing room number on schedule.
2. Request such information from Owner through Architect at least 2 months prior to start of fabrication; upon request, submit preliminary schedule.
3. Submit for approval by Owner through Architect prior to fabrication.

C. Material Samples: Submit three samples illustrating full size sample sign, of type, style and color specified.

D. Manufacturer's installation instructions.

1.3 QUALITY ASSURANCE

A. Sign Fabricator Qualifications: Firm with 5 years experience in producing signs similar to those indicated for this Project.

B. Provide signs from one manufacturer, unless otherwise approved.

C. Pre-Installation Conference:

1. Notify Architect when signs are ready for installation. Arrange for conference at site. Do not proceed with installation until Architect's approval of specific locations and methods of attachment has been obtained.

1.4 REGULATORY REQUIREMENTS

A. Raised characters shall comply with CBC Section 11B-703.2:

1. Depth: shall be 1/32 inch (0.8 mm) minimum above their background and 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". 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. 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. CBC Sections 11B-703.4 and 11B-703.6

E. 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 and rounded shape and shall comply with CBC Table and Figure 11B-703.3.1.

F. Mounting height: A tactile sign shall be located 48” minimum to the baseline of the lowest Braille cells and 60” maximum to the baseline of the highest line of raised characters above the finish floor or ground surface.

G. Mounting location: A tactile sign shall be located on the approach side, as one enters or exits rooms or space, and be reached within 0” of the sign per CBC Section and Figure 11B -703.4 as follows:

1. Provide clear floor space of 18’ x 18” minimum, centered on the tactile characters, shall be provided beyond the arc of any door swings between the closed position and 45 degree open position.

2. On the wall at the latch side of a single door.

3. On the inactive leaf of a double door with one active leaf.

4. On the wall at the right side of a double door with two active leafs.

5. On the nearest adjacent wall where there is no wall space at the latch side of a single door or no space at the right side of a double door with two active leafs.

H. Visual characters shall comply with CBC Section 11B-703.5.

I. Pictograms shall comply with CBC Section 11B-703.6.

J. Symbol of accessibility shall comply with CBC Section 11B-703.7.

K. **Field Inspection - Tactile Signs shall be field inspected for compliance after installation (11B-703.1.1.2).**

1.5 DELIVERY, STORAGE AND HANDLING

A. Deliver products to site and protect from damage. Store until immediately prior to Notice of Completion.

1.6 WARRANTY

A. Manufacturer's Warranty: Submit manufacturer's standard warranty document executed by authorized company official.

B. Warranty Period: Two (2) years from Notice of Completion.

PART 2 - PRODUCTS

2.1 GENERAL

A. Refer to drawings for additional information for signage types, configurations, and locations.

2.2 MANUFACTURERS

A. Products of following manufacturers form basis for design and quality intended.

1. ASI (as-basis-of design) or equal.

a. Custom SignEtch I Series.

b. LPS Series.

2.3 ROOM IDENTIFICATION - Interior and Exterior Applications

A. ADA-Ready™ Panels; Custom SignEtch I Series by ASI or equal.

B. Face Material: Zinc, in 0.625inch thickness. Provide 0.125 thick where shown on drawings. Photochemically-Etched ADA panels.

C. Backing Plate Material: Aluminum, in 0.125 inch thickness. Color anodized, color to be selected by Architect from manufacturer's full range of colors.

D. Paint: Primer and urethane based color coat, of type standard with manufacturer with U.V. resistant clear urethane top coat.

E. Tactile Graphics and Text:

1. Fabrication process: Provide tactile copy and grade 2 Braille raised 1/32 inch minimum from plaque first surface by manufacturer’s photochemical etching.

2. Provide lettering and graphics precisely formed, uniformly opaque to comply with relevant ADA regulations and requirements indicated for size, style, spacing, content, position, and colors.

3. Edge Detail: Square

4. Edge Finish: Painted.

5. Panel size: As indicated on drawings.

6. Panel colors: To be slected by Architect from manufacturer's full range of colors.

7. Text or graphic colors: To be slected by Architect from manufacturer's full range of colors.

8. Letter styles, letter sizes and layout position: As indicated on drawings.

F. Mounting: Screw mount (3 screws each at restoom door sign and 4 screws each at room identification sign) with stainless steel, counter-sunk, tamper-proof mounting screw and silicone adhesive. Apply VHB mounting tape at the perimeter.

2.4 ACCESSIBILITY EXIT/EXIT ROUTE SIGNAGE

A. Interior and Exterior Applications:

1. ADA-Ready™ Panels; SignEtch I Series by ASI or equal.

2. Base Material: Zinc, in 0.0625 inch thickness. Photochemically-Etched ADA panels.

3. Paint: Primer and urethane based color coat, of type standard with manufacturer with U.V. resistant clear urethane top coat.

B. Tactile Graphics and Text:

1. Fabrication process: Provide tactile copy and grade 2 Braille raised 1/32 inch minimum from plaque first surface by manufacturer’s photochemical etching.

2. Provide lettering and graphics precisely formed, uniformly opaque to comply with relevant ADA regulations and requirements indicated for size, style, spacing, content, position, and colors.

3. Edge Detail: Square

4. Edge Finish: Painted.

5. Panel size: As indicated on drawings.

6. Panel colors: To be slected by Architect from manufacturer's full range of colors.

7. Text or graphic colors: To be slected by Architect from manufacturer's full range of colors.

8. Letter styles, letter sizes and layout position: As indicated on drawings.

C. Mounting: Screw mount (4 screws each sign) with stainless steel, counter-sunk, tamper-proof mounting screw and silicone adhesive. Apply VHB mounting tape at the perimeter.

D. Locations: Provide at each accessible building entrance. Include International symbol of accessibility with text “This facility entirely accessible by persons with disabilities”, manufacturer’s standard, approved by Architect. Sign shall be visible to persons along approaching pedestrian ways.

E. Conform to Section 3.09, Title 19, CCR.

2.5 RESTROOM SIGNS

A. Refer to ROOM IDENTIFICATION signs above for panel materials and finish.

B. Restroom Wall Signs:

1. Material: Provide tactile copy and Grade 2 Braille raised 1/32 inch minimum from plaque first surface by manufacturer’s phenolic photopolymer bonded process. Signface of single material, tactile characters and Braille integral to photopolymer. Provide raised characters and symbols to conform to California Building Code. Adhesive-fixed characters are not acceptable.

2. Panel size: As indicated on drawings.

3. Panel colors: To be slected by Architect from manufacturer's full range of colors.

4. Text or graphic colors: To be slected by Architect from manufacturer's full range of colors.

5. Letter styles, letter sizes and layout position: As indicated on drawings.

C. Restroom Door Signs:

1. Panel size: As indicated on drawings.

2. Panel colors: To be slected by Architect from manufacturer's full range of colors.

3. Text or graphic colors: To be slected by Architect from manufacturer's full range of colors.

4. Letter styles, letter sizes and layout position: As indicated on drawings.

D. Fastener: Screw mount (3 screws each at restoom door sign and 4 screws each at wall sign) with stainless steel counter-sunk, tamper-proof mounting screw and silicone adhesive. Apply VHB mounting tape at the perimeter.

2.6 EMERGENCY GAS-SHUT OFF SIGN

A. ADA-Ready™ Panels; SignEtch I Series by ASI.

1. Base Material: Zinc, in 0.0625 inch thickness. Photochemically-Etched ADA panels.

2. Paint: Primer and urethane based color coat, of type standard with manufacturer with U.V. resistant clear urethane top coat.

B. Locations: Refer to Mechanical drawings.

C. Size: 6” x 6”, text to include: “Emergency Gas-Shut Off Valve.”

2.7 FIRE SPRINKLER RISER ROOM DOOR SIGN

A. ADA-Ready™ Panels; SignEtch I Series by ASI.

1. Base Material: Zinc, in 0.0625 inch thickness. Photochemically-Etched ADA panels.

2. Paint: Primer and urethane based color coat, of type standard with manufacturer with U.V. resistant clear urethane top coat.

B. Locate one sign at each fire sprinkler riser room door as indicated in drawings.

C. Text: Sign to read “Fire Sprinkler Riser Room”, white color letters, 1 inch high on red background.

2.8 MISCELLANEOUS SIGNS - Refer to Drawings

A. ADA-Ready™ Panels; SignEtch I Series by ASI.

1. Base Material: Zinc, in 0.0625 inch thickness. Photochemically-Etched ADA panels.

2. Paint: Primer and urethane based color coat, of type standard with manufacturer with U.V. resistant clear urethane top coat.

2.9 Directional Signs

A. Sign Face: One piece 1/8 inch thick acrylic.

B. Graphic: Building Map as shown on the Drawings. Architect to provide graphic at time of submittal.

C. Size: 24" x 36" unless indicated otherwise on the Drawings.

2.10 DIRECTIONAL SIGNAGE

A. Sign Face: One piece 1/8 inch thick acrylic.

B. Graphic: Building Map as shown on the Drawings. Architect to provide graphic at time of submittal.

C. Size: 24" x 36" unless indicated otherwise on the Drawings.

2.11 DIMENSIONAL CHARACTERS

A. Basis-of-Design: Series LPS Dimensional Cut Letters by ASI, or equal.

B. Comply with requirements indicated for finish, style, and size:

1. Material: Aluminum.

2. Finish: **Duranodic Anodized; color - Dark Gray**.

3. Character Thickness: 1 inch.

4. Character Height: Varies, refer to drawings.

5. Character Style: Helvetica Medium.

6. Location: Refer to drawings.

7. Mounting: Projected mechanical attachment to substrate. Field verify mounting substrate prior to fabrication

2.12 DEDICATION PLAQUE

A. Aluminum Dedication Plaque

1. Aluminum plaque, 5/16 inch thick.

2. Surface Texture: Leatherette

3. Font: Helvetica with satin finish.

4. Border: Beveled edges, raised border with satin grain finish.

5. Logo: Raised logo using District provided PDF. Create camera ready art.

6. Mounting; Anchored to vertical surface per manufacturer's standard mounting methods.

7. Text: Up to 15 lines of texts, sized to fit plaque. Text to be provided at the submittal.

8. Size: 14" x 28", unless noted otherwise on drawings.

2.13 Fasteners: Use stainless steel, counter-sunk, vandal-proof fasteners fabricated from metals that are not corrosive to the sign material and mounting surface.

2.14 Anchors and Inserts: Use nonferrous metal or hot-dipped galvanized anchors and inserts for exterior installations and elsewhere as required for corrosion resistance. Use toothed steel or lead expansion bolt devices for drilled-in-place anchors. Furnish inserts, as required, to be set into concrete or masonry work.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify fonts, texts for each signs with Architect.

B. Verify that surfaces are ready to receive work.

C. Beginning of installation means installer accepts existing surfaces.

3.2 METHODS OF INSTALLATION

A. Wall Mounted Identification Signs :

1. Screw mount (4 screws each sign) with stainless steel, counter-sunk , tamper-proof mounting fasteners and silicone adhesive. Apply VHB mounting tape at the perimeter.

B. For installation on glass, fasten sign to glass with very high bond double faced tape. On opposite side of glass, anchor matching backplate to glass with very high-bond double-faced tape.

3.3 CLEANUP

A. Remove rubbish, debris, and waste materials and legally dispose of off Project site.

3.4 PROTECTION

A. Protect Work of this section until Substantial Completion.

3.5 SIGNAGE SCHEDULE

A. DIRECTIONAL SIGNS

1. Quantity: One.

2. Height/Location: To be determined by Owner.

B. ROOM IDENTIFICATION SIGNS - ADA Compliance

1. Quantity: 1 at each exit door.

2. Installation Height and Location: Refer to paragraph 1.4 above and details on Drawings.

C. TOILET ROOM DOOR SIGNS - California State Building Code Compliance.

1. Quantity: 1 at each toilet room.

2. Size: Doorways leading to men's sanitary facilities shall be identified by an equilateral triangle 1/4 inch thick with edges 12 inches long and a vertex pointing upward. Women's sanitary facilities shall be identified by a circle 1/4 inch thick and 12 inches in diameter. Unisex sanitary facilities shall be identified by a circle 1/4 inch thick and 12 inches in diameter and an equilateral triangle 1/4 inch thick with edges 12 inches long with the vertex pointing upward, superimposed on and geometrically inscribed within the 12 inch diameter circle. CBC Section 11B-703.7.2.6.

3. Mounting Location, Height and Color: These geometric symbols mounting height shall be 58 inches (1473 mm) minimum and 60 inches (1524 mm) maximum above the finish floor to the centerline of the sign. Where a door is provided the symbol shall be mounted within 1 inch (25 mm) of the vertical centerline of the door. Color and contrast shall be distinctly different from the color and contrast of the door. CBC Section 11B-703.7.2.6.

D. TOILET ROOM IDENTIFICATION SIGNS - ADA Compliance.

1. Quantity: 1 at each toilet room.

2. Pictogram: Man or woman or both as applicable plus International Symbol of Accessibility. 1/32 inch raised finish.

3. Text: As shown on drawings.

4. Braille: Grade 2 braille directly below text.

5. Installation Height and Location: Refer to paragraph 1.4 above.

E. DIMENSIONAL LETTERING

1. Provide where indicated on the plans.

2. Provide spacers for attachment.

3. Align letters and space equally.

END OF SECTION

SECTION 10 2113.19
PLASTIC TOILET COMPARTMENTS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Solid plastic toilet compartments and urinal screens.

1.2 RELATED REQUIREMENTS

A. Section 10 2800 – Toilet Accessories.

1.3 REFERENCE STANDARDS

A. ASTM A167 - Standard Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip.

B. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profile and Tubes.

C. ASTM E 84 - Standard Test Method for Surface Burning Characteristics of Building Materials.

1. NFPA 286 – Standard Methods of Fire Tests for Evaluating Contribution of Wall and Ceiling Interior Finish to Room Fire Growth.

1.4 SYSTEM DESCRIPTION

A. Toilet partitions floor mounted, overhead braced.

B. Urinal screens wall mounted.

1.5 SUBMITTALS

A. Submittals for Review:

1. Shop Drawings: Include dimensioned layout, elevations, trim, closures, and accessories.

1.6 QUALITY ASSURANCE

A. Manufacturer Qualifications: Minimum 5 years experience in manufacture of solid plastic toilet compartments with products in satisfactory use under similar service conditions.

B. Installer Qualifications: minimum 5 years experience in work of this Section.

C. 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 9" high minimum above the finish floor and 6" deep minimum beyond the compartment side face of the partition, exclusive of partition support members. It shall be 12" high minimum above the finish floor for children's use. Partition components at toe clearances shall be smooth without sharp edges or abrasive surfaces. Toe clearance at the side partition is not required in a compartment greater than 66" wide.

3. 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" minimum. CBC Figure11B-604.8.2.

4. 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.

1.7 PROJECT CONDITIONS

A. Field Measurements: Verify actual locations of walls, columns, ceilings, and other construction contiguous with toilet compartments by field measurements before fabrication and indicate measurements on Shop Drawings.

1.8 WARRANTIES

A. Provide manufacturer's 25 year warranty against breakage, corrosion and delamination under normal conditions.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Contract Documents are based on products by Scranton Products (www.scrantonproducts.com)

B. Substitutions:

1. Ampco Products, Inc; www.ampco.com.

2. Metpar Corp; www.metpar.com.

C. Or equal.

D. MATERIALS

1. Doors, Panels and Plasters:

a. Solid Plastic fabricated from polymer resins compounded under high pressure, forming single thickness panel.

1) Waterproof and nonabsorbent, with self-lubricating surface, resistant to marks by pens, pencils, markers, and other writing instruments.

2) 1 inch thick with edges rounded to ¼ inch radius.

3) Recycled content: Minimum 25 percent.

4) Fire hazard classification:

2. Aluminum Extrusions: ASTM B221, 6463-T5 alloy and temper.

3. Stainless Steel: ASTM A167, Type 304

2.2 HARDWARE

A. Hinges: Regal hinge fabricated from heavy-duty cast aluminum, wrap around flanges, adjustable on 30-degree increments, through bolted to doors and pilasters.

B. Door: Strike and Keeper:

1. 6 inches long, fabricate from heavy-duty extruded aluminum with bright dip anodized finish, with wrap- around flanges secured to pilasters with stainless steel tamper resistant Torx head sex bolts.

2. Bumper: Extruded black vinyl.

C. Latch and Housing:

1. Heavy-duty extruded aluminum.

2. Latch housing: Bright dip anodized finish.

3. Slide latch and paddle.

D. Coat Hook/Bumper:

1. Combination type, chrome plated Zamak

2. Equip outswing handicapped doors with second door pull and door stop.

E. Door Pulls: Chrome plated Zamak.

2.3 COMPONENTS

A. Doors and Dividing Panes: 55 inches high, mounted 14 inches above finished floor, [with aluminum heat-sinc fastened to bottom edges.]

B. Pilasters: 82 inches high, fastened to pilaster sleeves with stainless steel tamper resistant Torx head sex bolt.

C. Pilaster Sleeves: 3 inches high, 20 gage stainless steel, secured to pilaster with stainless steel tamper resistant Torx head sex bolt.

D. Wall Brackets: 54 inches long, heavy-duty aluminum, bright dip anodized finish, fastened to pilasters and panels with stainless steel tamper resistant Torx head sex bolts.

E. Headrail: Heavy duty extruded aluminum, anti-grip design, clear anodized finish, fastened to headrail bracket with stainless steel tamper resistant Torx head sex bolt and at top of pilaster with stainless steel tamper resistant Torx head screws.

F. Headrail Brackets: 20 gage stainless steel, satin finish, secured to wall with stainless steel tamper resistant Torx heads crews.

PART 3 EXECUTION

3.1 INSTALLATION

A. Install compartments in accordance with manufacturer's instructions and approved Shop Drawings.

B. Install rigid, straight, plumb, and level.

C. Locate bottom edge of doors and panels 14 inches above finished floor.

D. Provide uniform, maximum 3/8 inch vertical clearance at doors.

E. Not Acceptable: Evidence of cutting, drilling, or patching.

3.2 ADJUSTING

A. Adjust doors and latches to operate correctly.

END OF SECTION

SECTION 10 2226
OPERABLE PARTITIONS

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Manually operated, paired panel operable partitions.

B. Related Sections include the following:

1. Division 3 Sections for concrete tolerances required.

2. Division 5 Sections for primary structural support, including pre-punching of support members by structural steel supplier per operable partition supplier's template.

3. Division 6 Sections for wood framing and supports, and all blocking at head and jambs as required.

4. Division 9 Sections for wall and ceiling framing at head and jambs.

1.3 QUALITY ASSURANCE

A. Installer Qualifications: An experienced installer who is certified in writing by the operable partition manufacturer, as qualified to install the manufacturer's partition systems for work similar in material, design, and extent to that indicated for this Project.

B. Acoustical Performance: Test operable partitions in an independent acoustical laboratory in accordance with ASTM E90 test procedure and classified in accordance with ASTM E413 to attain no less than the STC rating specified. Provide a complete and unedited written test report by the testing laboratory upon request.

C. Preparation of the opening shall conform to the criteria set forth per ASTM E557 Standard Practice for Architectural Application and Installation of Operable Partitions.

D. The operable wall must be manufactured by a certified ISO-9001-2015 company or an equivalent quality control system.

1.4 REFERENCE STANDARDS

A. ASTM International

1. ASTM E557 Standard Practice for Architectural Application and Installation of Operable Partitions.

2. ASTM E90 - Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements.

3. ASTM C1036 - Standard Specification for Flat Glass.

4. ASTM C1048 - Heat-Treated Flat Glass—Kind HS, Kind FT Coated and Uncoated Glass.

5. ASTM E84 - Surface Burning Characteristics of Building Materials.

6. ASTM E413 - Classification for Rating Sound Insulation

B. Health Product Declaration Collaborative

1. Health Product Declaration Open Standard v2.1

C. International Standards Organization

1. ISO 14021 - Environmental Labels and Declarations - Self-Declared Environmental Claims (Type II Environmental Labeling).

2. ISO 14025:2011-10, Environmental Labels and Declarations - Type III Environmental Declarations - Principles and Procedures.

a. ISO 14040:2009-11, Environmental Management - Life Cycle Assessment - Principles and Framework.

b. ISO 14044:2006-10, Environmental Management - Life Cycle Assessment - Requirements and Guidelines.

3. ISO 21930 – Sustainability in Buildings and Civil Engineering Works — Core Rules for Environmental Product Declarations of Construction Products and Services.

D. Other Standards

1. ADA – Americans with Disabilities Act.

2. ANSI Z97.1 - Safety Glazing Materials Used in Buildings.

3. CPSC 16 CFR 1201 - Safety Standard for Architectural Glazing Materials.

4. NEMA LD3 - High Pressure Decorative Laminates.

1.5 SUBMITTALS

A. Product Data: Material descriptions, construction details, finishes, installation details, and operating instructions for each type of operable partition, component, and accessory specified.

B. Shop Drawings: Show location and extent of operable partitions. Include plans, elevations, sections, details, attachments to other construction, and accessories. Indicate dimensions, weights, conditions at openings, and at storage areas, and required installation, storage, and operating clearances. Indicate location and installation requirements for hardware and track, including floor tolerances required and direction of travel. Indicate blocking to be provided by others.

C. Setting Drawings: Show imbedded items and cutouts required in other work, including support beam punching template.

D. Samples: Color samples demonstrating full range of finishes available by architect. Verification samples will be available in same thickness and material indicated for the work.

E. Reports: Provide a complete and unedited written sound test report indicating test specimen matches product as submitted.

F. Create spaces that are healthy for occupants.

1. Furnish products and materials with Health Product Declaration (HPD), Manufacturer Inventory, or other material health disclosure documentation. Products without an HPD or other disclosure documentation are not acceptable.

G. Furnish materials that generate the least amount of pollution.

1. Furnish products and materials that have third party verified environmental product declarations (EPD's). Consider products and materials that have optimized environmental performance (reduced life cycle impacts). Products without an EPD or other disclosure documentation are not acceptable.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Clearly mark packages and panels with numbering systems used on Shop Drawings. Do not use permanent markings on panels.

B. Protect panels during delivery, storage, and handling to comply with manufacturer's direction and as required to prevent damage.

1.7 WARRANTY

A. Provide written warranty by manufacturer of operable partitions agreeing to repair or replace any components with manufacturing defects.

1. Warranty period: Two (2) years.

PART 2 – PRODUCTS

2.1 MANUFACTURERS, PRODUCTS, AND OPERATION

A. Manufacturers: Subject to compliance with requirements, provide products by the following:

1. Modernfold, Inc.

2. Or equal.

B. Product Basis of Design: Subject to compliance with the requirements, provide the following product:

1. Acousti-Seal Legacy – Paired Panel (932) manually operated paired panel operable partition.

2.2 OPERATION

A. Acousti-Seal Legacy – Paired Panel (932): Series of paired flat panels hinged together in pairs, manually operated, top supported with operable floor seals.

B. Final Closure:

1. Horizontally expanding panel edge with removable crank

2. Hinged panel closure

3. Enclose

2.3 PANEL CONSTRUCTION

A. Nominal 3-inch (76mm) thick panels in manufacturer's standard 48-inch (1220mm) widths. All panel horizontal and vertical framing members fabricated from minimum 16-gage formed steel with overlapped and welded corners for rigidity. Top channel is reinforced to support suspension system components. Frame is designed so that full vertical edges of panels are of formed steel and provide concealed protection of the edges of the panel skin.

B. Panel Skin:

1. Roll-formed 21-gage steel wrapping around panel edge. Panel skins shall be lock formed and welded directly to the frame for unitized construction. Acoustical ratings of panels with this construction:

a. 50 STC

C. Hinges for Closure Panels, Pass Doors, and Pocket Doors shall be:

1. Full leaf butt hinges, attached directly to panel frame with welded hinge anchor plates within panel to further support hinge mounting to frame. Lifetime warranty on hinges. Hinges mounted into panel edge or vertical astragal are not acceptable.

2. SOSS® Invisible laminated hinge with antifriction segments mounted between each heat-treated link. Hinge to be attached directly to panel frame. Welded internal hinge bracket shall support the hinge and allow for adjustment of hinge plates. Concealed hinges mounted into edge or vertical astragal are not acceptable (available on steel skin panel only).

D. Panel Trim: No vertical trim required or allowed on edges of panels; minimal groove appearance at panel joints.

E. Panel Weights:

1. 50 STC - 8 lbs./square foot

2.4 PANEL FINISHES

A. Panel face finish shall be:

1. Full height steel markerboard work surface.

2. Full height 1/4-inch (6.35 mm) natural cork tackboard with vinyl or fabric covering.

B. Panel trim: Exposed panel trim of one consistent color from manufacturer's standard offering:

1. Smoke Gray

2.5 SOUND SEALS

A. Vertical Interlocking Sound Seals between panels: Roll-formed steel astragals, with reversible tongue and groove configuration in each panel edge for universal panel operation. Rigid plastic or aluminum astragals or astragals in only one panel edge are not acceptable.

B. Horizontal Top Seals: Continuous contact extruded vinyl bulb shape with pairs of non-contacting vinyl fingers to prevent distortion without the need for mechanically operated parts.

1. Horizontal Bottom Seals:

a. A2 - Automatic operable seals providing nominal 2-inch (51 mm) operating clearance with an operating range of +1/2-inch (13mm) to –1-1/2 inch (38 mm) which automatically drop as panels are positioned, without the need for tools or cranks.

2.6 SUSPENSION SYSTEM

A. #17 Suspension System

1. Suspension Tracks: Minimum 11-gage, 0.12-inch (3 mm) roll-formed steel track, suitable for either direct mounting to a wood header or supported by adjustable steel hanger brackets, supporting the load-bearing surface of the track, connected to structural support by pairs of 3/8-inch (9.5mm) diameter threaded rods. Aluminum track is not acceptable.

a. a. Exposed track soffit: Steel, integral to track, and pre-painted off-white.

2. Carriers: One all-steel trolley with steel-tired ball bearing wheels per panel (except hinged panels). Non-steel tires are not acceptable.

a. Warranty period: Five (5) years.

2.7 OPTIONS

A. Hardware:

1. Hand pull with push plate.

B. Work Surfaces:

1. Markerboard: White enamel on steel, bonded to the face of the panel with horizontal trim without exposed fasteners. Trim is not acceptable on vertical edges to provide uninterrupted work surface.

2. Tackboard: Minimum 1/4-inch (6.35 mm) natural cork, covered with vinyl or fabric, with horizontal trim without exposed fasteners. Trim is not acceptable on vertical edges.

C. Accessories:

1. Finished end caps.

2. Intersecting partition interface.

PART 3 – EXECUTION

3.1 INSTALLATION

A. General: Comply with ASTM E557, operable partition manufacturer's written installation instructions, Drawings and approved Shop Drawings.

B. Install operable partitions and accessories after other finishing operations, including painting have been completed.

C. Match operable partitions by installing panels from marked packages in numbered sequence indicated on Shop Drawings.

D. Broken, cracked, chipped, deformed, or unmatched panels are not acceptable.

3.2 CLEANING AND PROTECTION

A. Clean partition surfaces upon completing installation of operable partitions to remove dust, dirt, adhesives, and other foreign materials according to manufacturer's written instructions.

B. Provide final protection and maintain conditions in a manner acceptable to the manufacturer and Installer that ensure operable partitions are without damage or deterioration at time of Substantial Completion.

3.3 ADJUSTING

A. Adjust operable partitions to operate smoothly, easily, and quietly, free from binding, warp, excessive deflection, distortion, nonalignment, misplacement, disruption, or malfunction, throughout entire operational range. Lubricate hardware and other moving parts.

3.4 EXAMINATION

A. Examine flooring, structural support, and opening, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of operable partitions. Proceed with installation only after unsatisfactory conditions have been corrected.

3.5 DEMONSTRATION

A. Demonstrate proper operation and maintenance procedures to Owner's representative.

B. Provide Operation and Maintenance Manual to Owner's representative.

END OF SECTION

SECTION 10 2601
WALL PROTECTION

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Metal crash rails.

1. Crash rails.

1.2 RELATED REQUIREMENTS

A. Section 05 4100 - Structural Metal Stud Framing

B. Section 09 2116 - Gypsum Board Assemblies

1.3 REFERENCE STANDARDS

A. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2015a.

B. ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Material, 2016a.

1.4 SUBMITTALS

A. Product Data: Indicate physical dimensions, features, anchorage details, and rough-in measurements.

B. Samples: Submit samples illustrating component design, configurations, joinery, color and finish.

1. Submit two sections of crash rail, 6 inches long.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Construction Specialties, Inc: www.c-sgroup.com/#sle.

B. Babcock-Davis: www.babcockdavis.com.

C. Wallguard: www.wallguard.com

D. Or equal.

2.2 PRODUCT TYPES

A. Crash Rails: Factory- or shop-fabricated, with preformed end wall returns, and internal and external corners:

1. Performance: Resist lateral force of 250 lbs at any point without damage or permanent set.

2. Material: 16 gauge stainless steel, type 304 alloy with #4 sating finish.

3. Dimensions: 5-1/2 inches high by 1-1/2 inches deep with steel ends. Length to be one piece.

4. Mounting: Mount mounting bracket to blocking or studs with two #10 x 1-1/2 inches sheet metal screws at 32" on center.

5. Locations: Refer to drawings.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that rough openings, concealed blocking, and anchors are correctly sized and located.

3.2 INSTALLATION

A. Install components in accordance with manufacturer's instructions, level and plumb, secured rigidly in position to supporting construction.

END OF SECTION

SECTION 10 2800
RESTROOM ACCESSORIES

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Commercial toilet accessories.

B. Accessories for restrooms, support spaces and where shown on drawings..

C. Grab bars.

1.2 RELATED REQUIREMENTS

A. Section 06 1000 – Rough Carpentry.

B. Section 09 2900 - Gypsum Board.

C. Section 09 3000 - Tiling.

1.3 REFERENCE STANDARDS

A. 36 CFR 1191 - Americans with Disabilities Act (ADA) Accessibility Guidelines for Buildings and Facilities; Architectural Barriers Act (ABA) Accessibility Guidelines; current edition.

1.4 ADMINISTRATIVE REQUIREMENTS

A. Coordinate the work with the placement of internal wall reinforcement, concealed ceiling supports, and reinforcement of toilet partitions to receive anchor attachments.

1.5 REGULATORY REQUIREMENTS

A. Elements of Sanitary facilities shall be mounted at locations in compliance with CBC Sections 11B-602 through 11B-612.

B. Grab bars in toilet facilities and bathing facilities shall comply with CBC Section 11B-609.

C. 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:

1. 1 ½" minimum between the grab bar and the wall.

2. 1 ½" minimum between the grab bar and projecting objects below and at the ends.

3. 12" minimum between the grab bar and projecting objects above.

D. Toilet tissue dispenser to be continuous flow type.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Commercial Toilet Accessories:

1. Bobrick as the basis of design.

2. American Specialties, Inc: www.americanspecialties.com.

3. Bradley Corporation: www.bradleycorp.com.

2.2 RESTROOM ACCESSORIES

A. MATERIALS

1. Accessories - General: Shop assembled, free of dents and scratches and packaged complete with anchors and fittings, steel anchor plates, adapters, and anchor components for installation.

    a. Grind welded joints smooth.

    b. Fabricate units made of metal sheet of seamless sheets, with flat surfaces.

2. Keys: Provide 2 keys for each accessory to Owner; master key lockable accessories.

3. Stainless Steel Sheet: ASTM A666, Type 304.

4. Stainless Steel Tubing: ASTM A269/A269M, Grade TP304 or TP316.

5. Mirror Glass: Annealed float glass, ASTM C1036 Type I, Class 1, Quality Q2, with silvering, protective and physical characteristics complying with ASTM C1503.

6. Adhesive: Two component epoxy type, waterproof.

7. Fasteners, Screws, and Bolts: Hot dip galvanized; tamper-proof; security type.

8. Expansion Shields: Fiber, lead, or rubber as recommended by accessory manufacturer for component and substrate.

2.3 FINISHES

A. Stainless Steel: Satin finish, unless otherwise noted.

B. Commercial Toilet Accessories

1. See drawings for accessories and basis of design model number. Provide solid in-wall backing for each accessory.

2. Toilet tissue dispensers at accessible stalls to be continuous flow.

3. Grab bars to by length as noted on the plans and 1 1/2 inch diameter.

4. Grab Bars: Stainless steel, nonslip grasping surface finish.

    a. Standard Duty Grab Bars:

        1) Push/Pull Point Load: 250 pound-force, minimum.

        2) Dimensions: 1-1/4 inch outside diameter, minimum 0.05 inch wall thickness, exposed flange mounting,1- 1/2 inch clearance between wall and inside of grab bar.

        3) Peened grip suface

            (a) Length and Configuration: As indicated on drawings.

5. Combination Sanitary Napkin/Tampon Dispenser: Stainless steel, recessed.

6. Sanitary Napkin Disposal Unit: Stainless steel, surface-mounted, self-closing door, locking bottom panel with full-length stainless steel piano-type hinge, removable receptacle.

2.4 RESTROOMS

A. Provide restroom accessories as shown on drawings.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify existing conditions before starting work.

B. Verify exact location of accessories for installation.

C. Verify that field measurements are as indicated on drawings.

3.2 PREPARATION

A. Deliver inserts and rough-in frames to site for timely installation.

B. Provide templates and rough-in measurements as required.

3.3 INSTALLATION

A. Install accessories in accordance with manufacturers' instructions in locations indicated on the drawings.

B. Install plumb and level, securely and rigidly anchored to substrate.

C. Mounting Heights: As required by accessibility regulations.

3.4 PROTECTION

A. Protect installed accessories from damage due to subsequent construction operations.

END OF SECTION

SECTION 10 4400
FIRE PROTECTION SPECIALTIES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Fire extinguishers.
2. Fire blankets.
3. Fire blanket-extinguisher cabinets.
4. Accessories.

B. Related Sections:

1. Section 05 4100 - Structural Metal Stud Framing.
2. Section 09 2116 - Gypsum Board Assemblies

1.2 SUBMITTALS

A. Shop Drawings: Indicate materials, sizes, anchorage, and installation details.

B. Product Data: Submit manufacturer's product literature, indicating product characteristics.

C. Material Samples: Submit manufacturer's standard cabinet color Samples for selection by Architect.

1.3 QUALITY ASSURANCE

A. Installer shall be manufacturer trained and certified to install the Work of this section.

1.4 DELIVERY, STORAGE AND HANDLING

A. Deliver products in manufacturer's wrapping to protect items.

B. Store items in a dry, enclosed area.

PART 2 PRODUCTS

2.1 FIRE EXTINGUISHERS AND CABINETS

A. Location: Fire blanket-extinguisher cabinets and fire extinguishers shall be installed where indicated on Drawings or as required by authorities having jurisdiction.

B. Manufacturer: Fire extinguishers and cabinets shall be manufactured by one of the following:

1. Potter-Roemer
2. J. L. Industries
3. Larsen’s Manufacturing

C. Fire Extinguisher Type: Provide a legally appropriate rechargeable fire extinguisher for every fire extinguisher cabinet and as otherwise indicated.

1. **Fire Extinguisher** - Bracket mounted type:

a. Type ABC multi-purpose dry chemical with UL rating **2A:10B:C**, 5 lb. capacity with red glossy polyester coated steel cylinder, pressure gauge, hose and horn. Maximum Height: 15 ¼". Maximum Cylinder Diameter: 4 ½".

b. Location: **One per laboratory**, and where shown on drawings.

2. Fire Extinguisher Requirements:

a. Design Specification:

1) Finish: Corrosion and impact resistant red epoxy.

2) Valve Stem Assembly: Metal, reusable, connects to cylinder by threaded pipefitting, aluminum or steel siphon tube, and shatter resistant plastic face gauge.

3) Gauge to Indicate: "Recharge," "fully charged (195 PSI)," and "over charge."

4) Pull Pin: Metal, reusable and securely fastened to unit with metal, aluminum chain or very heavy plastic line approximately 4 ½" long.

5) Mechanical Operation: Pistol grip, heavy duty metal handle (plastic not permitted), and shall be operated by a grip and squeeze lever.

b. Manufacturer Identification/Information: Manufacturer's name, date manufactured, model number, U.L. approval seal and/or number, contents operating instructions, etc. shall be identified on the Fire Extinguisher.

c. Warning and First Aid Label: Fire extinguisher must indicate all standard warnings concerning breathing, eyes, skin and ingestion. Provide emergency and first aid procedures.

d. Repair Parts: The manufacturer and/or their representative shall maintain within the Los Angeles Metropolitan Area an adequate stock of replacement parts, available for immediate delivery.

e. Warranty:

1) Manufacturer shall provide a 5 year material warranty.

2) Installer shall provide a 5 year labor warranty.

f. Material Safety Date Sheet: Provide an MSDS sheet with every shipment as set forth in the California Labor Code, Section 6390.

D. **Semi-Recessed Cabinet**: Provide semi-recessed, rolled edge trim cabinet with 21/2-inch projection:

1. **Larsen's Manufacturing Fire Blanket-Extinguisher Cabinet FB3612RL or equal**:

a. Cabinet shall accomodate both fire blankets and up to a 20 lbs ABC fire extinguisher. Include a shelf for fire blankets.

b. Door Style: either DVL (Duo Vertical Panel with lock) or E (Center Break Glass with lock), glass to be clear tempered safety glass.

c. Cabinet Door and Frame: Cold rolled steel with electrostatically applied, thermally fused polyester coating with recoatable white finish.

d. Identification Lettering: Cabinet door to be furnished with die cut lettering indicating "FIRE EXTINGUISHERS" in red, and either vertical or horizontal lettering depending upon door style.

e. Location: **One per laboratory**, and where shown on drawings.

E. **Fire Blanket**: Provide three 62 x 80 inch fire retardant blanket per cabinet. Fire retardant blanket shall be fabricated of a rugged blend of reprocessed wool. Fire retardant blankets shall meet federal specification #CS-191-53.

PART 3 EXECUTION

3.1 INSTALLATION

A. Installation shall be in accordance with manufacturer's recommendations. Install Fire Extinguishers such that the distance from finished floor to handle does not exceed 48".

B. Cabinets shall be installed plumb and level, where indicated on Drawings, at heights required by authorities having jurisdiction.

C. Fire extinguisher cabinets must comply with CBC Sections 11B-307, 11B-308, 11B-309 and 11B-403.

D. Secure rigidly in place.

E. Place extinguishers and accessories in cabinets and on wall brackets.

3.2 PROTECTION

A. Protect the Work of this section until Substantial Completion.

3.3 CLEANUP

A. Remove rubbish, debris, and waste materials and legally dispose of off the Project site.

END OF SECTION

SECTION 11 4000
FOODSERVICE EQUIPMENT

PART 1 – GENERAL

1.1 SECTION INCLUDES:

A. Foodservice equipment.

1.2 SCOPE OF WORK:

A. Furnish all labor, materials, and services necessary for the procurement and installation of the equipment included in this section.

B. Supervise and provide required instructions for work to be performed by other contractors in connection with requirements for all equipment included this section.

C. Specifications and drawings have been prepared to form the basis for coordination with the other trades on this Project, procurement, erection, start-up, and adjustment of all equipment in this section. Plans and specifications are to be considered as mutually explanatory and work required by one, but not by the other, is to be performed as though required by both. Items required by one, but not by the other are to be provided as though required by both. Work to be accomplished as called for in specifications and shown on drawings, so that all items of equipment are completely functional for purpose for which they were designed. When/if there is any discrepancy between drawings and specifications, bidders should seek clarification of any discrepancies from the Consultant prior to bidding.

D. Should the drawings disagree between themselves or the specifications with the drawings, the better quality more stringent, and/or greater quantity of the work or materials to be completed without additional costs to the Owner.

E. Secure and pay fees for all permits and licenses as required by all authorities having jurisdiction. Give all notices and comply with all laws, ordinances, rules, regulations, and contract requirements bearing on the work.

1.3 RELATED DIVISIONS / SECTIONS:

A. Refer to General Conditions, Supplementary Conditions, and applicable provisions of Division 1 for additional instructions.

B. Refer to Interior Design Divisions for applicable provisions and sections regarding décor finishes, applications, details, and special instructions relating to items specified in this Section. Applicable to Projects with items specified in this Section, with décor finishes and/or construction.

C. Refer to Mechanical/Plumbing Divisions for applicable provisions and sections regarding mechanical services, including, but not limited to exhaust ductwork and fans, floor sinks and floor drains, water gas and steam rough-ins, grease traps, steam traps, drain traps, potable water backflow prevention atmospheric vents, and RPZ valves, valves, pipes and pipe fittings, ductwork, and other materials necessary to complete final connections to individual items as specified in this Section. Not work of this Section. Also includes:

1. Piping and insulation for fryer oil systems.

2. Piping for remote pulping systems.

3. All exhaust hood or ventilator duct work and fans upstream from the connection position.

D. Refer to Electrical Divisions for applicable provisions and sections regarding electrical services, including, but not limited to, rough-ins, standard voltage and low-voltage wiring, conduit, drop-cords, ceiling-mounted cord reel assemblies, disconnects and other materials necessary to complete final connections to individual items as specified in this Section. Not work of this Section. Also includes:

1. Installation of light fixtures furnished loose at cold storage rooms.

2. Connection of cold storage room temperature alarm system to the building security system.

3. Connection of hood fire suppression system to the building security system.

E. Work included in other Divisions - Provision of all walls, floor, and/or ceiling/roof openings, and sealing thereof, as necessary for installation of items included in this section. Not work of this Section. Also includes:

1. Slab depressions reinforced concrete wearing bed and interior finished floor with coved base at prefabricated cold storage assemblies.

2. Concrete or masonry platforms with finished top and coved base at perimeter, for raised setting of foodservice equipment: Divisions 03/09.

3. Slab depressions to receive stainless-steel drain trench liner/grate assemblies provided under this Section.

4. Wall backing to support all wall-mounted equipment.

5. Conduit and piping sleeves for soda, beer/liquor, refrigeration, CO2 and drain lines through building ceilings and floors.

F. Work included in other Divisions - Disconnection of existing equipment to be relocated and/or reused; and removal of existing equipment which will not be reused, as determined, and designated by the Architect in other Divisions. Not work of this Section. (Applicable to Projects with existing equipment.)

1.4 DEFINITIONS:

A. Furnish - Supply and deliver to Project Site, ready for unloading, unpacking, assembly, installation, and similar operations.

B. Install (set in place) - Operations at Project Site including actual unloading, unpacking, assembly, erecting, placing, anchoring, applying, finishing, curing, protecting, cleaning and similar operations, ready for final utility connections by other Divisions as appropriate.

C. Provide - Furnish and install complete, ready for intended use, including any necessary initial training.

D. Contractor - Refers to the Kitchen Equipment (Sub) Contractor in this Section. References to any other Contractor or Division will be specific, such as General Contractor, Plumbing (Sub) Contractor / Division, Electrical (Sub) Contractor / Division, Architect designated, etc.

1.5 LAWS, ORDINANCES, REGULATIONS AND STANDARDS:

A. Comply with the following in their current published form:

1. Air Conditioning and Refrigeration Institute (A.R.I): applicable regulations and references of the latest edition of standards for remote refrigeration system(s), components, and installation.

2. American Gas Association (A.G.A.): standards for gas heated equipment and provide equipment with the A.G.A. seal. Automatic safety pilots to be provided on all equipment, where available. (Canadian Gas Association or alternate testing lab's seals accepted if acceptable to local code jurisdictions.)

3. American National Standards Institute (A.N.S.I.): Z21-Series for gas-burning equipment. Provide labels indicating name of testing agency.

4. American National Standards Institute (A.N.S.I.): B57.1 for compressed gas cylinder connections, and with applicable standards of the Compressed Gas Association for compressed gas piping.

5. American National Standards Institute (A.N.S.I.): A40.4 and A40.6 for water connection air gaps and vacuum breakers.

6. American Society of Heating, Refrigeration and Air Conditioning Engineers (A.S.H.R.A.E.): applicable regulations and references of the latest edition of standards for exhaust system planning including A.S.H.R.A.E. 90.1 Section 5,6,7, and remote refrigeration system(s), components, and installation.

7. American Society of Mechanical Engineers (A.S.M.E.): Boiler Code requirements for steam generating and steam heated equipment and provide A.S.M.E. inspection stamp and registration with National Board.

8. American Society for Testing and Materials (A.S.T.M.): C1036 for flat glass.

9. American Society for Testing and Materials (A.S.T.M.): C1048 for heat-treated flat glass - Kind HS, Kind FT coated and uncoated glass.

10. American Society for Testing and Materials (A.S.T.M.): F232-03 for pre-rinse spray units, and in compliance with Energy Policy Act of 2005 (EPAct).

11. American Welding Society (A.W.S.): D1.1 structural welding code.
12. Energy Policy Act of 2005 (EPAct 2005): water savings pre-rinse spray valves.
13. National Electric Code (N.E.C.): N.F.P.A. Volume 5 for electrical wiring and devices included with foodservice equipment, A.N.S.I. C2 and C73, and applicable N.E.M.A. and N.E.C.A. standards.
14. National Electrical Manufacturers Association (N.E.M.A.): LD3 for high-pressure decorative laminates.
15. National Fire Protection Association (N.F.P.A.): applicable sections for exhaust hoods, ventilators, duct and fan materials, hoods fire suppression systems, wheel placement systems, construction, and installation; in addition to local codes and standards.
16. National Sanitation Foundation (NSF): latest Standards and Revisions, and as accredited by ANSI, IAS, NELAC, ISO, OSHA, and SCC. Provide NSF Seal of Approval on all standard manufactured items included in this Project and listed in any NSF Certified Food Equipment Products Category, and on all items of custom fabricated work included in this Project. (UL Sanitation approval and seal accepted if acceptable to local code jurisdictions.)
17. Sheet Metal and Air Conditioning Contractor's National Association (S.M.A.C.N.A.): latest edition of guidelines for seismic restraint of kitchen equipment, as applicable to project location. All seismic requirements shall be shown on all submittals. Submit requested information to the agencies and authorities having jurisdiction.
18. Underwriters Laboratories (U.L.): as applicable for electrical components and assemblies. Provide either U.L. labeled products or, where no labeling service is available, “recognized markings” to indicate listing in the U.L. “Recognized Component Index”. (Canadian Standards Association or alternate testing lab's seals accepted if acceptable to local code jurisdictions.)
19. UL 300 Standard: for wet chemical fire suppression systems for exhaust hoods/ventilators.
20. American with Disabilities Act (ADA): as applicable to this Project.
21. Refrigeration Service Engineers Society (R.S.E.S.): applicable regulations and references of the latest edition of standards for remote refrigeration system(s), components, and installation.
22. All refrigerants used for any purpose is to comply with the 1995 and 2010 requirements of the Montreal Protocol Agreement, and subsequent revisions and amendments. No CFC or HCFC refrigerants will be permitted on this Project.
23. All refrigeration components installation, repairs, and/or associated work on any refrigeration system, is to be performed by a Certified Refrigeration Mechanic thoroughly familiar with this type of commercial foodservice installation. ETL and other national and international recognized Testing and Listing Agency labels and certifications are acceptable in lieu of Listing Agencies indicated in these documents, if acceptable to the local code jurisdictions.
24. All applicable local codes, standards, and regulations.
25. All special local codes, standard, and regulations such as (examples only) California Energy Commissions Regulations, Dade County requirements for walk-in cooler(s) and/or freezer(s).
26. For detention facilities projects (as applicable): applicable Correctional Standards. Verify the level of security and construction required with the Architect and provide all items in compliance.

B. The Contract Documents shall prevail whenever they require larger sizes or higher standards than are required by regulations.

C. The above regulations shall govern whenever the Contract Documents require something that is deemed to violate the above regulations.

D. No extra charge will be paid by Owner for furnishing items required by the regulations, but not specified and/or shown on the drawings.

E. Rulings and interpretations of the enforcing agencies shall be considered part of the regulations.

1.6 CONTRACTOR'S QUALIFICATIONS:

A. In addition to requirements of Related Sections 1.3.A:

1. Five (5) years minimum continuous operation under the same company name and ownership.

2. Financial stability and ability to complete this Project.

3. Comparable size and scope projects completed in the last five (5) years.

4. Contractor to provide letter that states they are able-to purchase, distribute, and install all items specified.

B. Any sub-contractor or fabricator employed by Contractor:

1. Is to comply with the same qualifications.

2. Their name, address, and a brief-summary of their experience and qualifications is to be submitted with the bid proposal.

3. Fabrication sub-contractor shall be NSF, NEC, and UL-approved at a minimum for fabrication of all items detailed within this specification and attending drawing set. Moreover, fabrication shop shall have the means and expertise to fully engineer and fabricate any-and-all counters, tables, natural and man-made stone counter tops, food shields, etc. all in one manufacturing facility where specified as part of this document set.

1.7 BIDDING AND SUBSTITUTIONS:

A. The Bidder shall provide pricing on primary manufacturer and model specified. These Contract Documents were designed and engineered using the primary manufacturer and model and are intended to be the Basis of Bid. Provide itemized prices for each item, along with cited accessories with separate total prices for delivery and installation. Any-and-all city, state, occupational and government taxes which are applicable to this project, shall be included and added as a separate charge. All figures shall be included in a grand total package bid proposal. Bids shall be valid for thirty (30) days after bid deadline date and shall indicate same. Failure to comply with the above may be cause for rejection of the bid.

B. Unless otherwise noted, substitutions may be submitted for consideration, but must be itemized at the end of the bid proposal.

C. Substitutions must be approved in writing by the Architect and/or Owner, prior to utilization in this Contract. A copy of the approval must be included with any submittals by Contractor.

D. Contractor shall provide all design/engineering services required to make-adjustments in space, systems, utilities, etc. and pay all additional costs of utilities, construction or professional services that may be incurred due to the acceptance of any substitution.

E. Application for Substitution of Specified Foodservice Equipment. This form shall be submitted in support of each suggestion of request to substitute an alternate manufacturer and/or model of equipment that is not included in the Division 11 40 00 (Foodservice Equipment) specifications.

APPLICATION FOR SUBSTITUTION OF SPECIFIED FOODSERVICE EQUIPMENT

The decision to accept an unnamed alternate will be based exclusively on the information provided hereon and the Owner's or their designee's research and verifications of claims, which shall include sharing the information with manufacturer(s) of the originally specified equipment. Accordingly, any proprietary information regarding the proposed substitution should be so identified and submitted as an addendum to this form.

By submitting this application, the Contractor guarantees the information is correct and accepts total responsibility for all additional costs that may directly or indirectly result from acceptance of the proposed substitution. It is the interest of the Contractor to declare in this form all benefits that they may accrue to the Owner. Include the proposed manufacturer's data sheets, drawings and any other supporting information.

The original specifications describe the minimum standards of the equipment – proposed substitutions that do not meet or exceed this minimum standard or otherwise benefit the Owner will not be considered except in the case of an originally specified item that is no longer available. The Owner or their designee will be the sole authority regarding identifying specific features, capacities, etc. that are operationally critical. Acceptance of a proposed substitution does not relieve the Contractor of responsibility for all direct or indirect costs associated with the substitution.

1. Date Submitted: _____

2. Item Number:_____ Description:_____ Quantity:_____

3. Specified Manufacturer:_____ Specified Model Number:_____

4. Proposed Manufacturer:_____ Proposed Model Number:_____

5. Does the proposed equipment incorporate all features and options expressed or implied by the specifications, including features and option that are provided as standard by the specified item?

   ☐ Yes ☐ No – describe (attach additional sheets as required):_____
   _____

6. Compare Utilities (attach additional sheets as required):

   Specified: HW_____ CW_____ Gas (BTU) _____ Steam (BHP) _____ Electrical_____

   Exhaust (cfm) _____ Duct size_____ Supply (cfm) _____ Duct size_____

   Proposed: HW_____ CW_____ Gas (BTU) _____ Steam (BHP) _____ Electrical_____

   Exhaust (cfm) _____ Duct Size_____ Supply (cfm) _____ Duct Size_____

7. Compare Dimension:

   Specified: Left to Right_____ Front to Rear_____ Height_____

   Proposed: Left to Right_____ Front to Rear_____ Height_____

8. Does the proposed substitution require changes to the work to be provided by other trades?

   ☐ No ☐ Yes – describe (attach additional sheets as required):_____

   _____

9. Does the proposed substitution require changes or create any issues regarding adjacent or associated equipment (for instance: door swing interference; service access; air circulation)?

☐ No ☐ Yes – describe (attach additional sheets as required):_____

_____

What benefits will the Owner realize as a result-of this substitution (for instance: capital expense; energy savings, flexibility)? Provide specific information.

☐ There are no benefits to the Owner.

☐ The following will benefit the Owner – (attach additional sheets as required):_____

_____

_____

10. Are there any other considerations that should be evaluated? _____

_____

_____

11. Signature of Contractor's Representative: _____

1.8 APPROVED SUBSTITUTIONS AND/OR LISTED ALTERNATES:

A. Substitutions approved as noted in Article 1.7, and/or any Listed Alternate manufacturers included in the Itemized Specifications Article 3.12, or added by Addendum, may be utilized, in lieu of the primary specified manufacturer with the following conditions:

1. These Contract Documents are designed and engineered using the primary specified manufacturer and model and are intended to be the Basis of Design and Bid. Contractor assumes complete responsibility for any deviations required due to utilization of a substitution/alternate manufacturer or model; including, but not limited to, fitting alternates into available space, providing directions for required changes, and assuming any associated cost for utility, building, architectural, or engineering changes.

2. Contractor is responsible for supplying the model, which is as close as possible to the primary specified model in regard-to general function, features, options, sizes, accessories, utility requirements, finish, operation, internal system engineering and listing approvals. if it is determined by the owner or their appointed representative at any time during the construction and installation process, and prior to the final acceptance of the Project, that the substitution/alternate model submitted is not equivalent to the primary specified model, the Contractor will assume all associated cost and implications required to replace the model submitted, with the correct model.

3. The bid proposal is to clearly state any proposed substitutions/alternates, that are being offered for review by including the manufacturer and model number. Along with a current data sheet for each substitution/alternate, with any-and-all deviations between the primary specified manufacturer and the substitution/alternate manufacturer clearly defined. Technical brochures from manufacturers may not be acceptable as adequate information required for comparison. Complex alternates such as utility distribution systems, exhaust hoods, ventilators, refrigeration systems, etc., shall include a shop drawing specific to this Project.

4. Inclusion of an alternate manufacturer in Itemized Specifications Article 3.12 is not intended to indicate that there is an equal alternate unit to match every primary specified unit. It is the responsibility of the Contractor to ensure that the alternate unit submitted matches or exceeds the primary specified unit; and meets the conditions as stated above.

5. Manufacturers not approved as substitutions or included as a Listed Alternates will not be permitted.

1.9 DISCREPANCIES:

A. Where discrepancies are discovered between the drawings and the specifications, regarding quality or quantity, the higher quality or the greater quantity is to be included in the Bid Proposal.

B. Contractor to notify the Architect, in writing, of any discrepancies discovered; and await written clarification prior to proceeding with the items or areas in question.

C. Contractor is responsible for verifying and coordinating all items provided in this Section, with the drawings, specifications, manufacturer's requirements, submittals, actual site conditions, adjacent items, and associated (Sub-) Contractors; to assure that there are no discrepancies or conflicts. This is to include, but not be limited to, quantities, dimensions, clearances required, direction of operation, door swings, utilities, fabrication details and methods, installation requirements, etc.

1.10 SUBMITTALS:

A. Provide one (1) digital set (PDF) of all Submittals for review by the Design Team. After review process this set will be returned for any updating necessary and subsequent distribution.

B. Substitutions must be approved in writing by the Architect and/or Owner prior to utilization in this contract. A copy of the approval must be included with any submittals.

C. Contractor to review all submittals for compliance with the Contract Documents, prior to submitting to the Design Team for review and is responsible for the accuracy of the information within their submittals.

D. Contractor's use of any Design Team's digital contract drawings for basis of producing their submittal drawings, is limited to the following conditions, and understanding:

1. Contractor shall perform a thorough project review of all foodservice and allied discipline (MEPS) documents within the Contract Document set and provide independent engineering for all equipment to be provided. Contractor shall assume complete liability and responsibility for accuracy, and for conformance and verification

with the latest Architectural and Engineering drawings, actual field conditions and equipment to be provided as part of contract.

2. The copy and simple re-use of the foodservice consultant's equipment plans, connection plans, building conditions plans, manufacturer's drawings, elevations/sections are prohibited.

3. Contractor further assumes responsibility for coordination of their submittals with those of other allied Contractors and Sub-Contractors, such as electrical, plumbing, and mechanical contractors as required.

4. Submittals shall contain Contractor's notes, symbols, details, title block and information.

E. Equipment Plan and Rough-In Drawings:

1. Submit 1/4" (1:50) scale drawings in pdf format. These drawings are to include complete information on the work included in this Contract, with references to equipment as provided by others; and are to provide sufficient information for associated trades, contractors, and/or sub-contractors to complete their division of work associated with foodservice equipment included in this Contract. Include any additional information pertinent to the installation of this equipment.

2. Special Conditions Drawings, dimensioned, sizing and locating the following conditions:

   a. Slab depressions, cores, sleeves, or block-outs (cold storage assemblies drain trenches, piping, etc.).

   b. Concrete or masonry platforms.

   c. Pipe sleeves or roof jacks.

   d. Wall-openings or block-outs for pass-through equipment, recessed control panels, in-wall fire-protection system components, etc.

   e. Blocking grounds or anchor plates required in walls for equipment support/attachment.

   f. Above-ceiling hanger assemblies for support of exhaust hoods, utensil-racks, etc.

   g. Access panels in walls or ceiling for service of equipment.

   h. Ceiling pockets or recesses for unusually high equipment.

   i. In-wall carriers for wall-hung or cantilevered equipment.

   j. Ventilation for exhaust hoods, condensate hoods, ice machines, compressors, compressor racks and all other equipment requiring heat removal.

   k. Support systems such as beverage conduit and refrigeration line-run sleeves.

   l. Any other additional information pertinent to the installation of this equipment.

3. Electrical Rough-in Drawings field-coordinated and dimensioned providing the following information, but not limited to:

   a. Electrical utility schedule.

   b. Locations of rough-ins.

   c. Locations of control panels.

   d. Inter-wiring of walk-in freezer compressors to compressor rack control panel for defrost cycle.

   e. Inter-wiring of controls panels to equipment.

4. Plumbing Rough-In Drawings field-coordinated and dimensioned providing the following information, but not limited to:

   a. Plumbing utility schedule.

   b. Locations of rough-ins.

   c. Interconnection water filters assemblies to ice machine, beverage equipment, combi-ovens, steamers, etc.

5. Field-coordinated, dimensioned refrigeration line-run drawings providing the following information, but not limited to:

   a. Sleeve locations & sizes for walls, floors, ceilings.

   b. Detailed and field-coordinated route of refrigeration line-runs from remote refrigeration system to unit served.

   c. Location and inter-wiring detail required for any temperature monitoring and/or control system specified.

6. Drawings to also include equipment plan(s) with detailed equipment list, similar-to Foodservice Equipment Plans included in the Contract Drawings. Item numbers are to be the same as shown in the Contract Documents and are to include Spare Numbers and associated items provided by others.

7. In the event rough-ins have been accomplished before award of this contract, Contractor is to examine the existing facility and identify adjustment needs related to their equipment to suit building conditions and utilities, where possible. Contractor to seek approval for the same prior to further construction. If not possible, state so in a letter, with reasons and an alternate method and pricing for their equipment, to the Architect and Foodservice Consultant.

F. Shop Drawings:

1. Submit shop drawings for items of custom fabrication included in this contract in pdf format. Shop drawings are to be submitted at 3/4" (1:20) and/or 1-1/2" (1:10) scale and are to show dimensions, materials, finishes, details of construction, installation and relation of adjoining work requiring cutting or close fitting as well as any specified fabrication shop fit-out work such as electrical load circuit breaker panels, inter-wiring or interpiping. Shop drawings are to also indicate reinforcements, anchorage and related work required for the complete installation of fixtures. Fabricator's shop drawings shall be prepared as a coordinated single submittal, separate-from, and not part of a single collated foodservice submittal.

2. Submit shop drawings for any equipment requiring field assembly, including but not limited to, Suite-style cooking assemblies, pulper/extractor assemblies, remote refrigeration systems, walk-in coolers and/or freezers, exhaust hoods/ventilators, fire suppression system, utility distribution systems, pot/utility/cart/tray/ware washing assemblies/machines, conveyors, floor troughs, seismic anchoring details (as required) and fresh oil supply/waste oil recovery systems in pdf format. Manufacturer's shop drawings shall be separated per system submitted in single form, and not part of a collated foodservice submittal.

3. When applicable, prepare and submit section, elevation, axonometric drawings in PDF format for all food shields within counters in a coordinated single submittal. Food shields to be compliant with current NSF code requirements and ergonomic reach requirements. Contractor to provide physical mock-up of same for Owner/Operator review and sign-off prior to fabrication.

4. Before proceeding with the fabrication or manufacture of any item, Contractor is responsible for verifying and coordinating all dimensions and details with site dimensions, conditions, and adjacent equipment.

5. The Contractor to clearly identify on drawings any-and-all differences between the Bid and/or Contract Documents and what is being provided. If any structural, electrical, plumbing, gas or steam requirements are different than what the Bid and/or Contract Documents show the Contractor will notify and record on the drawings identifying what is different and discuss same with General Contractor, Owner and Foodservice Consultant prior to commencing work.

G. Product Data Submittal Manuals:

1. Submit product data brochure(s) with a cover sheet complete with detailed information on every item included in this section in pdf format. Detailed information is to include, but not be limited to, item number, description, quantity, model numbers, options and accessories provided, N.E.M.A. plug and receptacle configuration for applicable items, exact utility requirements, manufacturer's cut-sheets, reference to specific shop drawings, etc. Distribute one additional copy of installation and start-up instructions to the Installer. Every cover sheet and associated detailed submittal is to provide sufficient and complete information for the Design Team to verify that the Contractor understands the Contract requirements and is providing each item in compliance with the Contract Documents. Cover sheets to also include associated items as listed on the Equipment Plan but provided by others; and are to be noted as "Not in Section 11 40 00 Contract Division".

2. Reproduction of any part of the Contract Specifications will not be acceptable as part or total of Contractor's

Product Date Submittal Manuals. These Manuals are to be produced and assembled entirely by the Contractor, in numerical order according to Item numbers.

3. The cover sheet shall clearly identify all differences between the bid documents and what is being provided. If any electrical, plumbing, gas or steam requirements are different than what the bid documents show the Contractor will make a note on the coversheet identifying what is different and why. If a model has been discontinued, the Contractor will make a note on the cover sheet and offer a replacement model.

4. The cover sheet shall clearly identify all differences between the Bid/Contract Documents and what is being provided. If any electrical, plumbing, gas or steam requirements are different than what the bid documents show the Contractor will make a note on the coversheet identifying what is different and why. If a model has been discontinued, the Contractor will make a note on the cover sheet and offer a replacement model.

H. The Design Team's review of submittal drawings, shop details, product data brochures, and operation and maintenance manuals are for general conformance with the design concept and Contract Documents. Review markings or comments are not to be construed as relieving Contractor from compliance with the Contract Documents, or departures there from. Contractor remains responsible for details and accuracy, confirming and correlating all quantities and dimensions, selecting fabrication processes, techniques of assembly, and performing their work in a safe, satisfactory, code-compliant and professional manner.

I. Commencement of purchasing or fabrication by the Contractor, of any item(s) included in this Contract, prior to receipt of reviewed Submittals from the Design Team, shall be at the Contractor's own risk; unless specifically instructed to do so in writing by the Owner, including the specific item numbers requested.

J. Contractor shall verify requirements and equipment sizes, critical clearances, or other characteristics necessary to represent Owner/ Purveyor items completely on the shop drawing submittals even though they may be listed as "NIC/Not in Contract" in the Equipment Schedule/Item Specification sections of this document.

1.11 OPERATION AND MAINTENANCE DATA MANUALS:

A. Two (2) bound sets of manuals are to be furnished for items of standard manufacturer on/or before the date of the first event to occur of the following: demo/start-up, start-up for intended use by the Owner/Operator, completion of installation of kitchen equipment contract package, or final acceptance of installation by Owner. Manuals are to be in alphabetical order according to manufacturer. Manufacturer's info is to include Tech Services telephone number, email, and web site address, where available.

B. Provide a complete list of all equipment, with make, model and serial numbers. Provide list of local service agencies for included manufacturers, complete with addresses, email addresses and telephone numbers. Also provide email and web site addresses, where available.

C. Provide electronic/digital media for maintenance, training, operation, etc. where available from the manufacturer.

D. Manual shall also include a leak testing report for each-and-every remote refrigerated system included under this Foodservice Equipment Section, as required in article 2.7.A.6 Refrigeration Equipment of this Section.

1.12 AS - BUILT/ RECORD DOCUMENTS:

A. Maintain one record set of Foodservice Equipment Plans with any related corrections, revisions, additions, deletions, changes, etc. noted during construction and installation. Provide an "as-built" set on a computer disk or electronically in PDF format.

B. Provide one (1) final set of Product Data Submittal Manual with any related corrections, revisions, additions, deletions, changes, etc. noted during construction and installation as a specifications' record set electronically in PDF format.

C. These documents are to be provided at the same time as the O & M Data Manuals. Submit the O & M Data Manuals electronically in PDF format.

1.13 SCHEDULE:

A. Time is of the essence and acceptance constitutes assurance that the Contractor can and will obtain materials, equipment, and manpower, to permit installation of the items included in this Section, on schedule. Contractor is to coordinate their work with the progress schedule, as prepared and updated periodically by the General Contractor or Construction Manager.

B. Anticipated delays, not within the control of the Contractor, are to be noted in a written notification to the Architect, immediately upon the Contractor's realization that delays are imminent.

C. Failure of manufacturers to meet promised delivery dates will not grant relief to the Contractor for failure to meet schedules; unless the Contractor can establish, in writing, that orders were received by the manufacturer, with reasonable lead times.

D. Extra charges resulting from special handling or air shipment in-order-to meet the schedule will be paid by the Contractor if insufficient time was allowed in placing factory orders.

1.14 WARRANTY:

A. Unless otherwise noted in Related Divisions / Sections 1.3.A, items furnished are to be fully guaranteed against defects in workmanship, materials, and functionality for one full year from the date of the first event to occur of the following: date of issue of Certificate of Occupancy (or the equivalent), start-up for intended use by the Owner/Operator, completion of installation of kitchen equipment contract package, or final acceptance of installation by Owner. Should a Temporary Certificate of Occupancy be issued for partial completion of work, the items furnished within that designated area are to be under warranty from the date of issue of that Certificate. Contractor or their service agent will make necessary repairs and replacements without charge to the Owner, and within a reasonable time.

B. Additional Refrigeration Warranty: in addition to the one-year warranty requirements as stated above, provide start-up and parts and labor for the first year, plus additional four-year extended warranty on compressors. Extended warranty is for provision of replacement compressor, determined to be defective by a certified refrigeration mechanic. However, verification of defective compressor, installation of replacement compressor, recharging and repairs of system will be the responsibility of the Owner. This includes all items with built-in or remote refrigeration system.

C. Periodic routine maintenance, servicing, adjustments, cleaning, etc., as required by the manufacturers included in this Project, are the responsibility of the Owner.

D. Any-and-all parts or requirements for manufacturer’s warranties to be in effect, whether, or not noted in the itemized specifications, are to be provided or complied with by the Contractor. This is to include, but not be limited to, particular-parts, accessories, or installation; installation supervision, start-up, and/or follow-up inspections required by factory trained, Certified, and/or authorized personnel. Factory training, Certification, and/or authorization is to be in effect at the time of bidding, installation, start-up, and warranty period of this Project.

E. Unless otherwise noted in Related Divisions manufacturer’s warranties which comply with the requirements of this Warranty Article 1.14, are to be provided in lieu of Contractor’s own warranties, where available. Copies of the written warranties are to be included in the O & M Manuals.

PART 2 – PRODUCTS

2.1 EQUIPMENT:

A. Refer to schedule on Foodservice Drawings and Section 3.12 Itemized Specifications for equipment included in this Section.

2.2 MATERIALS:

A. Metals:

1. Stainless-Steel: AISI Type 201 or 302/304, hardest workable temper, and No.4 directional polish. Unless otherwise noted or specified, or required by the manufacturer, 201 may be used wherever 302/304 is listed.

2. Galvanized Steel Sheet: ASTM A526, except ASTM A527 for extensive forming; ASTM A525, G90 zinc coating, chemical treatment.

a. Where painted finish is indicated, provide mill phosphatized treatment in lieu of chemical treatment.

3. Steel Sheet: ASTM A569 hot-rolled carbon steel.

4. Galvanized Steel Pipe: ASTM A53 or ASTM A120, welded or seamless, schedule 40, galvanized.

5. Steel-Structural Members: Hot rolled or cold formed, carbon steel unless stainless-steel is indicated.

a. Galvanized Finish (G.I.): ASTM A123 hot-dipped zinc coating, applied after fabrication.

6. Aluminum: ASTM B209/B221 sheet, plate, and extrusions (as indicated); alloy, temper, and finish as determined by manufacturer/fabricator, except 0.40-mil natural anodized finish on exposed work unless another finish is indicated.

B. Plastic Laminate: NEMA LD3, Type 2, 0.050" (1.27 mm) thick, except Type 3, 0.042" (1.07 mm) for post- forming smooth (non-textured). Color and texture as selected by Architect/ Interior Designer.

1. Comply with NSF Standard No. 35.

2. Veneered with approved waterproof and heat proof cement. Rubber base adhesives are not acceptable.

3. Applied directly over close grained plywood, such as solid Mahogany or solid Birch, of selected, smooth, sanded stock to ensure a smooth ripple-free laminated surface; or commercial grade furniture particle board, Cortron or equal.

4. Exposed faces and edges are to be faced with 1/16” (1.6 mm) thick material. Corresponding backs are to be covered with approved backing and balancing sheet material.

C. Millwork: No unfinished millwork, plywood/particle board or wood framing (including backs, undersides, and all surfaces concealed from view) will be permitted. All unfinished surfaces or openings cut through finished surfaces are to be sealed to be water resistant; with excess plastic laminate material, Cortron (Melamine) material, backing materials, sealers, primers, finish paint, etc., to blend with specified finish materials.

D. Hardwood Work Surfaces: Laminated edge grained hard maple (Acer saccharum), NHLA First Grade with knots, holes and other blemishes culled out, kiln dried at 8 percent or less moisture, waterproof glue, machined, sanded, and finished with NSF approved oil-sealer.

E. Solid Surface Material and Simulated/Engineered Stone:

1. Single-Source Responsibility for Solid Surface Material and Simulated/Engineered Stone: Obtain each color, grade, finish, type, and variety of material or stone from a supplier with resources to provide materials of consistent quality in appearance and physical properties, including the capacity to cut and finish material without delaying the progress of the work.

2. Single-Source Responsibility for Other Materials: Obtain each type of solid surface material and simulated/engineered stone accessory, sealant, and other materials from one manufacturer for each product.

3. Installer Qualifications: Trained and approved by countertop manufacturer who has completed countertops similar in material, design, and extent to that indicated for project that has resulted in construction with a record of successful in-service performance.

4. The Contractor is responsible for verification of delivered stone materials for quantities, defects, or damage within [ten (10) days] after delivery. No compensation will be allowed to the contractor for materials and labor that may be required to replace materials after this time-period.

5. Allowable Tolerances:

a. Variation in component size: +/- 1/8 inch (3 mm) in 8 feet (2.4 m).

b. Maximum height of abrupt irregularities: 1/32 inch (.8 m).

c. Location of openings: +/- 1/8 inch (3 mm) from indicated location.

6. Do not deliver countertop materials until painting and similar operations that could damage engineered stone materials have been completed in installation areas. If engineered stone materials must be stored in other than installation areas, store only in areas where environmental conditions comply with requirements specified in "Project Conditions" Article.

7. Handle materials to prevent damage to finished surfaces. Provide protective coverings to prevent physical damage or staining following installation for duration of project.

8. Environmental Limitations: Do not deliver or install simulated stone materials until building is enclosed, wet work is complete, and HVAC system is operating and maintaining temperature and relative humidity at occupancy levels during the remainder of the construction period.

a. Maintain ambient temperature between 50 and 95 degrees F. for 48 hours before, during and for minimum

7 days after installation.

9. Field Measurements: Where simulated stone materials are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

    a. Locate concealed framing, blocking, and reinforcements that support simulated stonework by field measurements before being enclosed and indicate measurements on Shop Drawings.

10. Anchors: Select material, type, size, and finish required for each substrate for secure anchorage. Provide nonferrous-metal or hot-dip galvanized anchors and inserts on inside face of exterior walls and elsewhere as required for corrosion resistance. Provide toothed-steel or lead expansion sleeves for drilled-in-place anchors.

11. Adhesive and Sealant as recommended by engineered stone manufacturer.

12. Sink/bowl mounting hardware:

    a. Manufacturer's approved bowl clips, brass inserts and fasteners for attachment of under-mount sinks/bowls.

13. Fabrication:

    a. Fabricate components to greatest extent practical to sizes and shapes indicated, in accordance with approved shop drawings and manufacturer's printed instructions. Clean surfaces to remove loose and foreign matter that could impair adhesion.

    b. Remove ridges and projections. Fill voids and depressions with patching compound compatible with setting materials.

    c. Shop cut openings, to maximum extent possible, to receive hardware, appliances, plumbing fixtures, electrical work, and similar items. Locate openings accurately and use templates or roughing-in diagrams to produce accurately sized and shaped openings.

    d. Rout and finish component edges with clean, sharp returns. Rout cutouts, radii, and contours to template. Smooth edges. Repair or reject defective and inaccurate work.

    e. Provide materials with ample allowance for cutting, when required to cut and fit on site. Provide trip for scribing and site cutting.

    f. Thickness: Provide thickness indicated, but not less than the following:

        i. Countertop: [3/4] (19 mm) [1-1/4] inch[es] (32 mm)

        ii. Back and End Splashes: 3/4 inch (19 mm), unless shown otherwise.

        iii. Substrate: [3/4] (19 mm)

F. Stone:

1. Single-Source Responsibility for Stone: Obtain each color, grade, finish, type, and variety of stone from a supplier with resources to provide materials of consistent quality in appearance and physical properties, including the capacity to cut and finish material without delaying the progress of the work.

2. Single-Source Responsibility for Other Materials: Obtain each type of stone accessory, sealant, and other materials from one manufacturer for each product.

3. Installer Qualifications: Engage an experienced installer who have completed stone countertops similar in material, design, and extent to that indicated for project that has resulted in construction with a record of successful in-service performance.

4. The Contractor is responsible for verification of delivered stone materials for quantities, defects, or damage within ten (10) days after delivery. No compensation will be allowed to the contractor for materials and labor that may be required to replace materials after this time-period.

5. Allowable Tolerances:

    a. Variation in component size: +/- 1/8 inch (3 mm) in 8 feet (2.4 m).

b. Maximum height of abrupt irregularities: 1/32 inch (.8 mm).

c. Location of openings: +/- 1/8 inch (3 mm) from indicated location.

6. Granite materials shall not contain unsafe levels of radioactive materials.

7. Do not deliver countertop materials until painting and similar operations that could damage stone materials have been completed in installation areas. If stone materials must be stored in other than installation areas, store only in areas where environmental conditions comply with requirements specified in "Project Conditions" Article.

8. Deliver materials to project site in undamaged condition.

9. Store and handle stone and related materials to prevent their deterioration or damage due to moisture, temperature changes, contaminants, corrosion, breakage, chipping, or other causes.

a. Do not use pinch or wrecking bars.

b. Lift with wide-belt-type slings where possible. Do not use wire rope or ropes containing tar or other substances that might cause staining. If required to move stone, use wood rollers with cushions at end of wood slides.

c. Store stone on wood skids or pallets covered with non-staining, waterproof membrane.

d. Place and stack skids and stones to distribute weight evenly and to prevent breakage or cracking of stones.

e. Protect stored stone from weather with waterproof, non-staining covers or enclosures, but allow air to circulate around stones.

f. Store cementitious materials off the ground, under cover, and in dry location.

10. Environmental Limitations: Do not deliver or install stone materials until building is enclosed, wet work is complete, and HVAC system is operating and maintaining temperature and relative humidity at occupancy levels during the remainder of the construction period.

a. Maintain ambient temperature between 50 and 95 degrees F. for 48 hours before, during and for minimum 7 days after installation.

11. Field Measurements: Verify dimensions of construction to receive stone countertops by field measurements before fabrication and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the work.

a. Established Dimensions: Where field measurements cannot be made without delaying the work, establish dimensions and proceed with fabricating countertops without field measurements. Provide allowance for trimming at site and coordinate construction to ensure actual dimensions correspond to established dimensions.

12. Comply with referenced standards and other requirements indicated applicable to each type of material required.

13. Provide matched slabs, coordinated for each type, variety, color, and quality of stone required.

14. The use of colored tints, dyes, or waxes applied to stone shall NOT be permitted.

15. Granite:

a. Granite Building Stone Standard: ASTM C615, free from cracks, chips, stains, or other defects, uniform in tone and coloring.

16. Marble:

a. Marble Building Stone Standard: ASTM C503, free from cracks, chips, stains, or other defects, uniform in tone and coloring.

17. Adhesives:

a. Stone Seam Adhesive: 2-part, epoxy or polyester stone adhesive formulated specifically for bonding

stone to stone, with an initial set time of not more than 2 hours at 70 deg F.

b. Water-cleanable Epoxy Adhesive: ANSI A118.3, water-cleanable, tile-setting epoxy adhesive.

c. Color: Clear

d. Use installation adhesives that have a VOC content 65 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24), or as listed in VOC limit tables in Section 01 81 19 “Indoor Air Quality Requirements”. Products furnished shall comply with whichever VOC content requirement is more stringent.

18. Stone Sealants:

a. Sealant for Countertops: Clear silicone sealant complying with requirements of Section 07 92 00 "Joint Sealants".

b. For sealants used inside of the vapor barrier, provide sealants that have a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24), or as listed in VOC limit tables in Section 01 81 19 “Indoor Air Quality Requirements”. Products furnished shall comply with whichever VOC content requirement is more stringent.

19. Stone Sealers:

a. Penetrating Sealer: Penetrating sealer that protects the exposed faces of stone and grout from staining. Sealer shall be UV transparent; non-yellowing; VOC compliant; mold and mildew resistant; and USDA approved as safe on food handling surfaces. Material shall exceed ADA standards for slip resistance at traffic areas.

b. For sealers used inside of the vapor barrier, provide sealers that have a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24), or as listed in VOC limit tables in Section 01 81 19 “Indoor Air Quality Requirements”. Products furnished shall comply with whichever VOC content requirement is more stringent.

20. Cutouts and Holes for Lavatories, Sinks, and Fittings:

a. Undercounter Lavatories: Make cutouts for undercounter lavatories in shop using template or pattern furnished by lavatory manufacturer. Form cutouts to smooth, even curves with edges at right angles to top. Ease juncture of cutout edges with tops, and finish edges to match tops.

21. Fittings: Drill countertops in shop for plumbing fittings, undercounter soap dispensers, and similar items.

G. Insulation:

1. For low temperature applications, such as ice bins, cold pans, or fabricated under counter freezers, use urethane, rigid board foam or foamed-in-place; not less than 2” (50 mm) thick, except that vertical surfaces of cold pans and ice bins may be 1” (25 mm) thick. Insulation to be bonded at joints, to prevent condensation on exterior.

2. For refrigerated applications such as fabricated under counter refrigerators, use urethane rigid board foam or foamed-in-place, or Styrofoam rigid board foam 2” (50 mm) thick, bonded at joints. No fiberglass insulation will be permitted.

3. For heated type applications, such as plate warmers, use block type rock wool, minimum 1” (25 mm) thick; or Marinite I as noted in #4 below.

4. At counters with tops subject to direct or indirect heat from heating or cooking-equipment, provide heat-resistant, food-safe caulking, three (3) layers of Nomex insulation held-in-place with aluminum tape. Provide a 1/8” (3 mm) minimum space between the heat source and the insulation. Coordinate drop-in equipment flange support and provide a 16-gauge stainless-steel 90-degree angle collar.

5. All insulation is to be fully encased or enclosed in 16-gauge (1.6 mm) stainless-steel.

H. Joint Materials:

1. Sealants: waterproof and mildew resistant silicone sealant, with Shore A hardness of 30, except 45 if subject to traffic, and minimum service temperature range of -60º to +400º F. Sealant to be NSF Standard #51 Listed,

and FDA and USDA Approved for use in food zones. Surfaces, cleaning, and sealants installation to comply with applicable requirements of FDA, USDA, and NSF Standards, and accepted foodservice installation practices.

2. Backer Rod: For 3/8" (9.5 mm) or larger joints, to be polyurethane rod stock, larger than joint width.

3. Gaskets: Solid or hollow (but not cellular) neoprene or polyvinyl chloride; light grey, minimum of 40 Shore A hardness, self-adhesive or prepared for either adhesive application or mechanical anchorage.

I. Paint and Coatings:

1. Provide the types of painting and coating materials which, after drying or curing, are suitable for use in conjunction with foodservice, and which are durable, non-toxic, non-dusting, non-flaking, mildew resistant, and comply with NSF Standards and governing regulations for foodservice.

2. Galvanize Repair Paint: MIL-P-21035.

3. Sound Deadener: NSF-listed sound deadening material such as latex sound deadener, for internal surfaces of metal work, and underside of metal counters and tables between work top and underbracing. Verify sound deadening requirements or restrictions with local health authorities.

4. Pretreatment: SSPC-PT2 or PT3, of FS TT-C490.

5. Primer Coating for Metal: FS TT-P-86, type suitable for baking, where indicated.

6. Enamel for Metal: Synthetic type, FA TT-P-491, type suitable for baking, where indicated.

2.3 FABRICATED PRODUCTS:

A. Hardware (also refer to article 2.4 Fabrication of Metal Work in general, and paragraphs O. Doors 1-3 and P. Drawer Assemblies 1-6 specifically, for additional requirements):

1. General: Manufacturer's standard, but not less than ANSI 156.9 Type 2 (Institutional), satin finish stainless-steel or dull chrome finish on brass, bronze, or steel.

2. Hinged Door Hardware: Stainless-steel hinged doors to be mounted with heavy duty NSF-approved hinges with Component Hardware Group, Model No. P62-1010 pulls, or equal; or full length pulls as per individual itemized specifications and shown on Standard Detail FSD1-24. Catches to be heavy-duty magnetic type, except as otherwise indicated. Millwork cabinet hinged doors to be mounted with Blum 95º CLIP top thick door all metal hinges, nickel plated, with 3-dimensional adjustment, or equal, or as per individual itemized specifications.

3. Drawer Hardware: Slides to be 200 pounds (90 kilograms) minimum capacity per pair, 201 or 300 series stainless-steel, full extension, side-mounting, self-closing type, with stainless-steel ball-bearings, and positive stops; Component Hardware Group Series S52, or equal. Pulls to be Component Hardware Group, Model No. P62-1012, or equal; or full length pulls as per individual itemized specifications and shown on Standard Detail FSD1-24.

4. Sliding Door Hardware: Sliding doors to be mounted on large, quiet ball bearing rollers in 14-gauge (2 mm) stainless-steel overhead tracks and be removable without the use of tools. Bottom of cabinet to have stainless-steel guide-pins and not channel tracks for doors.

5. All hardware to be identified with manufacturer's name and number, so that broken or worn parts may be replaced.

B. Casters:

1. Type and size as recommended by caster manufacturer, NSF- approved for the type and weight of equipment supported; normally 5" (127 mm) diameter heavy-duty, ball-bearing, solid or disc wheel with non-marking grease proof rubber, neoprene or polyurethane tire, unless otherwise specified. Minimum width of tread to be 1-3/16" (30 mm). Minimum capacity per caster to be 250-pound (113.4kg), unless otherwise noted in itemized specifications.

2. Solid material wheels to be provided with stainless-steel rotating wheel guard.

3. Wheel and swivel bearings shall be sealed and show a polished plated finish per NSF.

4. Unless otherwise indicated, equip each item with two (2) swivel type casters and two (2) fixed casters, with foot brakes on two (2) casters.

5. Unless item is equipped with another form of all-around protective bumper, provide circular rotating bumper above each caster, 5" (127 mm) diameter tire of light grey synthetic rubber (hollow or closed-cell) on cadmium-plated disc.

C. Plumbing Fittings, Trim and Accessories:

1. General: Where exposed or semi-exposed, provide bright chrome plated brass or polished stainless-steel units. Provide copper or brass where not exposed.

2. Vacuum Breakers: Provide with foodservice equipment as listed in the itemized specifications.

3. Water Outlets: At sinks and at other locations where water is supplied (by manual, automatic or remote control), furnish commercial quality faucets, valves, dispensers, or fill devices, of the type and size indicated, and as required to operate as indicated.

4. Waste Fittings: Except as otherwise indicated, furnish 2" (50 mm) remote-lever ball valve type waste valve, and 3-1/2" (89 mm) flat strainer.

5. Also refer to article 2.4.K for additional information.

D. Electrical Materials:

1. General: Provide standard materials, devices and components as recommended by the manufacturer or fabricator, selected, and installed in accordance with N.E.M.A. standards and recommendations; and as required for safe and efficient use and operation of the foodservice equipment, without sanitation concerns.

2. Components to bear the U.L. label or be approved by the prevailing authority.

3. Custom fabricated refrigerated/freezer units to be provided with vapor tight light receptacles, shatterproof lamps, and automatic switches. Wiring to be concealed.

4. Where light fixtures are specified or detailed as part of counters, cases, or fixtures; light fixtures with lamps to be furnished and installed. Warm white lamps to be provided, unless otherwise specified. If fluorescent light fixtures are specified, ballasts and tubes to be provided. Shields to be provided for all light fixtures.

5. Convenience and Power Receptacles: Make cutouts and install appropriate boxes or receptacles in fabricated fixtures, complete with wiring, conduit, receptacle, and stainless-steel cover plate. Receptacles and plugs to conform to N.E.M.A. standards. Electrical receptacles and devices to be first quality "Specification Grade". GFCI receptacles to be furnished as per the National Electrical Code.

6. Plugs and Cords: Where cords and plugs are provided, they are to comply with National Electrical Manufacturer's Association (N.E.M.A.) requirements. Indicate N.E.M.A. configuration for each applicable item.

7. Power Characteristics: Refer to Electrical Divisions specifications for project power characteristics. Also, refer to individual equipment requirements, for loads and ratings.

8. All electrical components (J-boxes, conduit, receptacles, switches, cover plates, light fixtures, panels, etc.) built into or on any equipment provided by Contractor, other than standard buy-out factory manufactured equipment, are to be vapor or water-tight type. Provide buy-out equipment with vapor or water-tight electrical components wherever available.

2.4 FABRICATION OF METALWORK:

A. General Fabrication Requirements:

1. Remove burrs from sheared edges of metalwork, ease the corners and smooth to eliminate cutting hazard. Bend sheets of metal, at not less than the minimum radius required to avoid grain separation in the metal. Maintain flat, smooth surfaces, without damage to finish.

2. Reinforce metal at locations of hardware, anchorages, and accessory attachments wherever metal is less than 14-gauge (2 mm) or requires mortised application. Conceal reinforcements to the greatest extent possible. Weld in place, on concealed faces.

3. Exposed screws or bolt heads, rivets and butt joints made by riveting straps under seams and then filled with

solder, will not be accepted. Where fasteners are permitted, provide Phillips-head, flat or oval head machine screws. Cap threads with acorn nuts and lock washers, unless fully concealed in inaccessible construction; and provide nuts and lockwashers unless metal for tapping is at least 12-gauge (2.5 mm). Match fastener head finish with finish of metal fastened.

4. Where components of fabricated metal work are indicated to be galvanized and involve welding or machining of metal heavier than 16-gauge (1.6 mm), complete the fabrication and provide hot-dip galvanizing of each component, after fabrication, to the greatest extent possible (depending upon available dip-tank sizes). Comply with ASTM A123.

5. Welding and Soldering:

   a. Materials 18-gauge (1.3 mm), or heavier, to be welded.

   b. Seams and joints to be shop welded or soldered as the nature of the material may require.

   c. Welds to be ground smooth and polished to match original finish.

   d. Where galvanizing has been burned off, the weld is to be cleaned and touched up with high grade aluminum paint.

6. Provide removable panels for access to mechanical and electrical service connections, which are concealed behind or within foodservice equipment, but only where access is not possible and not indicated through other work.

7. Where ends of fixtures, splashbacks, shelves, etc., are open, fill by forming the metal or welding sections, if necessary, to close entire opening flush to walls or adjoining fixtures.

8. Rolled edges are to be as detailed, with corners bullnosed, ground and polished.

9. Equipment to have 1/2” (12.7 mm) or larger radius coves in horizontal and vertical corners, and intersections, per NSF standards.

B. Metal and Gauges:

1. Except as otherwise indicated, fabricate exposed metalwork of stainless-steel; and fabricate the following components from the gauge of metal indicated, and other components from not less than 20-gauge (1 mm) metal:

   a. Table and counter tops: 14-gauge (2 mm)

   b. Sinks and drainboards: 14-gauge (2 mm)

   c. Shelves:16-gauge (1.6 mm)

   d. Front drawer and door panels:18-gauge (1.3 mm) (double pan type)

   e. Single pan doors and drawer fronts:16-gauge (1.6 mm)

   f. Enclosed base cabinets:18-gauge (1.3 mm)

   g. Enclosed wall cabinets:16-gauge (1.3 mm)

   h. Exhaust hoods and ventilators:18-gauge (1.3 mm)

   i. Pan-type insets and trays:16-gauge (1.6 mm)

   j. Removable covers and panels:18-gauge (1.3 mm)

   k. Skirts and enclosure panels:18-gauge (1.3 mm)

   l. Closure/trim strips over 4" (102 mm) wide: 18-gauge (1.3 mm)

   m. Hardware reinforcement:12-gauge (2.5 mm)

   n. Gusset plates:10-gauge (3.4 mm)

   o. Removable toe kicks:14-gauge (3.4 mm)

p. Wall flashing: 20-gauge (.95 mm)

C. Work-Surface Fabrication:

1. Fabricate metal work surfaces by forming and welding, to provide seamless construction using welding rods matching sheet metal, grinding, and polishing. Where necessary for disassembly, provide waterproof gasketed draw-type joints with concealed bolting.

2. Reinforce work surfaces 30” (762 mm) on center both ways, with galvanized or stainless-steel concealed structural members. Reinforce edges, which are not self-reinforced, by formed edges.

D. Metal Top Construction:

1. Metal tops to be one-piece welded construction, including field joints. Secure to a full perimeter galvanized steel channel frame cross-braced not farther than 30" (762 mm) on center. Fasten top with stud bolts or tack welds. If hat sections are used in lieu of channels, close ends.

2. Properly designed draw fastening, trim strip, or commercial joint material to suit requirement is to be used, only if specified.

E. Structural Framing:

1. Except as otherwise indicated, provide framing of minimum 1” (25 mm) pipe-size round pipe or tube members, with mitered and welded joints and gusset plates, ground smooth. Provide 14-gauge (2 mm) stainless-steel tube for exposed framing, and galvanized steel pipe for concealed framing.

2. Where indicated, flange rear and end edges up to form splashes integrally with top, with vertical and horizontal corners coved of not less than 1/4” (6 mm) radius, die formed. Turn back splashes 1” (25 mm) to wall across top and ends with rounded edge on break, unless otherwise specified.

3. For die-crimped edges, use inverted "V" 1/2” (13 mm) deep inside and 2” (50 mm) deep on outside, unless otherwise shown. For straight down flanges, make 1-3/4” (45 mm) deep on outside. For bullnose edges, roll down 1-3/4” (45 mm).

4. Edges: die-formed, integral with top. For rounded corners, form to 1” (25 mm) radius, weld, and polish to original finish.

F. Field Joints: For any field joint required because of size of fixture; butt-joint, reinforce on underside with angles of same material, bolt together with non-corrosive bolts and nuts, field-weld, grind, and polish to a seam not visible to the naked eye.

G. Pipe Bases: Construct pipe bases of 1-5/8” (41 mm) diameter 18-gauge (1.3 mm) stainless-steel tubing. Fit legs with polished stainless-steel sanitary adjustable bullet feet to provide for not less than 2” (50 mm) of vertical adjustment without exposing threads. Space legs to provide ample support for tops, precluding any possibility of buckling or sagging and in no case more than 6’ -0" (1829 mm) centers.

H. Legs and Cross rails

1. Equipment legs and cross rails to be 1-5/8” (41 mm), 16-gauge (1.6 mm) stainless-steel tubing.

2. Welds at cross rails to be continuous and ground smooth. Tack welds will not be acceptable.

3. Bottom of legs to be hugged inward and fitted with a stainless-steel bullet-type foot with not less than 2” (50 mm) vertical adjustment without exposing threads.

4. Free standing legs or legs on island tables/counters with electrical/plumbing connections to be anchored to floor with bolt-down type flanged feet with stainless-steel fasteners.

5. Components:

a. Steel Gusset: Stainless-steel exterior to fit 1-5/8” (41 mm) tubing, with Allen screw for fastening and adjustment. Not less than 3” (76 mm) diameter at top and 3-3/4” (95mm) long. Outer shell 16-gauge (1.6 mm) stainless-steel, reinforced with 12-gauge (2.5 mm) mild steel insert welded interior shell, or approved equal.

b. Stainless-Steel Low Counter Legs: Stainless-steel exterior 5-3/4” (146 mm) minimum, 7” (178 mm) maximum length with stainless-steel 3-1/2” (89 mm) square plate with four countersunk holes, welded to

top for fastening.

c. Stainless-Steel Adjustable Foot: Stainless-steel 1-1/2" (37 mm) diameter tapered at bottom to 1" (25 mm) diameter, fitted with threaded cold rolled rod for minimum 1-1/2" (37 mm) diameter x 3/4" (19 mm) threaded bushing plug welded to legs, or approved equal. Push-in foot not acceptable.

6. Legs to be fastened to equipment with gussets, as follows:

a. Sinks: Reinforced with bushings and set screw.

b. Metal Top Tables and Dish Tables: Welded to galvanized steel channels, 14-gauge (2 mm) or heavier, anchored to top with screws through slotted holes.

c. Wood Top Tables: Welded to stainless-steel channels, 14-gauge (2 mm) or heavier, anchored to top with screws through slotted holes.

I. Shelves:

1. Construct solid shelves under pipe base tables of 16-gauge (1.6 mm) stainless-steel, with 1-1/2" (37 mm) turned down and under edges on exposed sides, and 2" (50 mm) turn up against walls or equipment. Fully weld to pipe legs.

2. In fixtures with enclosed bases, turn up shelves on back and sides with 1/4" (6 mm) (minimum) radius and feather slightly to ensure a tight fit to enclosure panels.

J. Sinks:

1. Construct sinks of 14-gauge (2 mm) stainless-steel with No.4 finish inside and outside.

2. Form back, bottom and front of one piece, with ends and partitions welded into place. Partitions: double thickness, 2" (51 mm) minimum space between walls. Multiple compartments to be continuous on the exterior, without applied facing strips or panels.

3. Cove interior vertical and horizontal corners of each tub not less than 1/4" (6 mm) radius, die formed. Outer ends of drainboards to have roll rim risers not less than 3" (76 mm) high.

4. Drill faucet holes in splashes 2-1/2" (63.5 mm) below top edge. Verify center spacing with faucet specified. Grind and polish.

5. Sink insets to be deep drawn of 16-gauge (1.6 mm), or heavier, polished stainless-steel. Weld into sink drainboards with 1-1/2" (37 mm) x 1-1/2" (37 mm) x 14-gauge (2 mm) stainless-steel angle brackets; securely welded to sinks and galvanized cross angles spot welded to underside of drainboards to form an integral part of the installation.

6. The bottom of each compartment is to be creased such as to ensure complete drainage to waste opening. Slope bottom of sink bowls toward drain outlet.

K. Drains and Wastes and Faucets:

1. Furnish and install Fisher model 28940, or equal, ball valve type rotary drain assembly with flat strainer and connected overflow assembly, with chrome finish, in die-drawn inset type sinks and Bain Marie sinks.

2. Other custom fabricated sinks to be furnished with Fisher model 28932, or equal, ball valve-type rotary drain assembly, with flat strainer and chrome finish. Waste connection to have 2" (50 mm) external thread size, with 1-1/2" (37 mm) internal thread size.

3. Rotary Handle: Of sufficient length to extend to front edge of sink. No riveting, screws or soldering permitted to fit drains to sinks, with all parts of drains easily removable for servicing and replacement.

4. All faucets furnished with equipment included in this Section to be lead-free and comply with NSF Standard #61, Section #9; such as manufactured by Fisher, Chicago, or T&S.

5. Faucets and pre-rinse spray assemblies furnished with equipment included in this Section, are to have a maximum GPM flow rate in compliance with the Energy Policy Act of 2005 (EPAct) and later updates; or local requirements, whichever is lower. EPAct / local requirements are to be applicable to all faucets and pre-rinses; except for pre-rinse type assemblies used at glass icing / fill stations, fill hose / faucet assemblies at high water usage cooking equipment such as kettles, tilt fry pans, etc., and fill faucets at high volume / usage sinks, such

as pot wash, mop sink and preparation sinks, etc. are to have flow rates of approximately 5 gpm flow minimum.

6. All flex hose type faucet assemblies, such as pre-rinses, kettle fill hoses, etc., to have an inline pressure type back-flow preventer in the hose assembly, as required by local codes.

7. All equipment provided by this Contractor, which discharges liquid waste exceeding 140º F (60º C), is to be provided with a cold-water drain tempering assembly per local codes.

L. Workmanship:

1. Best quality in the trade. Field-verify dimensions before fabricating; conform all items to dimensions of building; neatly fit around pipes, offsets, and other obstructions.

2. Fabricate only in accordance with approved shop drawings, showing pipes, obstructions to be built around, and location of utilities and services.

M. Casework:

1. Enclosure: except as otherwise indicated, provide each unit of casework (base, wall, overhead and free-standing) with a complete-enclosure metal cabinet, including fronts, backs, tops, bottoms, and sides.

2. Bases to be made of 18-gauge (1.3 mm) stainless-steel sheets reinforced by forming the metal and the inclusion of hat-channels.

3. Ends, partitions and shelves to be stainless-steel.

4. Unexposed backs and structural members may be galvanized, unless otherwise noted.

5. Vertical ends and partitions to be single wall, with a 2” (50 mm) face.

6. Sides and through partitions are flush with bottom rail, welded at intersections.

7. Shelves: Provide adjustable standards for positioning and support of shelves in casework; except bottom shelf of cabinet mounted on legs or as specified. Turn back of shelf units up 2” (50 mm) and hem. Turn other edges down to form open channel. Reinforce shelf units and pilasters to support 40 pounds per square foot (195 kgs/sq meter) loading, plus 100 percent impact loading.

8. Bottom front rail of bases set on masonry platform to be continuously closed and sealed to platform.

9. Provide removable access hatchways to all concealed floor sinks under casework directly over floor sinks. Sink locations to conform to local Health Department code requirements.

N. Doors:

1. Metal doors to be double-cased stainless-steel. Outer pans to be 18-gauge (1.3 mm) stainless-steel with corners welded, ground smooth and polished. Inner pan to be 20-gauge (1 mm) stainless-steel fitted tightly into outer pan with a sound deadening material such as Celotex or Styrofoam used as a core. The two pans to be tack welded together and joints solder filled. Doors to finish approximately 3/4” (19 mm) thick and be fitted with flush recessed type stainless-steel door pulls; or full-length continuous pulls as per individual itemized specifications and shown on applicable Standard Detail sheet.

2. Wood doors to be fabricated as detailed.

3. Hinged doors to be mounted on heavy-duty NSF-approved hinges, or as noted on plans or specifications.

4. Drawer Assemblies:

5. Assemblies to consist of removable drawer body mounted in a ball bearing slide assembly with fully enclosed housing.

6. Slide assembly consists of one pair of 200-pound (90 kilograms) capacity stainless-steel roller bearing full extension slides, with side and back enclosure panels, front spacer angle, two drawer carrier angles, secured to slides and stainless-steel front.

7. Drawers intended for tools and general non-food products storage are to have 20” x 20” x 6” deep (508 mm x 508 mm x 152 mm), 18-gauge (1.3 mm) minimum stainless-steel drawer pans.

8. Drawers intended to hold food products are to have 12” x 20” x 6” deep (305 mm x 508 mm x 152 mm) stainless-steel food pans.

9. All drawer pans to be easily removable without tools or disassembly of any drawer assembly components.

10. Drawer fronts are double-cased, 3/4” (19 mm) thick, with 18-gauge (1.3 mm) stainless-steel welded and polished front pan. Steel back pan shall be tightly fitted, and tack welded. Sound-deaden with rigid insulation material.

11. Provide drawers with replaceable soft neoprene bumpers or for refrigerated drawers - a full perimeter replaceable refrigerator gasket.

O. Closed Base: Where casework is indicated to be located on a raised-floor base, prepare casework for support without legs, and for anchorage and sealant application, as required for a completely enclosed and concealed base.

P. Support from Floor: Equip floor supported mobile units with casters, and equip items indicated as roll-out units, with manufacturer's standard one-directional rollers. Otherwise, and except for closed-base units, provide pipe or tube legs, with adjustable bullet-design feet for floor supported items of fabricated metalwork. Provide 2” (50 mm) vertical adjustment of feet (concealed threading).

Q. Shop Painting:

1. Clean and prepare metal surfaces to be painted; remove rust and dirt. Apply treatment to zinc coated surfaces, which have not been mill phosphatized. Coat welded and abraded areas of zinc coated surfaces, with galvanize repair paint.

2. Apply 1.5 mil (dry film thickness) metal primer coating, followed by 2, 1.0 mil (dry film thickness) metal enamel finish coatings.

3. Bake primer and finish coatings in accordance with paint manufacturer's instructions for a baked enamel finish.

R. Sound Deadening:

1. Sound-deaden underside of metal tops, drainboards, undershelves, cabinet interior shelves, etc., above the underbracing/reinforcing/framing only.

2.5 ACHITECTURAL MILLWORK EQUIPMENT:

A. The following general requirements shall govern the construction of millwork-built fixtures, except where otherwise noted. Work shall be performed by skilled mechanics of the trade and shall be of the highest quality throughout, in such a manner as to fulfill the intent of the Contract Documents. Perform architectural woodwork in accordance with “Architectural Woodwork Quality Standards” published by the Architectural Woodwork Institute (AWI). Fabricator shall have a demonstrated ability in fabricating woodwork items similar in type and quality to those required for this project.

1. All fixtures shall be made by one manufacturer and assembled in single and complete units as the dimensions will permit shipment to and installation of at the building. Large pieces requiring sectional construction shall have their parts accurately fitted and aligned with all others, and provided with ample screws, glue and bolt blocks, tongues, grooves and splines, dowels, mortises and tenons, screws bolts or suitable means of concealed fastening, as required to render the work substantial, rigid, and permanently secured in proper position to each related section.

2. Sufficient additional material shall be allowed to permit accurate scribing to walls, floor and related work, and due allowance made whenever possible for such shrinkage as may develop after installation. Single and sectional units shall be provided with adequate cleating, blocking, crating and other forms of protection as required precluding damage during shipping and handling.

3. Framing and blocking members shall be assembled with bolted and screwed connections and should be secured to the structural backing with cinch, expansion screws or toggle bolts, as required; spaced and installed to insure ample strength and rigidity. Rails and stiles shall be mortised and tenoned, work neatly mitered and membered, all butt joints made flush and smooth, and all permanent joints made up with water resistant glue. All fixtures shall be assembled without face screws or nails, except where it may be necessary to attach items. All face screws or nails which are necessary shall be counter sunk and plastic wood or wood

plugs used to cover head, and the plug neatly touched up. The heads of all screws used in any assembly shall be counter sunk below the surface.

4. The core material shall be marine-grade, 7 ply-substrate or MEDEX exterior resin medium density fiberboard substrate; conform to ANSI A208.2.3.3.4. All substrate materials shall be LEED certified and meet the LEED requirements for the project.

5. Back sheet shall be NEMA LD .020" (0.5 mm) thick, Type V, Grade 91 plastic laminate; apply on all surfaces not covered with plastic laminate; coordinate color with exposed surface color; comply with NSF Standard 35.

B. Construction / Joints:

1. Follow AWI Premium Grade Standards; factory assembled parts and prefinished; flush type fronts and overlapping ends; ¾" (19 mm) core material base cabinet, end and dividers with corner joints between framed members fully lock-jointed, glued and screwed; dado and glue cabinet backs into sides and bottom; scribe countertop and backsplashes; secure countertops to base cabinet from underside; fully cure surfaces prior to installation. Mortise and tenon, spline, dowel and/or pin lock and glue work to avoid use of nails wherever practical. Make butt joints with an approved device for prevention of separation of members. Blind nail and conceal.

C. Plastic Laminate:

1. Plastic laminate shall be bonded to all exposed surfaces with Urac 185 adhesive or equal, to minimum ¾" (19 mm) fir-faced, close grain marine-grade plywood applied under high pressure. In accordance with AWI 1600A-G-1, use horizontal grade on all exposed surfaces, vertical grad on semi- exposed surfaces and sealed paint on all concealed surfaces. Reject plastic laminate or plastic backing shall be used to prevent warping, unless otherwise specified. All edges shall be carefully sanded to smooth finish, removing burns, nicks, and cur marks. Plastic laminate joints shall be finished without wavy and unsightly joints. Joints need not be mitered except as specified. Hand sand edges to a slight chamfer.

2. Top sheet shall be placed on and over finished edge. Ease exposed edge to overlap sheet. Use largest sheet possible in order- to minimize seams.

3. Coved backsplashes shall be a minimum of ¼" (6 mm). End splashes may have a square intersection with tabletops unless specified otherwise.

4. Plastic laminated shelves shall be laminated with horizontal grade laminate on the side and vertical grade at all edges.

D. Doors, Hinged:

1. Hinged doors shall be fabricated of ¾" (19 mm) thick marine-grade plywood with hardwood full perimeter edge with plastic laminate on face and self-edging on exposed sides unless indicated otherwise in drawings and details. Door hinges, pulls and catches shall be supplied and detailed. Provide Grass 1200, 176 degree opening concealed casework hinges or equal by Blum or Amerock. Door catches shall be Component Hardware Model M22-2420 for non-magnetic and Model M30-2400, heavy duty, self- aligning for magnetic.

2. Utilize EPCO Model MC 4023.5 or as specified in the Item Specifications.

3. Door locks shall be Component Hardware Model P30 Series; stainless-steel faced; master keyed as specified.

E. Doors, Sliding:

1. Sliding doors shall be fabricated of solid core marine-grade plywood with hardwood edges and constructed similar- to hinged doors. Doors shall be mounted on E-Z Glides track. Doors shall be removable without the use of tools. Rubber stops shall be provided concealed in end stile or mullion.

F. Access Panels: Access panels shall be fabricated of ¾" (19 mm) nominal thick hardwood and shall be fabricated as a door. Each access panel shall be provided with 2 (two) magnetic catches at top and 2 (two) 3/16" (5 mm) positioning pins at bottom.

G. Drawers:

1. Drawers shall have dovetail construction, well glued and blocked. Fronts shall be not less than ¾" (19 mm) thick hardwood. Sides and back shall be ½" (13 mm) thick fabricated of Birch, Maple, or Sycamore except where extension slides are used, in which the side shall be ⅝" (10 mm) thick. Bottom shall be milled into fronts and sides.

2. Drawers shall be provided with suitable stops. Provide pulls as detailed or specified. The inside surfaces of all drawers shall receive one coat of penetrating primer and one coat of glass lacquer.

H. Painted Finishes:

1. Painted finishes shall have exposed surfaces free from defects and blemishes that would show after being finished, regardless of grade specified. All surfaces specified to receive paint or enamel finish shall receive one cross coat of lacquer type undercoat. The undercoat shall be of appreciably different color from that of the finish coat, and of proper ground color with relation to the finish coat. After the undercoat has been thoroughly dried, surfaces shall be sanded smooth, and two coats of enamel shall be applied. Back painting shall be provided for all cabinet and woodwork prior to installation.

I. Interior & Wall Shelves:

1. Interior shelves shall be adjustable with flush routed-in shelf standards. Wall shelves to be fabricated as specified and as per "Standard Detail".

J. Fire Retarding:

1. Where required by code, all required materials are to be treated with fire retardant chemicals to achieve the required flame spreading performance rating. Retardant chemicals must be a type approved by local authorities.

2.6 FILTER EXHAUST HOODS AND/OR WATER WASH VENTILATOR FABRICATION:

A. 18-gauge (1.3 mm) type 201 or 304 stainless-steel external welded construction, in accordance with the latest edition of N.F.P.A. No.96 and International Mechanical Code, including all applicable appendices. Exposed welds to be ground and polished. Exhaust hoods to be U.L. Listed as available for length specified.

B. Furnish type of fixture specified. Fixtures to be U.L. listed for cooking equipment exhaust hoods, NSF-approved, and with sealed safety lenses.

C. Furnish welded stainless-steel formed duct collars at ceiling or wall duct connections. Verify size and location of duct connections required in this contract before fabrication.

D. Pre-piped liquid chemical or water fire suppressant system, as specified, complying with applicable local and N.F.P.A. regulations. Wet chemical fire suppression systems to comply with UL 300 Standards. Water fire suppression systems to comply with U.L. Category Subject 199E. Each pull station is to be clearly identified with a permanent type of label, as to which exhaust hood(s) it is for. Each exhaust hood is to have a matching permanent-type label, identifying which pull station activates its fire system.

E. All cooking equipment below exhaust hoods/ventilators, on casters, are to be provided with positive wheel placement systems for the rear casters, similar-to Posi-Set units, in compliance with NFPA-17A 5.6.4 and NFPA-96 12.1.2.3.

F. Water wash or ultra-violet control panel to be by the same manufacturer as the ventilator, with time clock control for automatic operation. Provide stainless-steel trim strips for recessed control cabinet applications. Provide stainless-steel chase for surface mounted control panel, from top of panel to ceiling, full width, and depth of panel.

2.7 REFRIGERATION EQUIPMENT:

A. General:

1. Furnish either single or multiple compressor units, as specified or recommended by the manufacturer for the sizes and variations between connected evaporator loads as indicated.

2. Furnish units of the capacities indicated, arranged to respond to multiple- evaporator thermostats and defrosting timers. Include coils, receivers, compressors, motors, and motor starters, mounting bases, vibration isolation units, fans, dryers, valves, piping, insulation, gauges, winter control equipment and complete automatic control system.

3. Refrigerant: Pre-charge units with type or types recommended by manufacturer for services indicated, with quick-disconnect type connections only where specified, ready to receive refrigerant piping runs to evaporators and (where remote) to condensers. All refrigerant and associated components to comply with the requirements of the Montreal Protocol Agreement. No CFC or HCFC refrigerants or associated components will be permitted on this Project. HFC refrigerants and components are to be used. Contractor is responsible for coordinating these requirements with manufacturers.

4. Foodservice equipment items included in this Section, with remote refrigerated systems, are to include interconnecting refrigeration lines, sizing, and insulation between components, as per manufacturer's installation instructions, and as determined by this Contractor's Certified Refrigeration Sub-Contractor; and only after a thorough examination of actual site conditions and obstacles which might affect the routing. Routing should be as direct and short as possible and practical. Refer to additional requirements listed in this Section 11 40 00, 1.5 Laws, Ordinances and Standards.

5. The minimum outdoor operating ambient temperature for design of units is -10 degrees Fahrenheit (-23 Centigrade), or lower as applicable for extreme low local conditions. The maximum indoor design temperature for operation of compressor units is 95 degrees Fahrenheit (35 Centigrade). The maximum outdoor ambient design temperature is to be determined by Contractor with prevailing conditions at mounting location of compressor, such as sun exposure, limited ventilation, high fences/walls, roof color and materials, local climatic extremes, etc.; but in no case is it to be less than 100 degrees Fahrenheit (37.8 Centigrade).

6. All refrigeration systems with remote condensing units and jobsite installed interconnecting refrigeration lines shall be tested to verify that there are no leaks. Leak testing shall be equal to or better than a professionally recognized 48-hour minimum, pressure holding test. If any leaks are detected, they shall be repaired, and another leak test preformed; until there are zero leaks detected. A written report of the type test preformed, and a step-by-step record of the procedure and readings shall be submitted to Contractor for inclusion in the Operations and Maintenance Data Manuals.

B. Components:

1. Coils for fabricated refrigerators to have vinyl plastic coatings, stainless-steel housings; and be installed in such a manner as to be replaceable.

2. Provide guards for all refrigeration/freezer fans, with maximum 1/2" (13 mm) mesh.

3. Remote refrigeration system to be complete with thermostatic expansion valves at the evaporator.

4. Fabricated refrigerated compartments to be fitted with flush dial thermometers, with chrome plated bezels. Thermometers to be adjustable and shall be calibrated after installation. Thermometers to have an accuracy of + 2 degrees Fahrenheit (1 degree Centigrade).

5. Hardware:

a. Refrigerator hardware for fabricated refrigerator compartments to be heavy-duty components.

b. Self-closing hinges.

c. Latches to be magnetic edge mount type, unless specified or detailed otherwise.

6. Doors and drawers for walk-in coolers/freezers, and reach-in refrigerated compartments, both fabricated and standard, to be fitted with cylinder locking type latches, and provided with master keys.

7. Provide and install shut-off valves and service port for each compressor, manifold, or header, and refrigerated fixture for multiplex and parallel installations to enable service personnel to service one (1) fixture while other fixture(s) connected to the same compressor can continue to operate. Isolation valves for individual fixtures based upon the sizes of the individual pieces.

8. Drawers for refrigerated fabricated compartments shall be complete with heated surround at closing perimeter.

C. Cold Pans: Ice pans, refrigerated pans and cabinets to be provided with breaker strips, where adjoining top or

cabinet face materials, to prevent transfer of cold.

D. All mechanically cooled custom fabricated or standard buy-out refrigerators with openings in the top for cooling pans, and/or all built-in or drop-in mechanically cooled cold pans are to comply with and be listed by NSF Standard #7. Contractor is to verify that the specified unit complies with this requirement.

E. Ventilation of Refrigerated Equipment:

1. Adequate ventilation to be provided for custom fabricated equipment with integral refrigeration condensing units, both built-in and drop-in. If flow-through ventilation cannot be provided, provide flow direction partitions and an additional squirrel fan(s) capable of cooling the condensing unit.

2. If, in the opinion of the Contractor, additional room ventilation is required to ensure correct operating temperatures of standard buy-out, custom fabricated, or remote refrigeration condensing units, or compressor rack assemblies, they are to so state in a letter to the Architect, for evaluation and decision.

2.8 REMOTE REFRIGERATION SYSTEMS

A. All remote refrigeration systems shall be furnished and installed by one contractor, unless otherwise specified. Provide all components necessary for a complete and operable system. System to be fully capable of satisfying the refrigeration requirements for each fixture as defined by the manufacturer of each fixture.

B. Compressor and Condensing Units:

1. Units shall be factory assembles complete with hermetic units below 1 HP, semi-hermetic units 1 HP and larger, air or water-cooled condenser, depending upon building conditions and specifications, high-low pressure controls, suction accumulator on low temperature system, sight glass, liquid line dryer, suction and discharge service valves, liquid receiver, and electric control panel. The electrical control panel shall be furnished with magnetic motor starter, defrost timer clock, and contractors in accordance with "Refrigeration Schedule". Compressor capacities shall be based on Air Conditioning and Refrigeration Institute (A.R.I) Standards. The refrigerant for medium and low temperature fixtures to be CFC free and conform to the Montreal Protocol Agreement.

2. Capacities shall be based on the following:

a. Compartment temperature and evaporating temperature greater than 32oF (0oC) 18 to 20 hours operations.

b. Compartment temperature greater than 32oF (0oC) and evaporating temperature less than 32oF (0oC) 16 hours operation.

c. Compartment temperature and evaporating temperature less than 32oF (0oC) 18 hours operation.

d. Condensing units shall be mounted on a steel base to affect a quite operation. All rotating parts to be carefully balanced for minimum vibration and lubricated with forced or splash oil system. Receiver shall be sized for a complete pump down of the system and shall be shell type with fusible plug.

3. Compressor units to be provided with suction and discharge back setting type service valves and standard machinery finish.

4. Motors shall be single speed, maximum 1750 R.P.M. compound wound ball bearings or sleeve bearing. Double squirrel cage motors with high starting torque set and low starting current to be used in a 3-phase application.

5. All machines to be equipped with quick acting type high-low pressure control switches having adjustable range and differential and high-pressure cut-out. Cut-out to be automatic reset type.

6. For air-cooled units the condenser shall be a standard manufactured part of the equipment. Condensing temperatures shall be based upon (100°F 38°C) ambient air.

7. Other components and accessories, such as suction filter and crank case heater shall be furnished when specified in the itemized specifications.

C. Motor Starters-Contactors:

1. All single-phase motors shall be provided with mounted and internally wired contactors, except where pre-wired units are furnished without contactors. Single phase compressors shall be provided with built-in thermal and electrical overload protection.

2. All three-phase motors shall be provided with magnetic type starters with quick trip overload elements matched for motor amperage except where overload protection is built into the compressor motor and the manufacturer supplies a contactor instead of a starter. Overload heater element shall be sized according to manufacturer's recommendations. Compressor motor starters shall be definite purpose starters with manual reset.

3. Starters shall be installed upon surfaces free from excessive vibrations.

4. Where starters are required for installation in a motor control center, make and model of control center shall be verified, and starters provided to match.

D. Oil Separator

1. Provide oil separators, except when Compressor Manufacturer requires otherwise, 34°F, (1^{O}C) and below and install as near as possible to the compressor. The return line shall be connected to the top of the crankcase above the oil level. Where compressor does not have connection for oil return line from separator, connect to a tee in the suction line adjacent to the compressor. Exposed oil return line to be provided with shut-off valve of the packless stem type.

E. Compressor Rack Systems:

1. Racks shall be of the number of tiers and quantity to accommodate the number of condensing units specified for each rack assembly and allow for service clearance and ventilation. Review and confirm access into building or housing requirements to roof top locations.

2. Racks shall be fabricated with structural steel of size and quantity to properly support the equipment to be installed on the rack. In special applications where building access is limited, construct rack framing with Dexion of Unistrut material.

3. Racks shall be all welded construction with welds ground smooth.

4. After completion of fabrication the complete rack shall be cleaned, primed, and painted with top quality oil-base enamel.

5. Each rack shall be equipped with a pre-wired receptacle.

6. Racks shall be pre-wired to a circuit breaker panel and pre-plumbed to a header (when specified water cooled) requiring a single point electrical and plumbing connection.

7. Racks shall have UL or equivalent approval.

8. Special Conditions: For custom built racks for individual condensing units provide Dixon Angle Iron.

F. Coils and Cooling Units:

1. Units shall be direct expansion type of size and design to effect required temperature, humidity and to suit application intent.

2. Units shall be hung from the ceiling with 1/2" (13 mm) nylon rods with plated steel nuts and lock washers. Rods shall extend through ceiling to bracing adequate for the suspended weight. Bracing shall be furnished as required; penetrations shall be sealed and trimmed with escutcheon plates.

3. Units shall be installed tight to ceiling. All installations adjacent to walls shall be set out a minimum distance conforming to manufacturer's directions, to ensure proper air circulation and performance.

4. Units with fan or blower and motor shall have thermal overload protection and be wired as indicated in

"Refrigeration Schedule".

5. Defrost cycle shall be based on the following:

   a. Coils for 32oF (0oC) and lower shall have an electric defrost controlled by a time clock mounted on the compressor rack or at evaporators locations inter-wired by Division 26 - Electrical.

   b. Coils for 33o (0.6oC) and 34oF (1oC) shall have an air defrost controlled by a time clock mounted on the compressor rack or at evaporators locations inter-wired by Division 26 - Electrical.

   c. Coils for temperature above 34oF (1oC) shall have an air defrost in the off cycle controlled by proper sizing of the coil and the compressor.

6. Location of coils shall be coordinated with shelving and floor sink locations.

7. All coils for fabricated refrigerators and/or freezers shall be installed for accessibility and replacement.

G. Penetration Sleeves and Plates:

1. Service line penetrations of insulation to accommodate electrical conduit, refrigerant and drain lines shall be limited to a minimum with service stubbed through insulation or locations predetermined by respective divisions.

2. Where service lines penetrate insulated walls, the opening shall be packed with caulking, before trimming with escutcheon plate.

3. Where service lines penetrate building walls outside of foodservice areas, the opening shall be packed with “Perma-Gum” and foam caulking.

4. All exposed ends of sleeves, both inside and outside of compartments, are to be trimmed with 24-gauge stainless-steel escutcheon plates, furnished as blanks in which respective work divisions shall cut required line holes and install.

H. Refrigerant Piping:

1. Copper tubing for refrigerant piping shall conform to ASTM standard specifications, serial designation B-88. All piping shall be type "L" ACR hard copper or cleaned and sealed soft type "L" tubing, dry seal or equal as indicated. Forged or wrought copper fitting with sweat or soldered joints shall be used.

2. Tubing shall be cut only with a tube cutter and sized with a sizing tool.

3. Piping shall be exposed to view as required by the standard safety code for mechanical refrigeration.

4. The liquid suction lines form condensing units to coil shall be sized and run as shown on the “Refrigeration Schedule” and Refrigeration Drawings.

5. Piping run within cold storage rooms shall be finished with aluminum paint.

6. For exposed areas, accessible furred ceiling spaces and in walls or excavated trench type installations, hard copper tubing shall be used. Exposed tubing shall be run in a manner to preclude damage by activities in the area; or shall be protected by conduit, furnished, and installed as part of this contract. Conduit shall have water evacuated and both ends completely sealed.

7. For piping run in conduit through inaccessible areas, such as under slab on grade, continuous one-piece soft copper tubing shall be used with no joints. In lieu of large piping in conduit, especially vertical runs, random lines may be used; carefully fabricated and assembled to ensure equal pressure drop.

8. Ends of lines shall be capped to prevent contamination and opened only at time of final connection.

9. Suction lines shall be sized for a maximum pressure drop from evaporator to compressor 2 lbs. (0.9 kg.) for high and medium temperature systems, and of 1 lb. (0.45 kg.) for low temperature systems and shall allow gas velocities of not less than 750 FPM (3.8 M/sec.) in horizontal runs and 1500 FPM (97.6 M/sec.) in vertical risers. Liquid lines shall be sized for a maximum pressure drop of 3 lbs. (1.36 kg.) from receiver to evaporator.

10. Tubing runs shall be graded or pitched to prevent trapping of oil. Suction lines shall pitch 1/2"/10"-0" (13

mm/2.54 m) minimum.

I. Joints and Connections:

1. Fittings shall be long radius wrought copper only as manufactured by Mueller Brass Company or equal.
2. Vertically run suction lines shall have one piece of manufactured oil "P" traps. Line to be sized for proper velocity for oil return to compressor(s).
3. 1/8" NPT by 1/4 fl. half union for all suction and discharge service valves with 1/4 fl. cap.
4. Reduction in piping size shall be made with a manufactured reducer coupling.
5. Flare nuts shall be short forged or frost-proof.
6. All surfaces to be joined must be prepared and cleaned. When soldering stop or solenoid valves, wrap valves with moist fabric to absorb excessive heat. Stop valves shall be partly open. When soldering expansion valves or pressure regulating valves, remove power assembly, if necessary, to prevent damage by excessive heat.
7. Copper joints shall be made with Handy & Harmon "Sil-Fos" brazing alloy, "Phoson 15", "Silvaloy 15" or equal; melting point of 1185-1350°F; (640°C. - 732°C.) Silver content not less than 15%.
8. Copper to brass joints shall be made with Handy & Harmon "Easy Flo 45" brazing alloy "Silvaloy 45", "Mueller 122" or equal; melting point of 1125-1145°F, (607°-618°C.) silver content not less than 45%.

J. Hangers and Supports:

1. For all piping not run within conduit, provide adjustable hangers, anchors or straps as required. Hanger spacing shall not exceed 8'-0".
2. Insulated copper piping shall be provided with approved type sleeves at hanger points.
3. All insulated copper piping shall be isolated from supports by means of felt wrapping or with "Trisolater" by Semco or approved equal.
4. Vertical piping shall be supported at intervals with spring type hangers or a substantial pipe at case of the pipe. All horizontal pipe runs connected to vertical risers must be adequately supported.
5. For suspended conduit, support shall be by means of hanger permitting screw adjustments. Sufficient hangers shall be used to provide support, allow expansion, and limit vibration.

K. Piping Sleeves:

1. Coordinate sleeves provided by the General Contractor through walls which allow for fully insulated lines. Extend sleeves entirely through wall and dress each end with a chromium plated wall plate neatly fitted against the wall, securely fastened and sealed in place. All sleeves through wall shall be of standard weight steel pipe.
2. Piping lines and sleeves at wall or floor penetrations shall be caulked and made vermin-proof at all locations.

L. Piping Insulation:

1. Suction lines run in conduit shall be insulated according to ambient and humidity conditions to prevent condensation and freezing.
2. Refrigeration suction lines outside of refrigerated compartments, not run in conduit, shall be insulated back to compressors with Armstrong Armaflex AP foamed plastic insulation or as determined by code. Thickness of material shall suit service, ambient and humidity conditions, to prevent condensation, minimum thickness 1/2" (15 mm.).
3. Freezer Storage Room drain lines should not be extended through adjacent cooler compartments if at-all

possible. All such lines shall be insulated with 1/2" (15 mm) minimum thickness of Armstrong Armaflex AP foamed plastic insulation to prevent condensation. Carefully seal end of insulation tight against freezer wall surface.

4. Piping for cooling water services or refrigerant piping exposed to freezing ambient temperatures shall be insulated with 1/2" (15 mm) minimum thickness of Armstrong Armaflex AP foamed plastic insulation. Paint exterior installation with Armaflex paint.

5. Thickness of material shall suit service, ambient and humidity conditions to prevent condensation.

6. Joints shall be sealed with Armstrong 520 adhesive. Insulation shall be continuous through clamps. Provide additional insulation where suction lines must be run within 12" (304 mm) or less of water or underground waste lines.

7. Exterior-run piping shall be insulated as per above and covered with stainless-steel channels secured to structure, sealed to be weather-proof.

M. Heat Interchangers:

1. All blower controls, unit coolers, plate type evaporators and other evaporators where specified, are to be provided with heat interchangers, with a capacity to match the condensing unit.

N. Temperature Control:

1. Temperature control of cold storage rooms shall be by line voltage thermostats operating liquid line solenoids.

2. Temperature control for remote normal temperature refrigerator shall be by low pressure switch setting.

3. Temperature in each cold storage room compartment shall be controlled by electric thermostat, Ranco No. 010-1408, located within compartment and sensing element positioned to avoid fan discharge air stream.

4. Contractor to coordinate any additional specified temperature control/monitoring/alarm system within this document set including assisting with coordination of home-run control wiring, wireless assembly coordination and HACCP requirements in terms of reporting.

O. Valves and Accessories:

1. All valves and controls shall be standard weight and suitable for service purpose intended, and subject to approval by the Designer.

2. Provide shut-off valves and service port for each refrigerated fixture for multiplex installations to enable service personnel to service one (1) fixture while other fixture(s) connected to the same compressor can continue to operate.

3. Each system shall include condensing unit with standard valving, refrigerant piping, refrigerant, evaporator(s), liquid and suction line isolation valves within 5'-0" (1500 mm) of evaporators, thermostatic expansion valve for evaporator, heat exchanger, filter-dryer, liquid line solenoids for Cold Storage Rooms and liquid indicator.

4. Vibration eliminators on compressor suction and discharge lines, size same as piping, as manufactured by Anaconda.

5. Refrigerant shut-off valves shall be as manufactured by Henry or Superior Valve Company. Valves shall be placed and in liquid line for each condensing unit and in each liquid line to each evaporator.

6. Expansion valves shall be Sporlan, or approved equal, furnished, and installed in the liquid line at the evaporator, unless provided with manufactured equipment. External equalizer expansion valves shall be provided for coils fitted with refrigerant distributor.

7. A Sporlan, or approved equal, drier shall be provided at the compressor. Up to 3HP shall be a Catch-All series; larger than 3HP shall be angle replaceable cartridge series or approved equal.

8. Each liquid line sight glass shall be Sporlan "See All" moisture and liquid indicator and shall be full line size or approved equal.

9. Solenoid valves shall be Sporlan, or approved equal, line voltage, manual lift stem type, to operate at maximum of 2 lbs. (0.9kg.) pressure drop across the valve. Valves shall be full line size, using silver solder connection as applicable. A liquid line solenoid, normally closed, shall be used with temperature controller for each Cold Storage Room compartment coil on a system.

10. Include a suction line filter with access valve adjacent to compressor. Filter shall be a Superior "F" Series or equal.

11. EPR, CTR, and/or CDA valves shall be Alco, or Sporlan, or approved equal.

12. Suction accumulators shall be Refrigeration Research 3700 series or Virginia VA series or approved equal.

13. Discharge line mufflers shall be Refrigeration Research M-10 and M-15 or AC and RSS- 6300 series or approved equal.

14. Time clocks shall be Paragon or approved equal.

P. Drain Lines:

1. Type "L" copper coil drain lines extended to exterior of refrigerated compartments over floor sinks (drain) with "S" traps at termination ends.

2. Provide clean out "T" and cap at each change of direction in the lines. Provide individual drain lines for each coil unless otherwise specified. Drain lines shall be run tight to refrigeration compartment walls with minimum pitch of 2" per foot.

3. Drain lines inside low temperature compartments shall be equipped with drain-line heaters provided by and wired by electrical division. Freezer Storage Room drain lines should not be extended through adjacent cooler compartments if at all-possible. (Drain line in low temp compartment to be insulated with Armaflex ½" (13 mm) – insulation and wall fastening by the foodservice equipment contractor).

4. Drain lines on the exterior of refrigerated compartment shall be painted with chrome tone paint and shall be trapped to disallow ambient air infiltration into refrigerated cavity.

Q. Refrigerant/Compressor Oil Reclaim:

1. For existing refrigeration systems which may be reused, abandoned or where site conditions warrant, the system(s) refrigerant, oil and/or other components shall be reclaimed and contained by certified personnel in conformance to Refrigerants and Hazardous Waste criterion as specified by the Environmental Protection Agency and/or Montreal Protocol Guidelines & Requirements.

2.9 MISCELLANEOUS MATERIALS AND FABRICATION:

A. Nameplates: Whenever possible, locate nameplates and labels on manufactured items, in accessible position, but not within customer's normal view. Do not apply name plates or labels on custom fabricated work, except as required for compliance with governing regulations, insurance requirements, or operator performance.

B. Manufactured Equipment Items: Furnish items as scheduled or herein specified. Verify dimensions, spaces, rough-in and service requirements, and electrical characteristics, before ordering. Provide trim, accessories and miscellaneous items for complete installation.

C. Insert Pans:

1. General: Cut-outs, openings, drawers, or equipment specified or detailed to hold stainless-steel insert pans to be provided with a full complement of pans as follows:

a. One (1) stainless-steel, 20-gauge (1 mm) minimum, solid insert pan – in us pan size or gastronorm configuration as specified for each space, sized per plans, details, or specifications.

b. Where pan sizes are not indicated in plans, details, or specifications, provide one full-size pan for each opening.

c. Provide maximum depth pan to suit application and space.

2. Provide 18-gauge (1.3 mm) NSF- approved removable stainless-steel adapter bars where applicable.

3. All cut-outs and openings, or equipment specified or detailed to hold stainless-steel insert pans, shall be provided with a hinged stainless-steel removable night cover.

D. Tray Slides: Before fabrication of counters with tray slides, verify:

1. Size and shape of tray with Owner/Operator prior to fabrication. Edge of tray should not overhang outer support/slider by more than 2" (50 mm). If edge of tray exceeds this dimension, notify Architect, in writing, for evaluation and adjustment, if necessary.

2. Configuration of corners, turns, and shape of tray slides for proper support and safe guidance of trays.

3. Tray slide to be capable of supporting 200 pounds per linear foot (298 kgs/meter), live load.

E. Self-leveling dispensers: Verify type, make dimensions and weight of ware with Owner/Operator; and submit to the dispenser manufacturer, for proper sizing and calibration of dispensers.

F. Carbon dioxide (CO^2) equipment: Where equipment requires connection with compressed CO^2 cylinder for operation, provide 2-cylinder manifold and control system (integral with equipment) with proper connectors for Department of Transportation (DOT) approved type cylinders, complete with cylinder safety devices, and supports. Applicable to projects with CO2 equipment included in Contractor's specified equipment.

G. Reasonable quietness of operation of equipment is a requirement, and Contractor will be required to replace or repair any equipment producing out-of-the-ordinary intolerable noise. This also includes providing and installing bumpers and gaskets for doors and drawers on fabricated and standard manufactured items and sound insulation where feasible.

H. Gas pressure regulator: All gas fired equipment included with this Section is to be provided with a gas pressure regulating valve with a built-in vent limiting device sized per WC pressure rating of this project. Contractor is responsible for coordinating this requirement with their manufacturers and suppliers.

PART 3 – EXECUTION

3.2 SUPERVISION:

A. A competent supervisor, representing the Contractor, is to be present at-all times during progress of the Contractor's work.

B. Contractor is responsible for coordinating with all applicable Design Team members, Key Ownership Stakeholders Assigned, General Contractor, other Contractors and/or Sub-Contractors and Trades involved in this Project and associated with any items or work provided under this Section; as required for the successful provision, installation, completion, and functioning of these items and/or work, and the Project in general. This is to include, but not be limited to, exchange of shop drawings, details, and manufacturer's information, supplying templates or actual components to be installed in or on items provided by other Sections, for coordination; and coordinating with and between their own internal staff, sub-contractors, trades, manufacturers, fabricators, and installers, for compliance with the Contract Documents.

C. Contractor responsible for obtaining any documents referenced in this Section and on any associated drawings, which contain information relative to the performance of this Contract; and disseminating and coordinating the pertinent information contained in them, with the appropriate sub-contractors, manufacturers, fabricators, and/or installers.

D. Contractor is to take every precaution against injuries to persons or damage to property.

E. Contractor is to store his apparatus, materials, supplies and equipment in an orderly fashion at the site of the work so it will not unduly interfere with the progress of his work or the work of any other contractors.

3.3 SITE EXAMINATION:

A. Verify site conditions under the provisions of the General Conditions, Supplementary Conditions, and applicable provisions of Division 1 Sections. Notify the Architect, in writing, of unsatisfactory conditions for proper installation of foodservice equipment.

B. Verify wall, column, door, window, and ceiling locations and dimensions. Fabrication and installation should not proceed until dimensions and conditions have been verified and coordinated with fabrication details.

C. Verify that wall reinforcement or backing has been provided and is correct for wall supported equipment. Coordinate placement dimensions with wall construction Section.

D. Verify that ventilation ducts are of the correct characteristics, and in the required locations.

E. Verify that utilities are available, of the correct characteristics, and in the required locations.

3.4 DELIVERY AND INSTALLATION:

A. Delivery:

1. The equipment shall be delivered and installed on schedule. Coordinate all work with the General Contractor and other divisions as required.

2. Deliver materials (except bulk materials) in manufacturer's containers, fully identified with manufacturer's name, trade name, type, class, grade, size, color, item number, area, etc.

3. Contractor is responsible for receiving and warehousing equipment and fixtures, until ready for installation. Store materials, equipment, and fixtures in sealed containers, where possible. Store off the ground and under cover, protected from damage.

4. Contractor to verify and coordinate conditions at the building site, particularly door and/or wall openings, and passages, to assure access for all equipment. Pieces too bulky for existing facilities are to be hoisted or otherwise handled with apparatus as required.

5. Extra charges resulting from special handling or shipment to be paid by the Kitchen Equipment Contractor if insufficient time was allowed in placing factory orders to ensure normal shipment.

B. The work to be accomplished so as not to delay the project construction schedule, interfere, or conflict with the work being performed by other contractors. Work to be coordinated and integrated to prevent conflict of work necessitating changes to work already completed. Sequence installation and erection to ensure correct mechanical and electrical utility connections are achieved.

C. Verify all field dimensions before fabrication.

D. Install items in accordance with manufacturer's instructions.

E. Set each item of non-mobile and non-portable equipment securely in place, leveled and adjusted to correct height. Anchor to supporting substrate where indicated, and where required for sustained operation and use without shifting or dislocation. Conceal anchorages wherever possible. Adjust counter tops and other work surfaces to a level tolerance of 1/16” (1.6 mm) (maximum offset, and plus or minus on dimension, and maximum variation in 24" (610 mm) run from level or indicated slope). Provide anchors, supports, bracing, clips, attachments, etc., as required to comply with the local seismic restraint requirements. The Guidelines for Seismic Restraint of Kitchen Equipment, as prepared for the Sheet Metal Industry Fund of Los Angeles and endorsed by S.M.A.C.N.A., is to be followed.

F. Complete field assembly joints in the work (joints which cannot be completed in the shop) by welding, bolting-and-gasketing, or similar methods as indicated and specified. Grind welds smooth and restore finish. Set or trim flush, except for "T" gaskets as indicated. Field joints shall not be visible to the untrained eye.

G. Provide closure plates and strips where required, with joints coordinated with units of equipment.

H. Provide sealants and gaskets all around equipment to wall, ceiling, floors, masonry pads, and adjoining units not portable and with enclosed bodies to make joints airtight, waterproof, vermin-proof, and sanitary for cleaning purposes. Space between all equipment to wall, ceiling, floors, masonry pads, and adjoining units not portable and with enclosed bodies to be completely sealed against entrance of food particles or vermin by means of trim strips, welding, soldering or mastic. Mastic to be General Electric Silicone Construction Sealant Series SE1200 or equal in appropriate color.

I. Joints up to 3/8” (9.5 mm) wide, to be stuffed with backer rod, to shape sealant bead properly, at 1/4” (6 mm) depth.

J. At internal corner joints, apply sealant or gaskets to form a sanitary cove, of not less than 3/8” (9.5 mm) radius.

K. Shape exposed surfaces of sealant slightly concave, with edges flush with faces of materials at joint.

L. Provide sealant filled or gasketed joints up to 3/8" (9.5 mm) joint width. Wider than 3/8" (9.5 mm), provide matching metal closure strips, with sealant application each side of strips. Anchor gaskets mechanically, or with adhesives to prevent displacement.

M. Treat enclosed spaces, inaccessible after equipment installation, by covering horizontal surfaces with powdered borax at a rate of 4 ounces per square foot (1.2 kg/m2).

N. Insulate to prevent electrolysis between dissimilar metals.

O. Cut and drill components for service receptacles, fixtures, piping, conduit, fittings, etc. as required. Grind and polish penetrations to safe tolerance. Work to include welded sleeves, collars, ferrules, or escutcheons.

P. Verify and coordinate the mounting heights of all wall shelves and equipment, with equipment located below them, for proper clearances.

Q. Walk-In Refrigerator/Freezers:

1. The cold storage rooms shall be delivered and installed on schedule by factory supervised and approved installers. Coordinate the work with the General Contractor and other trades as necessary.

2. Provide the necessary job site coordination with the various trades to ensure job site conditions will meet the requirements of the cold storage rooms.

3. During curing and cleaning of the wearing floors inside the cold storage rooms, the cold storage room doors shall be left open, and the rooms well ventilated to prevent damage to the interior. "Keep Out" signs to be posted at each open door.

4. After the installation of the cold storage rooms and prior to the installation of the wearing floor has cured, the cold storage room doors are to be closed and locked.

R. Coordinate with the Plumbing and Electrical Divisions and provide penetrations in foodservice equipment for plumbing and electrical service to and through the fixtures, as required. This includes welded sleeves, collars, ferrules, or escutcheons. These services are to be located so that they do not interfere with intended use and/or servicing of the fixture.

S. All equipment provided by this Section, that requires light bulb(s), are to be provided with heavy-duty, energy efficient, extra long-life bulbs with a minimum life expectancy of 5000 hours, and as required by the local Jurisdictions. All light bulbs in and/or above foodservice equipment and/or areas are to be coated or provided with shields in compliance with local health codes.

T. All equipment provided by this Section, shall include any-and-all parts, components, options, accessories, etc. necessary to provide a completely functional item for its intended use under normal conditions; and if appropriate, after the final utility connections are completed by other Divisions. This shall generally apply to equipment such as soda systems, beer systems, and remote refrigeration systems, any type of remote system or equipment, or ice machines; but shall also apply to any equipment provided by this Section.

3.5 COUNTERTOP INSTALLATION:

A. General: Install countertops, except for vanities, over plywood sub-tops with a full spread of water-cleanable epoxy adhesive.

B. Install components plumb, level, and rigid, scribed to adjacent finishes, in accordance with approved shop drawings and product data.

1. Tops:

a. Flat and true to within 1/8" (3 mm) of a flat surface over a 10' length.

b. Allow a minimum of 1/16" (1.6mm) to a maximum of 1/8" (3mm) clearance between surface and each wall.

C. Fit countertops around projections and to adjacent construction. Smooth and clean field cut edges. Ensure that trim will completely cover cut edges.

D. Bond seams with stone seam adhesive and draw tight as countertops are set. Mask areas of countertops adjacent to seams to prevent adhesive smears. Use clamps to ensure countertop units are properly aligned and seams are

minimum width.

E. Complete cutouts not finished in shop. Mask areas of countertops adjacent to cutouts while cutting to prevent damage.

F. Install backsplash and end splash by adhering to wall with water-cleanable epoxy adhesive.

G. Leave 1/16-inch (1.6mm) gap between countertop and splash for filling with sealant. Use temporary shims to ensure uniform spacing.

H. Heat isolation for hot food wells, heated deck, and other drop-in heated equipment.

1. Three (3) layers of Nomex insulation held in place with aluminum tape.

2. 16-gauge stainless-steel collar.

3. Heat resistant, food safe silicone caulking.

4. Provide a 1/8" (3 mm) minimum space between the heat source and the insulation.

I. Apply sealant to seams and to gap between countertops and splashes; comply with Section 07 92 00 (07920) "Joint Sealants."

J. Countertop Adjusting and Cleaning:

1. Remove and replace or repair stonework of the following description:

a. Broken, chipped, stained, or otherwise damaged stones. Broken, chipped, stained, or otherwise damaged stone may be repaired, providing the methods and results are acceptable to Owner's Representative.

b. Defective joints.

c. Stones and joints not matching approved samples.

d. Stonework not complying with other requirements indicated.

2. Replace in manner that results in stonework matching approved samples and field- constructed mock-ups, complying with other requirements, and showing no evidence of replacement.

3. Clean stone countertops not less than six days after completion of work, using clean water and stiff and soft rags. Do not use wire brushes, acid-type cleaning agents, cleaning compounds with caustic or harsh fillers, or other materials or methods that could damage the stone.

K. Countertop Sealer Application:

1. All surfaces must be clean and free from all loose grit and debris, satins, dirt, and wax coatings. Surfaces shall remain dry for a minimum of 24 hours before the application of sealer and remain dry for 24 hours after the application of sealer.

2. Floor surface temperature must be above 50° F. and below 90° F.

3. Test on a small area before using to determine if the product is acceptable with type of stone.

4. Two (2) uniform coatings of sealer shall be applied before or after installation of stone materials. If prior to installation, adequate documentation shall be included with the material confirming it has been sealed. If after installation, install in strict accordance with Sealer manufacturer's recommendations.

3.6 PROTECTION OF WORK:

A. Use all means reasonable to protect the materials of this Section against theft and damage before, during, and after installation; and to protect the associated work and materials of the other trades.

B. Fabricated fixtures: cardboard, fiberboard or plywood taped to tops and exposed body panels/components.

C. Manufactured Equipment: cardboard, fiberboard or plywood taped as required by equipment shape and installation-access requirements.

D. Prohibited use of equipment includes tool and materials storage, workbench, scaffolding and stacking of construction

materials.

E. Damaged Equipment: immediately document and submit to Owner with Contractor's recommendation of action for repair or replacement and its impact on the Project Schedule and Contract Amount.

F. Pre-fabricated walk-in coolers/freezers are not to be used as general storage; and should be locked before leaving the site daily. Damage and theft resulting from failure to secure units will be repaired or replaced at Contractor's expense.

3.7 ADJUSTING:

A. Equipment to be tested for leaks, poor connections, inadequate or faulty performance.

1. Thermostatically controlled equipment and equipment with automatic features shall be operated for 14 days to prove controls are functioning as intended. Walk-in refrigerators and freezers shall be turned on and ran for a minimum of fourteen days.

B. Refrigeration equipment to run a minimum of three days duration before acceptance.

C. Lubricate and adjust drawer slides, hinges, casters.

D. Adjust pressure regulating valves, timed-delay relays, thermostatic controls, temperature sensors, exhaust hood grilles, etc.

E. Clean or replace faucet aerators, line strainers.

F. Repair, adjust or replace equipment, which is found to be defective in its operation, including units which are below capacity or operating with excessive noise or vibration.

3.8 CLEANING, RESTORING AND REPAIRING:

A. After completion of installation, and completion of other major work in foodservice areas, remove protective coverings and clean foodservice equipment, internally and externally. Repair all damage as a result-of this installation.

B. Restore exposed and semi-exposed finishes removing abrasions and other damages; polish exposed metal surfaces and touch-up painted surfaces. Replace work, which cannot be successfully restored.

C. Polish glass, plastic, hardware and accessories, fixtures, and fittings.

D. Wash and clean equipment and leave in a condition ready for the Owner to sanitize and use.

3.9 TESTING:

A. Delay the start-up of equipment until service lines have been tested, balanced, and adjusted for pressure, voltage, and similar considerations; and until water and steam lines have been cleaned and treated for sanitation.

B. Contractor, with assistance from a factory-certified representative from the exhaust hood manufacturer, shall conduct an exhaust hood performance test for each exhaust hood in the Contractor's scope of work at the conclusion-of the project when all hoods and related cooking equipment are in operation. Contractor shall have manufacturer's factory authorized representative test and measure exhaust airflow rates, dampers, switches, demand control ventilation, and sequence of operation, with all appliances at operating temperatures. Contractor shall furnish a written report within ten (10) working days of substantial completion and acceptance of the project by the Owner, indicating the design requirements for each hood and the actual operating parameters as tested and measured.

C. Refrigeration Piping Testing:

1. Each system shall be pressure tested for leaks. Tests for to be on the high side and on the low side. All valves shall be fully open during last test.

2. Tests are to be accomplished as follows:

a. Charge the systems with refrigerant through the port of liquid shut-off valves of the receivers to a pressure of 10 to 20 psi

b. Add dry nitrogen, the supply of which shall be equipped with a pressure regulating valve to provide the specified pressure.

c. Carefully test all joints for leaks using either a Halide torch or an electronic Halogen leak detector.

3. Precautions to be taken to disconnect the low-pressure controls for protection of the bellows during testing.

4. Refrigeration System Evacuation:

a. Evacuation shall be with a vacuum pump with an indicating gauge registering pressure in microns. Pump shall be connected to the system with a 5/8" (15 mm) O.D. line or larger.

b. Evacuate both high and low sides to 500 microns. Break the vacuum with refrigerant to 0 psi evacuate high and low sides to 100 microns; and then break vacuum to 0 psi. with the refrigerant to be used in the system.

3.10 START-UP AND INSTRUCTIONS:

A. Make-arrangements for demonstration of foodservice equipment operation and maintenance, in advance with the Owner/Operator.

B. Demonstrate foodservice equipment, to familiarize the Owner and the Operator on operation and maintenance procedures, including periodic preventative maintenance measures required. Include an explanation of service requirements and simple on-site service procedures, as well as information concerning the name, address, and telephone number of qualified local source of service. The individual(s) performing the demonstration are to be knowledgeable of operating and service aspects of the equipment.

C. Provide a written report of the demonstration, to the Owner, outlining the equipment demonstrated and malfunctions or deficiencies noted. Identify individuals present at demonstration.

D. Final Cleaning: After testing and start-up, clean the foodservice equipment, and leave in a condition ready for the Owner to sanitize and use.

E. All keys for all locks provided with equipment provided under this Section, are to be gathered up, individually tagged with the equipment they belong to, put into a single box, and handed over to the Owner's authorized representative. A list of the keys and their associated equipment Item numbers is to be provided with the O&M Manuals, along with a copy of the list, signed by the Owner's representative, acknowledging receipt of the keys.

3.11 CLEAR AWAY

A. Throughout the progress of their work, Contractor is to keep the working area free from debris and remove rubbish from premises resulting from work being done by them. At the completion of their work, Contractor is to leave the premises in a clean and finished condition.

3.12 EXISTING EQUIPMENT TO BE USED AFTER COMPLETION OF CONSTRUCTION: (Applicable only to projects with existing equipment to be used after completion of construction.)

A. Within ten working days of award of contract Contractor is responsible for identifying and recording by means of a spreadsheet with accompanying digital photography and heat-resistant tagging of all existing to remain or to be replaced in previous location or relocated equipment that will be used after completion of construction utilizing item numbers from received contract documents. If such equipment has been removed and relocated, contractor is still responsible for this identification and logging process. Contractor shall verify and coordinate specific equipment with these plans and specifications and verify same with the Owner, Architect and Foodservice Design Consultant. This includes items existing to remain or to be relocated, or to be removed, stored or refurbished and set back in place and used after completion of construction - and the associated work necessary - at the time of the signing of the Contract for the Foodservice Equipment section - and does not include any items added, changed, or damaged (by other than the Contractor) after the signing; except to the extent of work that would have been included with the original existing items. Contractor shall then remove such equipment to the agreed-upon storage location previously assigned and verified by the GC and Owner. Existing equipment to be re-placed in previous location or re-located and used after completion of construction shall be identified in both storage during construction location and intended final placement location on heat-resistant tag secured to unit by Contractor. Contractor shall also define critical clearances and utilities within this time frame including the testing of actual electrical, plumbing, mechanical values of any equipment without service or factory-applied serial numbered plates. When equipment is removed and re-located or placed back in original location, contractor is responsible for ensuring manufacturer-recommended clearances to walls and adjacent equipment, structural support needs, pour paths, correct MEP rough-in connection values and any applicable fire suppression and exhaust system protection.

B. Remove from existing locations, clean, and renovate/refurbish as noted below, store and re-install existing equipment to be used after completion of construction, in the new locations as shown on plans ready for utility connections, as appropriate. Existing equipment to be used after completion of construction, with utility connections, to be removed after disconnection as noted in paragraph J, below.

C. Perform work in cooperation with Owner, so that normal functioning of services is minimally interrupted. Coordinate all removal and replacement scheduling with the Construction Scheduling Manager (or similar responsible party), to ensure adequate time to complete the necessary work. If adequate time to properly relocate and reset the existing items and complete all cleaning and repair will not be available, due to continuing use of the existing items, or the allotted construction time; contact the Owner and obtain a written agreement as to what work is to be deleted or delayed, such as cleaning, repainting, or repairs.

D. All surface dirt, grease, oil, food residues, ingredients, extraneous matter, and other soiling materials is to be removed in order-to obtain minimum acceptable sanitation and foodservice standards. Thorough final rinsing of all cleaning agents to be at a minimum temperature of 180 degrees Fahrenheit (82.2 Centigrade) where possible without damage to equipment or controls. Otherwise, use USDA approved cleaning agents and/or cleaning agents, which are acceptable for use with commercial foodservice equipment. This includes all exterior surfaces of the existing equipment to be reused, and interior work surfaces such as inside oven compartments, fryer vats, ware washers, etc.

E. All painted items with major paint blemishes to be sanded, primed, and repainted to match the original color and type paint. Primer and paint to be of a type approved for use with commercial foodservice equipment. All controls, lights, view windows, non-painted parts, etc. to be protected as recommended by the Manufacturer. Minor paint blemishes can be touched-up in a professional manner. This work is to be included in the Bid Submittal, as a separate line cost, at the end of the Bid Submittal.

F. Replace and/or repair minor broken parts to produce a cleanable and functional item. Repairs and/or parts are for minor required items such as control knobs, handles, pilot lamps, belts, oil changes, minor adjustments, and recalibrations, etc. This does not include addition or replacement of any wearing components such as cutters, blades, etc.; or any accessory components such as mixer beaters, hooks, whips, etc., except for presently existing accessory components which are broken and non-functional, or as noted in the itemized specifications.

G. Where required by local code authorities, provide additional parts and/or modifications to comply with code requirements in place at the time of this project.

H. Where required, remove existing equipment to be used after completion of construction from the premises for repairs, alterations, and cleaning.

I. Refer to schedule on the Foodservice Drawings and to the Itemized Specifications at the end of this section for existing equipment to be used after completion of construction.

J. Disconnection of existing equipment to be relocated and/or existing equipment to be used in its found place after completion of construction and disconnection and removal/disposal of existing equipment that will not be used after completion of construction, is work as designated by the Architect, and not included in this Section. (See page 11 40 00-2, 1.3.F.)

K. Cost estimates for any repairs and/or parts more than the minor items stated above, or repairs requiring significant disassembling of the item, should be submitted to the Owner for consideration and approval as an addition to the Contract. In general, this would be considered as any repairs and/or parts amounting to an estimate up to 10% of the cost of a comparable new item. Any item, which would require repairs and/or parts amounting to an estimate up to 25% or more, should include an alternate cost for supplying a comparable new item as a consideration by the Owner, and an addition to the Contract. Estimates are for each existing equipment to be used after completion of construction only that require repairs and/or parts, and only to the extent that work is required; and should not be considered as a lump-sum estimate on all existing equipment to be used after completion of construction combined, or as an allowance for adding accessories or options.

3.13 ITEMIZED SPECIFICATIONS:

A. Refer to the following pages for specific-information on each item included in this Section.

(Remainder of page left blank intentionally.)

ITEM #A1 DRY STORAGE SHELVING

Quantity: Three (3) Assemblies
Manufacturer: Metro
Model: MaxQ

Fabricate/Furnish and set in place per plans, details and the following:

1. Metro length, width and configuration per plan and verified room dimensions.
2. MetroMax (Q) open grid mat shelving.
3. 74" High with four tiers.
4. Each section shall be free-standing with four legs.
5. Provide seismic flanged feet, quantity four (4).

ITEM #A2 HAND SINK

Quantity: One (1)
Manufacturer: Eagle Group
Model: HSAP-14-ADA-FW

Fabricate/Furnish and set in place per plans, details and the following:

1. Hand Sink, wall mount, 14" wide x 16" front-to-back x 5" deep bowl, 16/304 stainless steel construction, splash mount gooseneck faucet with wrist handles & mixer valve, marine edge on front & sides, 1/2" NPS water inlet, chrome-plated P-trap, wrist handles, soap dispenser, basket drain, skirt assembly & paper towel dispenser, physically challenged, NSF.
2. Left & right side splashes.

ITEM #A3 REACH-IN REFRIGERATOR

Quantity: One (1)
Manufacturer: Traulsen
Model: G20000

Fabricate/Furnish and set in place per plans, details and the following:

1. Dealer's Choice Refrigerator, Reach-in, two-section, 45.89 cu. ft., self-contained refrigeration, (4) half-height solid doors (hinged left/right), (3) epoxy coated shelves per section (factory installed), stainless steel front, anodized aluminum sides & interior, microprocessor control with LED display, LED interior lights, 6" high casters, non-flammable R-450A refrigerant, cETLus, NSF.
2. NEMA 5-15P, standard.
3. Casters, 4-5/8" high, set of 4, in lieu of standard casters.

ITEM #A4 AIR CURTAIN

Quantity: Two (2)
Manufacturer: Mars Air Systems
Model: NH236-1UA-TS

Fabricate/Furnish and set in place per plans, details and the following:

1. High Velocity Series 2 Air Curtain, for 36" wide door, unheated, galvanized steel cabinet, titanium silver powder coat finish, ETL.
2. Mechanical switches.
3. Door Limit Switch, indoor, plunger/roller type, remote mounted, NEMA 2.
4. Disconnect switches, remote mounted by others.
5. Disconnect Switch, fused, NEMA 3R (remote mounted by others).

ITEM #A5 STAINLESS STEEL WALL GUARD

Quantity: Three (3)
Manufacturer: Fabricated
Model: Stainless Steel

Furnish and set in place per manufacturer's standard specifications.

1. Stainless Steel Wall Guard per FSD1-59. These standard details are to be utilized as basic minimum guidelines only. Refer to these written specifications and any fabrication details included in the contract drawings for precise and complete fabrication instructions.
2. Refer to QF500 and QF501 sheet series for further information.

ITEM #A6 MOBILE HEATED CABINET

Quantity: One (1)
Manufacturer: Cres Cor
Model: H137SUA12D

Fabricate/Furnish and set in place per plans, details and the following:

1. Cabinet, Mobile Heated, insulated, top-mount heater assembly, recessed push/pull handles, magnetic latch, (12) sets chrome plated wire universal angle slides for 12" x 20" thru 18" x 26" pans on 4-1/2" centers, adjustable 1-1/2" centers, reversible dutch doors, (4) heavy duty 5" swivel casters (2) braked, anti-microbial latches, stainless steel construction, NSF, cCSAus, ENERGY STAR®.
2. 10 ft power cord, NEMA 5-15P, standard.
3. Right-hand door swing (top & bottom doors), standard.
4. Cord Wrap for insulated cabinet, standard, quantity one (1).
5. Corner Bumpers, add 2" to OA dimensions, non-marking, gray.
6. Menu Card Holder, quantity one (1).

ITEM #A7 WORK TABLE

Quantity: One (1)
Manufacturer: Eagle Group
Model: T2484STE

Fabricate/Furnish and set in place per plans, details and the following:

1. Spec-Master® Series Work Table, 84"W x 24"D, 14/300 series stainless steel top, rolled edges on front & back, Uni-Lok® gusset system, stainless steel crossrails on side & rear, (4) stainless steel legs & adjustable bullet feet, NSF.
2. Undershelf, sized per floor plan.
3. Special height legs for 34” high top.
4. Flanged Feet, stainless steel, each.

ITEM #A8 DROP CORD, QTY TWO (2), BY EC

ITEM #A9 SPARE NO.

ITEM #A10 CHEMICAL DISPENSING SYSTEM, QTY ONE (1), BY PURVEYOR

ITEM #A11 SHELVING, WALL MOUNTED

Quantity: One (1)
Manufacturer: Eagle Group
Model: WS1224-14/3

Furnish and set in place per manufacturer's standard specifications.

1. Shelf, wall-mounted, 24"W x 12"D, rolled frontedge, 1-1/2"H up-turn on sides & rear, includes stainless steel mounting brackets stud welded to shelf, 14/304 stainless steel construction, NSF.

ITEM #A12 THREE (3) COMPARTMENT SINK

Quantity: One (1)
Manufacturer: Eagle Group
Model: FFN2754-3-24-14/3

Fabricate/Furnish and set in place per plans, details and the following:

1. Spec-Master® Flush Front Sink, three compartment, 105-1/4"W x 30-1/2"D x 44-5/8"H overall size, 18"W x 27" front-to-back x 14" deep bowls, 24" drainboards on left & right, 10"H backsplash, (2) sets of splash mount faucet holes with 8" centers, includes (3) 3-1/2" basket drains, 14/304 stainless steel construction, stainless steel legs, front crossrails, & adjustable bullet feet, NSF.
2. Turn down back of splash per table with Z clip.
3. Enclosed backsplash per linear foot.
4. Stainless steel undershelf under drainboards, up to 24" with short legs.
5. Stainless steel apron, to cover sink bowls, 2 or 3 compartment.
6. Twist Handle Drain, 1-1/2 or 2" NPS connection.
7. Twist bracket, per drain.
8. Provide seismic flanged feet, stainless steel, each.

#A12.1 PRE-RINSE ASSEMBLY W/ ADD ON FAUCET

Quantity: One (1)
Manufacturer: T&S Brass
Model: B-0133-12-CR-B

Fabricate/Furnish and set in place per plans, details and the following:

1. EasyInstall Pre-Rinse Unit, spring action gooseneck, 8" wall mount, spray valve (B-0107), 12" add-on faucet, wall bracket, quarter-turn Cerama cartridges, low lead.
2. Installation Kit, (2) 1/2" NPT nipples, lock nuts & washers, (2) short "Ell" 1/2" NPT female x male.

ITEM #A12.2 POT FILLER

Quantity: One (1)
Manufacturer: T&S Brass
Model: B-0292

Furnish and set in place per manufacturer's standard specifications.

1. Big-Flo Pot & Kettle Sink Faucet, wall mount, 8" centers, 3/4" IPS model LL street EL inlets with locknuts, 24" double-jointed swing nozzle, 175°F four arm handles, 1-1/4" dia. holes required in backsplash.

ITEM #A13 TRASH RECEPTACLE, 20 GALLON, QTY ONE (1), BY OWNER

ITEM #A14 SHELVING, WALL MOUNTED

Quantity: One (1)
Manufacturer: Eagle Group
Model: WS1224-14/3

Furnish and set in place per manufacturer's standard specifications.

1. Shelf, wall-mounted, 24"W x 12"D, rolled frontedge, 1-1/2"H up-turn on sides & rear, includes stainless steel mounting brackets stud welded to shelf, 14/304 stainless steel construction, NSF.

ITEM #A15 LOCKER, QUADRUPLE, QTY ONE (1), BY ARCH/ ID

ITEM #A16 POS SYSTEM, QTY TWO (2), BY OWNER

ITEM #A17 STAINLESS STEEL SERVING COUNTER

Quantity: One (1)
Manufacturer: Fabricated
Model: Stainless Steel

Fabricate/Furnish and set in place per plans, details and the following:

1. Work counter, see plans for width, length, height, and configuration.
2. Similar to standard details; FSD5-1, FSD1-7, FSD1-10, and FSD1-23. These standard details are to be utilized as basic minimum guidelines only. Refer to these written specifications and any fabrication details included in the contract drawings for precise and complete fabrication instructions.
3. Straight turn-down edge profile similar to detail FSD1-1A.
4. Backsplash at wall and adjacent equipment, similar to FSD1-5A.
5. Leg base in lieu of cabinet base. Provide undershelf as shown on plans, similar to FSD1-8.
6. Extend countertop out thru window, as shown on plans.
7. Refer to QF500 and QF501 sheet series for further information.

ITEM #A18 MILK COOLER

Quantity: One (1)
Manufacturer: Beverage Air
Model: SMF49HC-1-W

Fabricate/Furnish and set in place per plans, details and the following:

1. School Milk Cooler, forced air, 49"W x 33-5/8"D x 47"H, 19.66 cu. ft., single access, exterior digital thermometer, (12) 13" x 13" x 11" or (8) 19" x 13" x 11" case capacity, self-latching doors/lids with safety bumpers, cylinder lock, wire floor racks, floor drain, electronic control, auto defrost, galvanized steel interior with stainless steel floor, white exterior, R290 Hydrocarbon refrigerant, cULus, UL EPH Classified, UL-Sanitation, Made in USA.
2. Self-Contained refrigeration.
3. Cord with NEMA 5-15P.
4. Corner bumpers, each (field installation required).
5. 6" Heavy duty casters, (2) with brakes, standard.

ITEM #A19 SPARE NO.

ITEM #A20 SPARE NO.

ITEM #A21 MOP SINK

Quantity: One (1)
Manufacturer: Advance Tabco
Model: 9-OP-28

Furnish and set in place per manufacturer's standard specifications.

1. Mop Sink, floor mounted, 33"W x 25"D x 10"H (overall), 28"W x 20" front-to-back x 6" deep (bowl size), free flow drain with 2" IPS outlet, stainless steel construction, NSF.

ITEM #A22 SERVICE FAUCET

Quantity: One (1)
Manufacturer: T&S Brass
Model: B-0655-BSTP

Furnish and set in place per manufacturer's standard specifications.

1. Service Sink Faucet, 8" centers-adjustable from 7-3/4" to 8-1/4", 5-1/8" clearance wall to center line of faucet, 11-5/8" from wall to center of outlet, polished chrome-plated finish, with built in screwdriver stops.

ITEM #A23 MOP HOLDER

Quantity: One (1)
Manufacturer: Advance Tabco
Model: K-242

Furnish and set in place per manufacturer's standard specifications.

1. Mop Hanger, 23", accommodates (3).

ITEM #A24 WALL FLASHING

Quantity: One (1)
Manufacturer: Fabricated
Model: Stainless Steel

Fabricate/Furnish and set in place per plans, details and the following:

1. Similar to standard detail FSD1-39. This standard detail is to be utilized as a basic minimum guideline only. Refer to these written specifications and any fabrication details included in the contract drawings for precise and complete fabrication instructions.
2. Cover wall behind the mop sink from the finished floor to the bottom of the ceiling grid, the length of the equipment.
3. Cover adjacent wall at end(s) of floor sink from the finished floor to the bottom of the ceiling grid, the depth of the sink.
4. Refer to QF500 and QF501 sheet series for further information.

ITEM #A25 DETERGENT SHELVING

Quantity: One (1)
Manufacturer: Metro
Model: MaxQ

Fabricate/Furnish and set in place per plans, details and the following:

1. Metro length, width and configuration per plan and verified room dimensions.
2. MetroMax (Q) open grid mat shelving.
3. 74" High with four tiers.
4. Each section to have two (2) #5MPpolyurethane swivel casters and two (2) #5MPB polyurethane casters with brakes.

ITEM #A26 TRASH RECEPTACLE, 7 GALLON, QTY ONE (1), BY OWNER

END OF SECTION

SECTION 11 5200
TELEVISION MOUNTING BRACKETS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Flat Screen Monitor (TV) Supports.

B. Support backing and framing.

1.2 RELATED WORK SPECIFIED ELESEWHERE

A. 05 4100 - Structural Metal Stud Framing.

1.3 SUBMITTALS

A. Submit Shop Drawings showing mount locations, rough-in and anchor placement dimensions, tolerances and clearances.

B. Submit Product Data showing dimensions and construction, load capacity and physical dimensions.

C. Submit manufacturer's installation instructions indicating special installation requirements.

1.4 QUALIFICATIONS

A. Manufacturer: company specializing in manufacturing the products specified in this section with minimum five years experience.

1.5 FIELD MEASUREMENTS

A. Verify that field measurements are as indicated on shop drawings or instructed by the manufacturer.

1.6 COORDINATION

A. Coordinate installation with size, location and installation of Owner-Furnished monitors.

PART 2 - PRODUCTS

2.1 MANUFACTURER

A. Sanus Systems

B. Equal

2.2 PRODUCTS

A. Bracket 1: Flat screen monitor (TV) mount for 46-95 inch flat screen smart TV or monitor.

1. Full Motion+ TV Wall Mount by Sanus Systems or equal.

2. Tilt: 5 degrees to -15 degrees.

3. Swivel: 30 degrees to -30 degrees.

4. Roll: 2 degrees to -2 degrees.

5. Capacity: 150 pounds.

6. Built-in wire management system.

7. Wall adaptor plate.

2.3 SHOP FINISHING

A. Powdercoat or baked enamel finish.

B. Color: Black

2.4 ACCESSORIES

PART 3 - EXECUTION

3.1 COORDINATION

A. Verify actual monitor size and model to be provided by Owner, and coordinate to confirm compatiblity with support brackets prior to ordering.

3.2 EXAMINATION

A. Verify rough-in conditions.

B. Verify that anchors and supports are accurately placed.

3.3 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Provide frames, anchors, supports, accessories and adapters; appropriate to specified units.

C. Anchor equipment securely in place.

D. Touch-up minor damaged surfaces caused during installation. Replace damaged components.

END OF SECTION

SECTION 11 6816
PLAYFIELD EQUIPMENT

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes the following types of play equipment and structures:

1. Basketball backboards and supports.

B. Related Requirements:

1. Section 03 3000 - Cast-In-Place Concrete.
2. Section 31 2000 - Earthwork
3. Section 32 1215 - Asphalt Concrete Paving
4. Section 32 1723 - Pavement Markings for court markings

1.2 SUBMITTALS

A. Shop Drawings:

1. Coordination Drawings: Layout plans and elevations indicating extent of playfield equipment with playfield surface systems. Indicate playfield equipment locations and installation.
2. Provide Shop Drawings details of attachment of equipment to structure.

B. Product Data:

1. Manufacturer’s standard printed brochure illustrating standard components and features of each system specified.
2. Manufacturer’s catalog cut and data sheets, complete parts list and installation requirements for each accessory specified.

1.3 QUALITY ASSURANCE

A. Comply with NAAMM’S “Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating metal finishes.

PART 2 - PRODUCTS

2.1 PLAYFIELD EQUIPMENT

A. Manufacturers:

1. Manufacturer/Product:
   a. Porter Athletic Equipment Co. / “Outdoor Backstop”, as a standard of quality
   b. L.A. Steelcraft
   c. Gametime. / Great Western
   d. PW Athletics
   e. Or Equal

2. Basketball:

a. Porter Model #00164-234 Outdoor 4-foot Extended Vertical Post Backstop with #234 Fan Aluminum Bank, Heavy Duty #00202-H00 double rim, and upright protective padding.

b. Backstop support shall be designed for mounting goal at any height between 6 and 10 feet.

c. Upright support shall be 4½-inch outside diameter heavy wall, galvanized steel pipe, capped at top end. Provide manufacturer's standard upright protective padding up to 6-foot high.

d. Backboard shall be supported 4-foot in front of upright support by dual horizontal support assemblies. Lower support assembly shall be fabricated from 3½-inch outside diameter heavy wall, galvanized pipe. Upper support assembly shall be fabricated from 17/8-inch outside diameter heavy wall, galvanized pipe fabricated with a plated, structural angle for attachment to the top corners of the backboard. Support assemblies shall be clamped to the upright support by means of heavy, galvanized, ductile iron castings with plated hardware.

e. Cast aluminum backboard, Porter model 00234-000. Official size (54 inches by 39 inches) and shape. Bank shall be high tensile #319 aluminum. Backboard shall be cast with structural reinforcing ribs on backside with a heavy, 1-½ inch deep perimeter flange. Furnish backboard with holes to fit normal mounting attachments without exposed bolt heads on front face of unit.

f. Goals:

1) Heavy duty Porter model #00202-H00 double rim.

2) Fabricated from 5/8 inch diameter cold drawn alloy steel round formed to an 18-inch inside diameter ring.

3) Inside of rim shall be positioned 6-inch from face of backboard by an L-shaped, formed steel mounting plate with a 5-inch by 5-inch mounting hole centers.

4) Rigidly brace goal with a ½ inch diameter cold drawn alloy steel round formed and welded.

5) Provided twelve “no-tie” net attachment clips.

6) Finish: Orange enamel.

7) Net: Heavy duty, nylon.

2.2 CAST-IN-PLACE CONCRETE

A. Concrete Materials and Properties: Comply with requirements of Section 03 3000 - Cast-in-Place Concrete to provide normal-weight, air-entrained concrete with a minimum 28-day compressive strength of 3,000 PSI, 4-inch slump, and one inch maximum size aggregate.

B. Footing sizes:

1. 1) Basketball Goals: 42 inches deep by 24-inch diameter.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and conditions for compliance with requirements for Project site clearing, earthwork, surface and sub-grade drainage, and other conditions affecting installation.

B. Do not begin installation before final grading for placing protective surfacing is completed.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Verify locations of playfield perimeter and pathways. Verify that playfield layout and equipment locations comply with requirements for each type and component of equipment.

3.3 INSTALLATION, GENERAL

A. General: Comply with manufacturer's written recommendations, unless more stringent requirements are indicated.

B. Basketball Standards: The backstop column support shall be installed, plumbed, and shored with the column positioned in a manner so that a minimum column embedment of 3 feet occurs at basketball . Fill excavation with concrete.

3.4 PROTECTION

A. Protect the Work of this section until Substantial Completion.

3.5 CLEANING AND CLEANUP

A. After completing playfield equipment installation, inspect components. Remove spots and dirt. Repair damaged finishes to match original finish or replace component.

B. Remove rubbish, debris, and waste materials and legally dispose of off the Project site.

END OF SECTION

SECTION 12 2400
WINDOW ROLLER SHADES

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Roller shades for manual operation and accessories.

B. Shade fabric.

1.2 RELATED SECTIONS

A. Section 05 4100 - Structural Metal Stud Framing: Blocking for mounting roller shades and accessories.

B. Section 09 2116 - Gypsum Board Assemblies: Coordination with gypsum board assemblies for installation of shade pockets, closures and related accessories.

C. Section 09 5100 - Acoustical Ceilings: Coordination with acoustical ceiling systems for installation of shade pockets, closures and related accessories.

1.3 REFERENCES

A. ASTM G 21 - Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi.

B. NFPA 70 - National Electrical Code.

C. NFPA 701 - Fire Tests for Flame-Resistant Textiles and Films.

1.4 ADMINISTRATIVE REQUIREMENTS

A. Coordination:

1. Where motorized shades are to be controlled by control systems provided under other sections, coordinate the work with other trades to provide compatible products.

2. Coordinate the work with other trades to provide rough-in of electrical wiring as required for installation of hardwired motorized shades.

3. Window shades shall not cover tactile signs at door sidelites.

1.5 SUBMITTALS

A. Submit under provisions of Section 01 3000.

B. Product Data: Manufacturer's data sheets on each product to be used, including:

1. Preparation instructions and recommendations.

2. Styles, material descriptions, dimensions of individual components, profiles, features, finishes and operating instructions.

3. Storage and handling requirements and recommendations.

4. Mounting details and installation methods.

5. Typical wiring diagrams including integration of motor controllers with building management system, audiovisual and lighting control systems as applicable..

C. Shop Drawings: Plans, elevations, sections, product details, installation details, operational clearances, wiring diagrams and relationship to adjacent work.

D. Window Treatment Schedule: For all roller shades. Use same room designations as indicated on the Drawings and include opening sizes and key to typical mounting details.

E. Selection Samples: For each finish product specified, one set of shade cloth options and aluminum finish color samples representing manufacturer's full range of available colors and patterns.

F. Verification Samples: For each finish product specified, one complete set of shade components, unassembled, demonstrating compliance with specified requirements. Shadecloth sample and aluminum finish sample as selected. Mark face of material to indicate interior faces.

G. Maintenance Data: Methods for maintaining roller shades, precautions regarding cleaning materials and methods, instructions for operating hardware and controls.

1.6 MAINTENANCE MATERIAL SUBMITTALS

A. A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. 1. Roller Shades: Full-size units equal to 5 percent of quantity installed for each size, color, and shadeband material indicated, but no fewer than two units.

1.7 QUALITY ASSURANCE

A. Manufacturer Qualifications: Obtain roller shades through one source from a single manufacturer with a minimum of twenty years experience in manufacturing products comparable to those specified in this section.

B. Installer Qualifications: Installer trained and certified by the manufacturer with a minimum of ten years experience in installing products comparable to those specified in this section.

C. Fire-Test-Response Characteristics: Passes NFPA 701 small and large-scale vertical burn. Materials tested shall be identical to products proposed for use.

D. Anti-Microbial Characteristics: 'No Growth' per ASTM G 21 results for fungi ATCC9642, ATCC 9644, ATCC9645.

E. Mock-Up: Provide a mock-up (manual shades only) of one roller shade assembly for evaluation of mounting, appearance and accessories.

1. Locate mock-up in window designated by Architect.

2. Do not proceed with remaining work until, mock-up is accepted by Architect.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Deliver shades in factory-labeled packages, marked with manufacturer and product name, fire-test-response characteristics, and location of installation using same room designations indicated on Drawings and in the Window Treatment Schedule.

1.9 PROJECT CONDITIONS

A. Environmental Limitations: Install roller shades after finish work including painting is complete and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.

1.10 WARRANTY

A. Roller Shade Hardware and Chain Warranty: Manufacturer's standard non-depreciating twenty-five year limited warranty.

B. Ecoveil Shadecloth: Manufacturer's standard ten year warranty.

C. Roller Shade Motors and Motor Control Systems: Manufacturer's standard non-depreciating five year warranty.

D. Roller Shade Installation: One year from date of Substantial Completion, not including scaffolding, lifts or other means to reach inaccessible areas.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturer: MechoShade Systems, Inc., which is located at: 42-03 35th St. ; Long Island City, NY 11101; Tel: 718-729-2020; Fax: 718-729-2941; Email: marketing@mechoshade.com; Web: www.mechoshade.com.

B. Or Equal.

2.2 ROLLER SHADE TYPES

A. Manually Operated Shades:

1. Mounting: Surface mounted with fascia.

2. Configuration: Single solar shade cloth.

3. Locations: Refer to Reflected Ceiling Plans.

2.3 SHADE CLOTH

A. Room Darkening Shade Cloth: **EcoVeil Screens: 0950 series**.TPO Cradle to Cradle Certified, fabric, non-PVC, 1 X 1 basket-weave pattern at 1 percent open.

1. Color: **Shadow Gray 0970.**

2.4 SHADE BAND

A. Shade Bands: 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.

1. 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 (39.37 mm) in diameter for manual shades, and less than 2.55 inches (64.77 mm) 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 shadecloth to hang flat without buckling or distortion. Fabricate with heat-sealed trimmed edges to hang straight without curling or raveling. Fabricate unguided shadecloth to roll true and straight without shifting sideways more than 1/8 inch (3.18 mm) in either direction per 8 feet (2438 mm) of shade height due to warp distortion or weave design. Fabricate hem as follows:

1. Standard concealed hem bar.

C. Provide battens in standard shades as required to assure proper tracking and uniform rolling of the shadebands. Contractor shall be responsible for assuring the width-to-height (W:H) ratios shall not exceed manufacturer's standards or, in absence of such standards, shall be responsible for establishing appropriate standards to assure proper tracking and rolling of the shadecloth within specified standards. Battens shall be roll-formed stainless steel or tempered steel, as required.

D. For railroaded shadebands, provide seams in railroaded multi-width shadebands as required to meet size requirements and in accordance with seam alignment as acceptable to Architect. Seams shall be properly located. Furnish battens in place of plain seams when the width, height, or weight of the shade exceeds manufacturer's standards. In absence of such standards, assure proper use of seams or battens as required to, and assure the proper tracking of the railroaded multi-width shadebands.

E. Provide battens for railroaded shades when width-to-height (W:H) ratios meet or exceed manufacturer's standards. In absence of manufacturer's standards, be responsible for proper use and placement of battens to assure proper tracking and roll of shadebands.

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 (3.18 mm) 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 M5** 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 (9.525 mm) 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. (22 kg) 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. (41 kg) minimum breaking strength. Nickel plate chain shall not be accepted.

2.7 ACCESSORIES

A. 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.

PART 3 EXECUTION

3.1 EXAMINATION

A. Do not begin installation until substrates have been properly prepared.

B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.2 PREPARATION

A. Clean surfaces thoroughly prior to installation.

B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.3 INSTALLATION

A. Install roller shades level, plumb, square, and true according to manufacturer's written instructions, and located so shade band is not closer than 2 inches (50 mm) to interior face of glass. Allow proper clearances for window operation hardware.

B. Adjust and balance roller shades to operate smoothly, easily, safely, and free from binding or malfunction throughout entire operational range.

C. Clean roller shade surfaces after installation, according to manufacturer's written instructions.

D. Engage Installer to train Owner's maintenance personnel to adjust, operate and maintain roller shade systems.

3.4 PROTECTION

A. Protect installed products until completion of project.

B. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION

SECTION 21 1300

FIRE SUPPRESSION SPRINKLER SYSTEMS

PART 1 GENERAL

1.1 REFERENCES

A. AMERICAN IRON AND STEEL INSTITUTE (AISI)

1. AISC/AISI 121 (2007) Standard Definitions for Use in the Design of Steel Structures

B. AMERICAN SOCIETY OF MECHANICAL ENGINEERS (ASME)

1. ASME A112.18.1 (2018) Plumbing Supply Fittings
2. ASME B1.20.1 (2013) Pipe Threads, General Purpose (Inch)
3. ASME/ANSI B16.1 (2020) Gray Iron Pipe Flanges and Flanged Fittings Classes 25, 125, and 250
4. ASME/ANSI B16.3 (2016) Malleable Iron Threaded Fittings, Classes 150 and 300
5. ASME/ANSI B16.4 (2016) Standard for Gray Iron Threaded Fittings; Classes 125 and 250

C. AMERICAN WATER WORKS ASSOCIATION (AWWA)

1. AWWA C111/A21.11 (2017) Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings
2. AWWA C151/A21.51 (2017) Ductile-Iron Pipe, Centrifugally Cast
3. AWWA C900 (2016) Polyvinyl Chloride (PVC) Pressure Pipe, and Fabricated Fittings, 4-inch Through 60-inch

D. ASTM INTERNATIONAL (ASTM)

1. ASTM A47/A47M (1999) Standard Specification for Ferritic Malleable Iron Castings
2. ASTM A53/A53M (2020) Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless
3. ASTM A135/A135M (2009; R2014) Standard Specification for Electric-Resistance-Welded Steel Pipe
4. ASTM A234/A234M (2019) Standard Specification for Piping Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and High Temperature Service
5. ASTM A536 (1984) Standard Specification for Ductile Iron Castings
6. ASTM D1784 (2020) Standard Specification for Rigid Poly (Vinyl Chloride) (PVC) Compounds and Chlorinated Poly (Vinyl Chloride) (CPVC) Compounds

E. FM GLOBAL (FM)

1. FM APP GUIDE (updated on-line) Approval Guide http://www.approvalguide.com/

F. NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

1. NFPA 13 (2016) Standard for the Installation of Sprinkler Systems
2. NFPA 14 (2016) Standard for the Installation of Standpipes and Hose Systems
3. NFPA 24 (2016) Standard for the Installation of Private Fire Service Mains and Their Appurtenances
4. NFPA 1963 (2019) Standard for Fire Hose Connections

G. UNDERWRITERS LABORATORIES (UL)

1.2 ADMINISTRATIVE REQUIREMENTS

A. Conduct a survey of the work area. Commencement of work constitutes acceptance of existing conditions.
B. Convene one week before starting work of this section for preinstallation meeting.

1.3 SUBMITTALS

A. Submit the following in accordance with DIVISION 01 – GENERAL REQUIREMENTS.

1. Shop Drawings

a. Shop drawings prepared in accordance with NFPA 13, including hydraulic calculations that are approved by the Authority Having Jurisdiction. Drawings shall have the approval of a Professional Engineer registered in the state in which the project is located. Drawings to consist of the following, refer to NFPA 13 "Plans and Calculations" for a comprehensive list of items to be included:
   1) Piping plan view and/or Reflected Ceiling Plan (RCP) drawing(s) indicating relationship of all other trades and approved sprinkler head locations.
   2) Details and sections to clearly identify design intent.
   3) Plans shall include: Seismic zones of influence, hydraulic remote areas, elevations of pipe, attachment locations and type, zones and associated coverage areas, volume of dry system(s) (if applicable), locations of seismic separation and expansion joints, hose cabinet locations, drain locations.

2. Product Data
   a. Provide data on piping, valves, sprinklers, hangers/supports, hose cabinets, notification devices, specialties and accessories. Product data shall include manufacturers catalog information with performance ratings, rough-in details, finish, weights, and installation requirements.
      1) Each product shall be referred to on submittals, drawings, and other documentation, by the identification or model number as specifically published in the appropriate agency listing or approval.
3. Design Data
   a. Provide detailed hydraulic calculations that clearly demonstrate that the water supply will meet the demand of the sprinkler system and hose streams. Calculations shall accompany design drawings and shall be based on a water flow test conducted at the site within six (6) months of the submittal of plans for approval. Flow test information and associated nodes shall be documented on shop drawings and include a site plan.
   b. Provide complete seismic calculations that clearly reflect seismic restraint with supporting site specific force factor and attachment details used, relative to an associated zone of influence.
4. Test Reports
   a. Contractor's Material & Test Certificate Reports in accordance with NFPA for above ground piping, underground piping, pressure, system operation, air, valve and drain tests.

1.4 QUALITY ASSURANCE

A. Fire protection system materials and components shall be Underwriter's Laboratories listed and labeled, or Factory Mutual approved.

B. Company specializing in performing the work of this section shall have a minimum of five years experience and approved by manufacturer.

C. Manufacturing Company shall be one specializing in manufacturing the products specified with a minimum three years documented experience.

1.5 COORDINATION

A. The Contractor shall coordinate and reflect routing and location of equipment, devices, and materials with other disciplines, where not already indicated, on the design documents. Indicate required space for routine maintenance and inspection, including location and sizes of access doors.

PART 2 PRODUCTS

2.1 SYSTEM DESCRIPTION

A. All fire protection system materials and equipment shall be Underwriters Laboratories (UL) listed or the Factory Mutual (FM) approved for its intended use.

2.2 EQUIPMENT

A. Aboveground Piping Materials

1. BCS - Black Carbon Steel
   a. All piping 2-inch and smaller: Schedule 40, black-carbon steel conforming to ASTM A53, or ASTM A135, threaded or roll grooved ends. All 1-inch pipe shall have threaded ends.
   b. All Piping 2-1/2-inch through 8 inch: Schedule 10, black carbon steel conforming to ASTM A53 or ASTM A135, roll grooved ends.
2. GCS - Galvanized Carbon Steel
   a. All piping 1/2- inch through 8-inch: Schedule 40 seamless or electric resistant welded galvanized steel conforming to ASTM A53/A53M, Type E (electric-resistance welded) or Type S (seamless). Type F (furnace butt welded continuous welded) is acceptable for sizes less than 2 inches.

B. Fittings and Couplings

1. Cast-Iron Threaded Fittings:
   a. ASME/ANSI B16.4, Class 125, standard pattern, for threaded joints. Threads shall conform to ANSI B1.20.1.
2. Malleable-Iron Threaded Fittings:
   a. ASME/ANSI B16.3, Class 150, standard pattern, for threaded joints. Threads shall conform to ANSI B1.2.1.
3. Steel Fittings:
   a. ASTM A234/A234M, seamless or welded, for welded joints.
4. Grooved Mechanical Fittings:
   a. Grade 65-45-12 ductile iron; ASTM A47 Grade 32510 malleable iron; or ASTM A53, Type F or Types E or S, Grade B fabricated steel fittings with grooves or shoulders designed to accept grooved end couplings.
5. Grooved Mechanical Couplings:
   a. consist of ductile or malleable iron housing, a synthetic rubber gasket of a central cavity pressure-responsive deign; with nuts, bolts, locking in, locking toggle, or lugs to secure roll-grooved pipe and fittings. Grooved mechanical couplings including gaskets used on dry-pipe systems shall be listed for dry-pipe service.
6. Cast-Iron Flanges:
   a. ASME/ANSI B16.1, Class 125, raised ground face, bolt holes spot faced.
7. Unions:
   a. Malleable iron, Class 150 hexagonal stock, with ball-and-socket joints, metal-to-metal bronze seating surfaces, female threaded ends. Threads shall conform to ASME B1.20.1.
8. Dielectric Unions:
   a. Threaded, solder, or grooved-end connections as required to suit application' constructed to isolate dissimilar metals, prevent galvanic action, and prevent corrosion.

C. Pipe Hangers and Supports

1. Shall be UL listed and shall meet requirements of NFPA 13 for type, dimension and location.
2. Hangers for Pipe Sizes 1/2 to 1-1/2 inch: Malleable iron, adjustable swivel, split ring.
3. Hangers for Pipe Sizes 2 inches and Over: Carbon steel, adjustable, clevis.
4. Wall Support for Pipe Sizes to 3 inches: Cast iron hook.
5. Wall Support for Pipe Sizes 4 inches and Over: Welded steel bracket and wrought steel clamp.
6. Vertical Support: Steel riser clamp.
7. Hanger Rods: Use only circular solid cross section rod hangers to connect building structure attachments to pipe-support devices. Use pipe, straps, or bars of equivalent strength for hangers.

D. Fire Department Connections

1. Ensure hose connections have National Firehose standard-thread form and rocker lugs in accordance with NFPA 1963. Ensure hose-connection sizes and threads are compatible with the equipment used by the fire department serving the facility.
2. Wall Siamese
3. Provide cast brass or bronze flush-mounted escutcheon-plate units, with two 2-1/2-inch, fire-department, swivel, female inlets; double-clapper valves; rocker-lug caps and chains; and cast-in function-identifying lettering. Provide a unit and plate with an architect approved polished surface finish and in accordance with ASME A112.18.1.
4. Sidewalk Siamese
   a. Provide cast brass or bronze flush-mounted escutcheon-plate units, with two 2-1/2-inch, fire-department, swivel, female inlets; double-clapper valves; rocker-lug caps and chains; and cast-in function-identifying lettering. Provide a unit and plate with an architect approved polished surface finish and in accordance with ASME A112.18.1. Mount unit on a Schedule 40 ASTM A53/A53M galvanized carbon-steel pipe
5. Roof Manifold
   a. Provide a cast brass or bronze, horizontal unit, with two 2-1/2-inch, 175-pound rated hose valves fitted with rocker-lug caps and chains. Finish is rough body with polished trim.

E. Alarm Devices

1. General: Types and sizes shall mate and match piping and equipment connections.
   a. Water Flow Indicators (Wet-pipe Systems): vane type waterflow detector, rated to 250 psi; designed for horizontal or vertical installation; have 2-SPDT circuit switches to provide isolated alarm and auxiliary contacts, 7 ampere 125 volts AC and 0.25 ampere 24 Volts DC; completed with factory-set, field-adjustable retard element to prevent false signals, and tamperproof cover.
2. Water Flow Indicators (Dry-pipe): pressure type waterflow detector, rated to 250 psi; designed for vertical installation; have 2-SPDT circuit switches to provide isolated alarm and auxiliary contacts, 7 ampere 125 volts AC and 0.25 ampere 24 Volts DC; complete with factory-set, field-adjustable retard element to prevent false signals, and tamperproof cover.
3. Electric Alarm Bell: UL listed 10" electric operated factory painted alarm bell with weatherproof bell kit and bell guard. Bell shall have minimum 90 decibel rating. Provided engraved plate under Bell lettered "Building Standpipe and Sprinkler System."
4. Supervisory Switches: SPST, normally closed contacts, designed to signal valve in other than full open position and tamperproof cover.

2.3 Automatic Sprinklers

A. Sprinklers: type and style as indicated or required by application. Sprinkler operating temperatures to comply with NFPA 13. Sprinklers in light hazard areas shall be quick response type.

B. Sprinkler Finishes: Provide sprinklers with the following finishes:

1. All sprinklers are to be glass bulb type unless otherwise approved by Owner or Architect.
2. Finished areas: Upright, pendent and sidewall type, with finish with matching escutcheons as indicated on drawings or approved by Owner or Architect.
3. Unfinished areas and areas not exposed to view: Upright, pendent and sidewall type, rough bronze finish. Sprinklers shall be was-coated where installed exposed to acids, chemicals, or other corrosive fumes.
4. Corrosive environments: Lead -coated, corrosion-resistant heads in all areas exposed to acids, chemicals, fumes, or environments.

C. Sprinkler Cabinet and Wrench: Provide a finished steel cabinet, suitable for wall mounting, with hinged cover and space for the appropriate quantity of spare sprinklers plus sprinkler wrench. Provide a separate cabinet for each style sprinkler on the project.

D. Head Protection

1. Protect heads with paper or plastic bags during painting operations. Remove protection immediately upon finishing painting operations.
2. Provide head guards wherever mechanical damage could occur. Guard finish is red enamel.

E. Aboveground Valves

1. Ensure gate, globe, and check valves (all sizes) are FM approved or UL listed.
2. Ensure ball valves, 2 inches and under, are FM approved, rated 300 psi, with provisions to wire or lock handle in place where critical alarm function may be isolated.
3. Ensure butterfly valves, 6-inches and larger are FM approved, rated 175 psi, cast-iron bodied wafer type, with elastomer liners and seals.

F. Paints and Coatings

1. Paints and coatings must comply with:
   a. The California Department of Public Health (CDPH) Standard Method v1.1-2010 general testing and emissions evaluation requirements.
   b. All paints/coatings wet-applied on site must meet the applicable VOC limits of the California Air Resources Board (2007), Suggested Control Measure (SCM) for Architectural Coatings, or the South Coast Air Quality Management District (SCAQMD) Rule 1113, effective June 3, 2011.

G. Adhesives, Sealants, and Sealant Primers

1. Adhesives, sealants, and sealant primers must comply with:
   a. The California Department of Public Health (CDPH) Standard Method v1.1-2010 general testing and emissions evaluation requirements.
   b. All adhesives, sealants, and sealant primers wet-applied on site must meet the applicable chemical content requirements of SCAQMD Rule 1168, July 1, 2005, Adhesive and Sealant Applications, as analyzed by methods specified in Rule 1168.

PART 3 EXECUTION

3.1 Preparation

A. Painting

1. If manufacturer's standard-finish equipment surfaces are damaged during construction, bring to as-new condition by touchup or repainting to the satisfaction of the Contracting Officer, or replaced with new undamaged equipment at no additional cost to the Owner.

3.2 Installation

A. Ensure installation of system materials and equipment is in accordance with the recommendations and provisions of NFPA 13. Perform work in the presence of the Contracting Officer.

B. Perform all installation work by licensed fire protection sprinkler contractors, licensed for such work in the state where the work is to be performed.

3.3 Underground Piping Installation

A. The fire protection water main shall be laid, and joints anchored, in accordance with NFPA 24. Minimum depth of cover shall be 3-feet. The supply line shall terminate inside the building with a flanged piece, the bottom of which shall be set not less than 6-inches above the finished floor. A blind flange shall be installed temporarily on top of the flanged piece to prevent the entrance of foreign matter into the supply line.

B. Thrust Blocks

1. Construct 3,000-psi cured-strength thrust blocks to absorb hydraulic thrust at caps, plugs, and at system change-of-direction fittings. Place concrete against undisturbed soil, with an area sufficient to provide load transmittal.

3.4 Aboveground Piping Installation

A. Locations and Arrangements: Coordinate installation of horizontal piping with other components. Allow sufficient space above removable ceiling panels to allow for panel removal.

B. Install system such that all piping is rigidly secured and supported. Cutting of structural members for passage of sprinkler pipes or hangers will not be permitted. Route all sprinkler piping and provide all offsets, bends and elbows around all mechanical, electrical, and structural members as required. In areas with ceilings, piping shall be routed concealed, above ceiling. In areas without ceilings, piping shall extend as high as possible.

C. Deviations from approved "Working Plans" for sprinkler piping require written approval of the Authority Having Jurisdiction. Written approval shall be on file with the Engineer prior to deviating from the approved "Working Plans."

D. Install sprinkler piping to provide for system drainage in accordance with NFPA 13.

E. Use approved fittings to make all changes in direction, branch takeoffs from mains, and reductions in pipe sizes.

F. Hangers and Supports: Comply with the requirements of NFPA 13. Hanger support spacing and locations for piping joined with grooved mechanical couples shall be in accordance with the grooved mechanical coupling manufacturer's written instructions, for rigid systems. Provide protection from damage where subject to earthquake if required by the applicable building code, designed in accordance with NFPA 13.

G. Make connections between underground and aboveground piping using an approved transition piece strapped or fastened to prevent separation.

H. Install mechanical sleeve seal at pipe penetrations in basement and foundation walls.

I. Install test connections sized and located in accordance with NFPA 13 complete with shutoff valve. Test connections may also serve as drain pipes.

J. Install pressure gauge on the riser or feed main at or near each test connection. Provide gauge with a connection not less than ¼ inch and having a soft metal seated globe valve arranged for draining pipe between gauge and valve. Install gauges to permit removal, and where they will not be subject to freezing.

K. Install automatic air vent at high point of system(s) in accordance with NFPA 13.

L. Sleeves

1. Provide sleeves where piping passes through roofs, masonry or concrete walls, or floors.
2. Continuously weld or braze sleeves to the deck when passing through steel decks.
3. Install sleeves that are continuous when extending through floors, roofs, or load-bearing walls, and sleeves through fire barriers. Fabricate sleeves from Schedule 40 steel pipe with welded anchor lugs. Form other sleeves by molded linear polyethylene liners or similar materials that are removable. Ensure diameter of sleeves is large enough to accommodate pipe, insulation, and jacketing without touching the sleeve, and additionally provides a minimum 3/8-inch clearance. Install sleeve to accommodate mechanical and thermal motion of pipe and to preclude transmission of vibration to walls and generation of noise.
4. Pack solid the space between a pipe and the inside of a pipe sleeve or a construction surface penetration or wherever the piping passes through firewalls, equipment-room walls, floors, and ceilings connected to occupied spaces, and other locations where sleeves or construction-surface penetrations occur between occupied spaces. Use a mineral fiber. Where sleeves or construction-surface penetrations occur between conditioned and unconditioned spaces, fill the space between a pipe, bare or insulated, and the inside of a pipe sleeve or construction-surface penetration with an elastomer caulk to a depth of 1/2 inch. Ensure surfaces are oil- and grease-free before caulking.
5. Caulk exterior wall sleeves watertight with lead and oakum or mechanically expandable chloroprene inserts with mastic-sealed components.

M. Escutcheons

6. Install escutcheons at penetrations of piping into finished areas. Where finished areas are separated by partitions through which piping passes, provide escutcheons on both sides of the partition. Where suspended ceilings are installed, attach plates at the underside only of such ceilings. Use chrome plated escutcheons in occupied spaces and conceal openings in building construction. Ensure escutcheons are firmly attached.

3.5 Field Quality Control

A. System Testing

1. Prior to acceptance of the work, test completed systems in the presence of the Contracting Officer. Upon approval, provide certificates of testing.
2. Conduct a hydrostatic test, unless otherwise specified. Use only potable water for testing.
3. Perform air tests, valve-operating tests, and drainage tests for dry-pipe systems.
4. Prepare and maintain test records of piping-system tests. Ensure records show personnel responsibilities, dates, test-gage identification numbers, ambient and test-water temperatures, pressure ranges, rates of pressure drops, and leakage rates. Each test acceptance requires the signature of the Contracting Officer.

B. Test Gauges

1. Acceptable test gages have 4-1/2-inch dials or larger with accuracy of plus or minus 1/2 of 1 percent of full-scale range and dial graduations and pointer width compatible with readability to within one-half of the accuracy extremes.

C. Pneumatic Testing

1. Perform pneumatic Pressure Tests when freezing conditions may occur and upon prior approval by the Contracting Officer. Use oil-free compressed air used for testing.

D. Test and Acceptable Criteria

1. Perform above ground systems pressure tests at 200 psi and maintain the applied pressure without further addition of test media for not less than 2 hours. No pressure drop is allowed.

3.6 Adjusting and Cleaning

A. At the completion of the work, clean all parts of the installation. Clean equipment, pipes, valves, and fittings of grease, metal cuttings, and sludge that may have accumulated from the installation and testing of the system. Adjust automatic control devices for proper operation.

3.7 Protection

A. Flushing

1. Before overhead sprinkler piping can be connected to the underground piping, verification of an approved hydrostatic test and flush must be furnished.

END OF SECTION

SECTION 21 13 13

WET-PIPE SPRINKLER SYSTEMS

PART 1 – GENERAL

1.01 DESCRIPTION OF WORK:

A. Extent of the work is indicated on the Drawings and Schedules and by the requirements of this Section.

B. The construction requirements herein shall include appurtenant structures and buildings to which the system is to be installed.

1.02 DESIGN CRITERIA:

A. Provide a hydraulically designed, complete automatic sprinkler system with the following hazard types: Restrooms, hallways, classrooms - Light Hazard. Lab classrooms, Mechanical – Ordinary Hazard Group I.

B. Wet systems serving Light Hazard area systems shall be hydraulically calculated to a design density of 0.1 gpm/sf over the most remote 1,500 sf. Wet systems serving Ordinary Hazard Group I areas shall be hydraulically calculated to a design density of 0.15 gpm/sf over the most remote 1,500sf.

C. Gridded sprinkler systems may be used on wet pipe systems where they are practical.

D. All areas of the building, except as noted, shall be completely sprinklered including the following areas:

1. Electrical Rooms that are not enclosed within two-hour walls
2. Elevator Shafts
3. Telephone Rooms
4. Stairwells (at top level and below lowest level)

1.03 QUALITY ASSURANCE:

A. All materials and equipment shall comply with requirements as specified in this section of these specifications.

B. All materials and equipment furnished and installed under this section of these specifications shall be new and in first class condition.

C. All materials and equipment furnished and/or installed by Contractor found to be in non-compliance with these specifications shall be removed and replaced with materials complying with this section of these specifications at Contractor's expense.

D. Codes and regulations referred to are minimum standards. Where the requirements of these specifications or drawings exceed those of the codes and regulations, the drawings and specifications shall govern.

E. Manufacturing firms shall be regularly engaged in the manufacture of fire protection products, of types, materials, and sizes required, whose products have been in satisfactory use in similar service for not less than five (5) years.

F. Installation Firms shall have at least five (5) years of successful installation experience on projects with fire protection work similar to that required for the project.

1.04 SUPPLEMENTAL STANDARDS:

A. Provide fire protection products which are Factory Mutual Approved or UL Listed.

B. Comply with local Fire Department regulations for sizes, hose threads and arrangement of connections for fire department equipment to fire department valves, and fire department connections.

1.05 DESCRIPTION AND REQUIREMENTS:

A. The work under this section of the specifications includes labor, materials, supervision and testing of the automatic sprinkler and associated systems.

B. The automatic sprinkler and associated systems shall be complete with all component equipment and material items, and installed and tested in full conformity with the requirements of all applicable codes, National Fire Protection Associations Standards, authorities having jurisdiction and the Owner's insurance company.

C. Provide chrome metal wall plates and/or escutcheons on all exposed piping which penetrates walls, floors, etc. Plastic wall plates are not acceptable.

D. The installed layout of the sprinkler system shall be coordinated to avoid interference with the structural, electrical, mechanical, and plumbing work in the building.

E. Sprinklers shall be located as required to provide coverage as required by applicable standards and the Contract Documents.

F. Sprinklers shall be located to avoid interference with lights, diffusers, grilles, or other ceiling mounted equipment. Sprinklers located in ceiling tile shall not be closer than 12 inches to "T" bars and centered. The sprinkler layout shall conform to the typical pattern.

G. Provide vane-type electric flow switch on each riser. Also provide tamper switches on all control valves to be interfaced with fire control panel. Wiring shall be by characteristics of each switch necessary for compatibility with the fire alarm control panel.

H. Locate all inspector tests and drain lines in mechanical room and “back-of-house” type spaces. Main drains and auxiliary drains are to be extended through the nearest exterior wall.

I. Provide backflow prevention. Backflow preventer OS&Y valves shall be equipped with tamper switches.

J. All piping in exposed structure areas shall be installed above the bottom chord of the bar joists.

1.06 APPROVALS:

A. Contractor shall submit for approval to the Architect, the Owner's insurance company and local authorities having jurisdiction, shop drawings, including site plans and details of installation, product submittal data and copies of all material and test certificates.

B. Installing Contractor shall anticipate a minimum of 30 days turn-around for reviewing sprinkler shop drawings by Architect-Engineer and Owner's insurance company. Installing Contractor shall submit shop drawings for review on a timely schedule so as not to impact construction schedule.

C. Floor plans on all shop drawings shall be prepared at a scale of 1/8"=1' unless local jurisdictional authority requires drawings be prepared at larger scales, in which case local requirements shall be met. Details and part plans may be at larger scales as appropriate. Prepare shop drawings on sheets 30" by 42". Except as indicated herein, drawings shall be in accordance with the requirements for working drawings as outlined in NFPA 13.

D. Plans submitted for approval to Architect shall be in the form of one reproducible set in rolled form, not folded. All other plan submittals to Owner's insurance company and local authorities shall be standard blueline prints in quantities as required by those persons.

E. All submittals (except for insurance submittal) for shop drawing review must be submitted directly to Architect. No submittals shall be made direct to Engineers. Submittals shall be made in one submission only; no partial submittals will be accepted. Partial submittals will be held until all components are received and may delay shop drawing review.

1.07 SUBMITTALS:

A. The following information is required for sprinkler plan submission:
   1. Physical Characteristics (Cross Section Through Building)
      a. Storage height.
      b. Roof height.
   2. Sprinkler Design
      a. Densities.
      b. Areas of operation. (Include key plan on each drawing.)
   3. Water Supply
      a. Static pressure, residual pressure, and flow.
      b. Date of flow test.
      c. Location of flow test hydrants shown on site plan.
      d. Elevation referenced to finished floor level.
      e. Source of water.
      f. On-site verification water flow test as referenced under "Flow Tests".
   4. Manufacturer's Data
      a. Pipe, fittings, and mechanical couplings.
      b. Alarm valves.
      c. All control, globe, and check valves.
      d. Water motor alarm and gongs.
      e. Sprinklers.
      f. Pipe hangers and supports.
      g. Water flow and tamper switches.
      h. Fire department connection
      i. Chrome metal wall plates and escutcheons.
      j. Underground pipe, valves, fittings and hydrants.
      k. Hose stations.
      l. Backflow preventer with pressure loss curves.
   5. A machine copy of the hydraulic calculation nameplate properly filled out for each system shall be submitted to the Architect-Engineer along with the manufacturer's submittal data and shop drawings referenced above.

B. Site Plan Drawing
   1. Installing Contractor is to submit with interior sprinkler shop drawings a complete site plan drawing prepared by the sprinkler contractor showing location of all underground fire mains, size and type of pipe and hydraulic calculation reference points. This requirement is necessary even though the actual installation of the final underground piping layout may not be in the Contractor's scope of work.

2. Indicate location and type of all fire hydrants.
3. Detail construction of all meter pits, etc., required by code or local authorities.
4. Show results of water flow test.
5. Indicate elevation at all hydrant reference points.
6. Show location of flow test hydrants and source of water.
7. Scale of site plan shall be as required to fit site on sheet; preferably the same scale of civil engineering drawings provided for this project where they are provided.

C. Hydraulic calculations shall be submitted with drawings and manufacturer's data sheets. Calculations shall include all documentation as required by NFPA 13 current edition, including cover sheet.

1.08 RECORD "AS BUILT" DRAWINGS:

A. Provide as-built drawings to the Contractor to be turned over to the Owner at the completion of the project.

1.09 FLOW TESTS:

A. Flow test data may be provided as part of the contract documents and may be used as a preliminary indicator of available water supply only. Flow test data may also be available from the local water supplier and should also be considered only as preliminary.

B. Each contractor submitting a bid on this project shall verify flow test information in the vicinity of the project by his own water flow test at the indicated hydrants. No requests for change orders will be accepted because successful contractor did not verify water supply information obtained from local authorities or did not run his own test prior to submitting his bid.

C. All flow test data shall be subject to the "10% rule" as defined in this paragraph. Before any calculations or supply curve plotting, reduce the reported static and residual pressures by 10%. Make no reduction to the flow rate reported.

D. Provide a reserve supply of sprinklers as required by NFPA 13 current edition. The sprinklers and tools shall be contained in a metal carrying case.

1.10 DELIVERY, STORAGE AND HANDLING:

A. Deliver materials to job site in new and in first class condition.

B. Store materials and equipment utilizing suitable means so as to protect from weather, construction work traffic and contamination. Where materials and equipment are stored outdoors, Contractor shall cover in a suitable manner to prevent contamination from water, dirt, mud and/or debris. Materials and equipment shall not be laid on grade for storage.

C. Materials and equipment found to be contaminated with water, dirt, mud and/or other debris shall be cleaned and restored to new condition to the satisfaction of the Architect. Contaminated materials and equipment shall not be used until inspected. Materials and equipment determined to be unsuitable for use by the Architect shall not be used and shall be removed from the job site at the Contractor's expense.

PART 2 - PRODUCTS

2.01 MATERIALS AND PRODUCTS:

A. Provide piping materials and factory fabricated piping products of sizes, types, pressure ratings, temperature ratings, and capacities as indicated. Provide sizes and types of materials to match piping and equipment connections; provide fittings of materials which match piping materials used in fire protection systems.

2.02 PIPE:

A. Above Ground Piping
1. All piping shall be new, designed for 175 PSI working pressure conforming to ASTM specifications and approved for fire sprinkler specifications.
2. All pipe shall be black steel unless galvanized is indicated for particular pipe sections on the drawings.
3. Schedule 40 piping may be used for piping 2" and smaller and may be joined by threading, roll grooving, or welding.
4. Schedule 10 piping may be used in all sizes and may be joined by roll grooving or welding only.

B. Fittings
1. Screwed fittings shall be standard approved, Class 250, cast iron or Class 150 malleable iron.
2. Flanged fittings shall be approved, short body, Class 250, black cast iron. Gaskets shall be full face, 1/8" minimum thickness red rubber.
3. All welded fittings shall be of the approved type and all welding according to NFPA requirements. No field welding will be permitted.
4. Mechanical couplings shall be approved for grooved end connections equivalent to Victaulic Style 75. All grooved couplings and fittings used throughout this project shall be from the same manufacturer. Grooved couplings and fittings shall be Grinnell Gruvlok, Gustin Bacon, or Victaulic.
5. Slip on fittings shall not be used. "Victaulic Fit" and "Victaulic Pressfit" and similar products are forbidden on this basis.
6. All inspector tests, drains and drum drips shall be Schedule 40 threaded.
7. Strap on tees or outlets may not be used. "Victaulic Snap-Let" or similar products and "Victaulic Style 921" or similar products are forbidden on this basis.
8. "Victaulic Style 920" mechanical tee or cross or similar products may be used.

C. Underground Piping
1. Underground pipe shall be PVC, C 900, Class 150 or Class 200. Fittings shall be Class 250 and installed in strict accordance with NFPA 24. All bends shall be rodded and thrust blocked.
2. Pipe passing under building grade beams shall have a 6" minimum clearance to prevent possible damage from building settlement.
3. All underground piping shall be flushed in accordance with NFPA #24.

2.04 JOINTS:

A. Threaded joints shall be made up with piping compound or teflon tape applied to the male threads only.

B. Welded joints shall be done by qualified welders per the requirements of Division 23.

C. Flanged joints shall be made up with rubber gaskets and assembled with machine bolts with hexagon heads made of open hearth steel.

D. Soldered joints shall be made using suitable flux and solder as specified.

2.05 BASIC HANGERS AND SUPPORTS:

A. Refer to Division 23, Pipe Hangers, Supports, and Anchor, Section 23 05 29.

B. Supports shall comply with provisions of NFPA 13 except where superseded by these herein and Section 23 05 29.

2.06 VALVES:

A. Valves as indicated shall be provided by Milwaukee, Nibco, Victaulic, Grinnell or Mueller.

B. All valves shall be designed and manufactured with back seating features to allow them to be repacked under pressure when in the fully opened position.

C. Provide valves of one manufacturer wherever practical to achieve maximum possible uniformity and facilitate maintenance.

D. All valves must be listed for use in sprinklers systems in the latest edition of Factory Mutual Approval Guide and U.L. listed.
   1. Gate valves 2" and smaller shall be of Class 250, with body and bonnet, cast bronze composition, threaded ends, OS&Y, solid disc.
   2. Gate valves 2-1/2" and larger shall be rated 250 psi WWP, iron body, bronze mounted, with body and bonnet, Class B cast iron, OS&Y, flanged or threaded end.
   3. Ball valves 2" and smaller shall be constructed of commercial brass rod, with Teflon seats, blowout proof stem.
   4. Butterfly valves 4" through 12" may be substituted for gate valves, where appropriate. Valves shall be rated for 250 PSIG working pressures. Valve bodies may be ductile iron or aluminum bronze and wafer or lug style.
   5. Check valves 2-1/2" - 12" shall be rated 250 PSI WWP, iron body, bronze mounted, OS&Y flanged end.
   6. Pressure ratings of valves shall be as required to meet the pressure conditions to which they are likely to be exposed or the ratings listed above, whichever is greater.

2.07 WATERFLOW INDICATOR:

A. Waterflow indicator shall be vane type with adjustable retard and two sets of single pole, double throw contacts for A.C. or D.C. operation.

2.08 O.S. & Y. VALVE SUPERVISORY SWITCH:

A. Valve supervisory switch for O.S. & Y. gate valves shall be provided with tamperproof cover and two sets of single pole, double throw contacts for A.C. or D.C. operation, bracket and J-bolts. Unit shall be U.L. Listed and F.M. Approved.

2.09 SPRINKLERS:

A. 1/2" brass pendent sprinkler, ordinary temperature, with concealing bracket and cover assembly. Cover shall be factory painted in a color selected by the Architect to match finish of ceiling in which it is installed, for use in all gypsum board ceilings.

B. 1/2" chrome pendent sprinkler, ordinary temperature, with chrome plated, semi-recessed escutcheon, for use in all lay-in tile ceilings.

C. 1/2" brass upright sprinkler, ordinary temperature, for use in areas without ceilings.

D. 1/2" sidewall sprinklers in Guestrooms

E. 1/2" brass upright sprinkler, intermediate temperature, for use in areas above high ceiling space and electrical rooms.

F. Acceptable sprinkler manufacturers are: Viking, Tyco, and Victaulic.

2.10 FIRE DEPARTMENT CONNECTIONS:

A. Fire department connection shall be two-way 4" x 2½" wall mounted type with drop clappers. Unit shall be complete with inlets with caps, chains and cast brass body. All exposed surfaces shall be polished chrome plate. Fire department connection shall be labeled with the name of the fire protection system served. The connection to the fire department shall be provided with an automatic ball drip with discharge drain line. The exact location shall be coordinated with the Fire Marshal prior to submission of the sprinkler shop drawings. Any adjustments in pipe routing shall to the Fire Dept. connection shall be included in the contractor's scope of work at no additional cost to the Owner.

PART 3 - EXECUTION

3.01 GENERAL:

A. Contractor shall not fabricate and/or install fire sprinkler systems until Architect/Engineer has reviewed shop drawings / submittals for compliance with engineer design concept.

B. Any fire sprinkler systems fabricated and/or installed prior to the Architect/Engineer's review found to be in non-compliance shall be removed or corrected as per instructions from Architect/Engineer at Contractor's expense.

3.02 PROCEDURE:

A. Valves in horizontal piping shall be installed with stems at or above the pipe centerline.

B. Automatic air vents shall be installed with gate valves.

C. Provide gate, globe and check valves throughout systems where shown and where necessary to properly regulate and control the systems. Valves shall be the full size of the lines and shall be designed for low pressure drop. Gate and globe valves shall have provision for repacking when open and under pressure.

3.03 SPRINKLERS:

A. Provide basket type guards over all upright sprinklers.

B. Sprinklers shall be provided above and below all ductwork or other obstructions greater than 4'-0" in width.

C. Sprinklers shall be centered in 2 x 2 ceiling tiles and at least 12" from each of 2 x 4 ceiling tiles.

D. Provide shields on all sprinklers located near electric panels to limit the sprinkler discharge on the panels.

E. Install sprinklers so that heads are located no closer than 1'-0" to lights, diffusers, or other obstructions.

F. Where sprinklers are exposed to exterior sprinklers must be wax coated to protect exposed surfaces from corrosion.

3.04 INSTALLATION:

A. The fire protection system shall include all signs, test connections, and drains required by NFPA 13.

B. Comply with requirements of NFPA 13 for installation of fire protection piping materials. Install piping products where indicated, in accordance with manufacturer's written instructions.

C. Coordinate with other work, including plumbing piping, as necessary to interface components of fire protection piping properly with other work.

D. Fire mains, crossmains, and branch piping shall not be installed inside or above the ceiling of Electrical Equipment Rooms, Telephone Rooms, Elevator Equipment Rooms, or other rooms of similar usage. Only sprinkler branch piping which serves sprinklers located inside such rooms shall be permitted to be installed within room.

E. Automatic sprinklers protecting elevator shafts shall have a supervised control valve located in an accessible location outside of the room, so that sprinkler heads in these areas may be shut down separately.

F. All valves in direct flow of water to sprinklers, standpipes or exterior connections shall be provided with valve position supervisory switches.

G. Waterflow indicators shall be mounted horizontally or vertically on top of pipe. Adjust retard to provide maximum of 30 second delay. Schedule 40 pipe must be provided for waterflow indicator.

H. O.S. & Y. valve stem shall be carefully filed to accommodate stem of valve switch.

3.05 DRAINS:

A. All trapped sprinkler piping shall be provided with drain valves and shall be routed to and discharged over the nearest suitable floor drain, hub drain or service sink. Drain valve shall be located at the point of discharge.

B. All drains and inspector's test connections located on exterior walls shall be painted to match exterior and penetration shall be sealed and provided with chrome plated escutcheon secured to wall.

3.06 ANCHORAGES:

A. General: Provide concrete thrust block anchorages for underground tees, plugs, caps, and bends in accordance with NFPA 24. Provide rods and clamps on fittings located underground inside building as shown on drawings.

B. After installation, apply a full coat of asphalt or other acceptable corrosion retarding material to surfaces of rods and clamps.

3.07 IDENTIFICATION:

A. Install signs on all inspector's test connections, auxiliary drains, drain valves, etc., in accordance with NFPA 13.

B. Access panels provided for valves concealed above ceilings or inside partitions must be provided with permanently attached signs identifying control valve or drain.

3.08 ADJUST AND CLEAN:

A. Sprinkler Piping Flushing: Prior to connecting sprinkler risers for flushing, flush water feed mains, lead in connections and control portions of sprinkler piping. After fire sprinkler piping installation has been completed and before piping is placed in service, flush entire sprinkler system as required to remove foreign substances, under pressure as specified by NFPA 13, current edition. Continue flushing until water is clear, and check to ensure that debris has not clogged sprinklers.

3.09 TESTING:

A. Hydrostatic Testing: After flushing system, test fire sprinkler piping hydrostatically, for a period of 2 hours, as follows:
1. 150 psi or less, test pressure 200 psi
2. 151 psi or more, test pressure 50 psi above normal operating pressure

B. Check system for leakage at joints. Measure hydrostatic pressure at low point of each system or zone being tested. No drop in pressure is permitted.

3.10 PAINTING:

A. Painting of properly prepared sprinkler piping and equipment shall be by the Contractor.

B. The Contractor is to remove all labels, stickers, fabrication identification tags, excess pipe dope and teflon tape from sprinkler piping before system is painted.

C. The Contractor is to install protective plastic bags on all sprinkler heads in areas where roof deck and/or structural system is to be painted.

D. The Contractor will remove all plastic bags after the final painting is complete.

E. The Contractor shall furnish a signed statement on his letterhead and place it in the operating instruction and maintenance manuals that he has verified that all plastic bags have been removed.

F. Any sprinkler head not protected from painting and subsequently receiving paint coating shall be replaced. Cleaning of sprinkler heads to remove paint is not acceptable.

3.11 WARRANTY:

A. Provide a written warranty in accordance with the general conditions.

B. This warranty shall further provide that in the event of the failure of any system or its component equipment items or the improper functioning thereof, during the period of the warranty, the contractor shall have available and "on call" competent service personnel for the restoration of all systems and equipment for complete operation. Should the nature of the failure be such as to present an emergency in the opinion of the Owner, such personnel shall be promptly available regardless of the hour of the day or the day of the week. Should the failure be such as to fall under the warranty, the cost of the service shall be borne by the contractor -otherwise, the Owner will pay therefore at the prevailing rate for such services.

C. If service personnel of the installing contractor are not promptly available "on call," the Owner may employ such personnel as are available to him, at the expense of the installing contractor.

D. Inspection and Tests

1. All inspections, examinations and tests required by NFPA, local authority having jurisdiction, and Owner's insurance company shall be arranged as necessary to obtain complete and final acceptance of the sprinkler system. The Contractor shall deliver certificates of all inspections and tests to Architect.
2. At job conclusion the entire system shall be flushed out and left clean in every respect.
3. After systems have been installed, tested and accepted, contractor is to provide three (3) copies of operating instructions and maintenance manuals complete with a copy of approved shop drawings, copy of NFPA-25, spare parts lists and phone numbers of emergency repair personnel to Architect. A copy of hydraulic calculation nameplate as installed on each riser shall be included in O & M manuals.
4. Provide three (3) copies of underground material and test certificate.

3.12 QUARTERLY INSPECTIONS:

A. Installing Sprinkler Contractor is to provide a minimum of four (4) on-site sprinkler system inspections during the one (1) year warranty period.

1. Inspections to consist of all items outlined in NFPA-25 such as lubricating valve stem of valves, replacement of F.D.C. (fire department connection) break-off caps if missing, etc.
2. After each quarterly inspection, copies of inspection reports outlining results and listing any problems observed shall be forwarded to the Owner, Owner's insurance company, and Architect and Engineer of Record.

END OF SECTION 211313

SECTION 22 0010

BASIC PLUMBING REQUIREMENTS

PART 1. GENERAL

1.01 SECTION INCLUDES

A. Basic Plumbing Requirements specifically applicable to Division 22 Sections, in addition to Division 01 - General Requirements.

1.02 DESCRIPTION

A. Furnish materials and perform labor required to execute this work as indicated on the drawings, as specified and as required to complete the work of this section, except as otherwise herein specifically excluded.

1.03 REFERENCES

A. Section 23 08 01 - Commissioning of Building Systems

1.04 WORK INCLUDED

A. The complete Plumbing systems (including Fire Protection systems), including but not limited to these major items.
   1. Coordinate work of this Section with related trades.
   2. Verify applicable dimensions at the jobsite.
   3. Furnishing and installation of miscellaneous hangers, supports, sleeves, inserts, anchors and other auxiliary equipment for systems under this Division.
   4. Soil waste and vent system inside and outside the building including connections to fixtures, equipment, sewer connections, clean-outs.
   5. Water piping systems inside and outside the building, including connections to fixtures, equipment, water meters and vaults; pressure regulating stations, backflow preventers.
   6. Interruptible and non-interruptible fuel gas systems inside and outside the building, including connections and earthquake valves.
   7. Plumbing fixtures, carriers, fittings, trim, hose bibs, wall hydrants, and accessories.
   8. Installation and connection of Owner furnished equipment.
   9. Natural gas piping system including connections to equipment and site.
   10. Water heating systems, including water heating equipment, circulating pumps, connections.
   11. Shop drawings.
   12. Equipment identification.
   13. Equipment and systems adjustments and balancing.
   14. Air, water and gas systems testing, adjusting and balancing.
   15. Written operating and maintenance instructions.
   16. Record drawings.
   17. Guarantee

1.05 WORK SPECIFIED ELSEWHERE

A. Concrete, Architectural Sheet Metal, Door and Exterior Wall Louvers, Painting and Electrical.

1.06 SITE INSPECTION

A. Contractor shall familiarize himself with the conditions at the site. No allowance will be made subsequently for any error through negligence in observing the site conditions. Contractor shall observe and make cost allowance for any mechanical and/or electrical items that must be relocated to accommodate the installation or servicing of any item covered under this contract.

1.07 ORDINANCES, REGULATIONS AND CODES

A. References to Technical Societies, Trade Organizations, Governmental Agencies is made in Division 15 in accordance with the following abbreviations.
   1. AFI - Air Filter Institute
   2. AMCA - Air Moving & Conditioning Association
   3. ARI - Air Conditioning & Refrigeration Institute
   4. ASHRAE - American Society of Heating, Refrigerating and Air Conditioning Engineers

5. ASME - American Society of Mechanical Engineers
6. ASTM - American Society of Testing Materials
7. AWSC - American Welding Society Code
8. ANSI - American National Standards Institute
9. CBC - California Building Code
10. CCR - California Code of Regulations
11. CEC - California Electrical Code
12. CFC - California Fire Codes
13. CMC - California Mechanical Code
14. CPC - California Plumbing Code
15. FIA - Factory Insurance Association
16. NAFM - National Association of Fan Manufacturers
17. NEMA - National Electrical Manufacturer's Association
18. NFPA - National Fire Protection Association
19. ORS - Office of Regulatory Services
20. SCAQMD - South Coast Air Quality Management District
21. SMACNA - Sheet Metal and Air Conditioning Contractors National Association
22. UFC - Uniform Fire Code
23. UL - Underwriter's Laboratories
24. UPC - Uniform Plumbing Code

B. Requirements of Regulatory Agencies: Materials and installation shall comply with applicable local, state, and national codes and ordinances. Rulings and interpretations of the enforcing agencies shall be considered as part of the local codes. No extras will be permitted for furnishing items required by the local codes but not specified or shown on the drawings.

C. Codes and Standards:
1. IBC and California Amendments (California Building Code - Part 2, Title 24, CCR).
2. UMC and California Amendments (California Mechanical Code - Part 4, Title 24 CCR).
3. UPC and California Amendments (California Plumbing Code - Part 5, Title 24 CCR).
4. Uniform Fire Code with State Amendments (California Fire Code - Part 9, Title 24 CCR).
5. National Fire Protection Associations - National Fire Code.

D. Nothing in these drawings and specifications is to be construed to permit work in violation thereof. Ordinances, regulations and codes are to be construed as minimum requirements.

E. The responsibility of the Architect to conduct construction reviews of the Contractor's performance is not intended to include the adequacy of the Contractor's safety measures in, on, or near the construction site.

F. Ventilating, refrigeration and electrical equipment and appliances are required to be approved by the Underwriters' Laboratories, Inc., or other nationally recognized testing agency and installed per the testing agency's specifications.

1.08 PERMITS, FEES AND INSPECTIONS

A. Obtain and pay for all necessary permits, fees, assessments, complimentary drawings, required by any legally constituted public authorities having jurisdiction.

1.09 DRAWINGS AND SPECIFICATIONS

A. The Architect's decision will be final on interpretation of the Drawings and Specifications.

B. The Drawings and Specifications are complimentary. Any work called for on the Drawings and not mentioned in the Specifications, or vice versa, shall be performed as though fully set forth in both.

C. Piping, ductwork and other equipment shown as existing has been taken from the Owner's drawings. Contractor shall verify exact location in field before proceeding with the work.

D. Where codes, standards, drawings or specifications conflict, the most stringent shall prevail, unless prior approval for variance is obtained. Specific details on the drawings shall supersede the specification in the event of a conflict.

E. Alternate support or seismic detail shall have prior approval by the Architect; and the Contractor shall obtain agency approval without any additional cost or time to the contract and without any time penalty on the work schedule.

1.10 SUBMITTALS

A. Before starting work, the Contractor shall furnish for the approval of the Architect, Shop Drawings and Submittals with Itemized Equipment Lists, complete in all details that they proposes to install. All items shall be submitted at the same time.

B. Submittals must be specific to this project with respect to model number, capacities, performance, etc., generic submittals will not be accepted.

C. Variations or deviations on submitted items from that specified must be clearly tagged and / or identified

D. Submittals shall include, but not necessarily be limited to the following which are mandatory:

1. Draw Equipment Layouts to ¼" scale, including equipment, piping accessories, and showing clearances for operating and servicing.
2. Schedule of pipe, fittings, valves, with manufacturer and catalog number.
3. Specialties, valves, gauges and thermometers of all types.
4. Foundations, supports, hangers, inserts.
5. Insulation.
6. Shop fabrication drawings and installation drawings of ductwork and piping layouts. Submit for approval prior to fabrication. Drawings shall indicate dimensions from bottom of piping and ductwork to finish floor level.
7. Access panels.
8. Clean-outs
9. Fixture carriers.
10. Hangers, inserts, supports, anchors.
11. Hose bibs.
12. Hot water circulators.
13. Pipe, fittings and specialties.
14. Pipe isolators.
15. Plumbing fixtures, fittings, trim, drains and receptors.
16. Pressure regulators.
17. Roof flashing.
18. Sleeves, escutcheons, caulking, waterproofing, fireproofing.
19. Strainers
20. Water hammer arrestors.
21. Water heating equipment.
22. Shop fabrications drawings and calculations.
23. Special and miscellaneous products furnished under this section and not listed herein.

1.11 RECORD DRAWINGS AND MANUALS

A. Record Set During the Work: At site, maintain at least one set of Drawings as a Field Record Set. Also maintain at least one copy of all Addenda, Modifications, approved submittals, correspondence, and transmittals at site. Keep Drawings and data in good order and readily available to Architect and Owner.

B. Changes: Clearly and correctly mark Record Drawings to show changes made during the construction process at the time the changed work is installed. No such changes shall be made in the work unless authorized by the Architect.

C. Final Record Drawings: Conform to Division 1 requirements.

D. Preparation of Final Record Drawings: Contractor shall transfer recorded changes in the work indicated on the Field Record Set to the record set. Changes shall be neatly and clearly drawn and noted by skilled draftsmen, and shown technically correct.

E. Approval: Prior to Architect's inspection for Substantial Completion, submit the Final Record Drawings to the Architect for review, and make such revisions as may be necessary for Final Record Drawings to be a true, complete, and accurate record of the work.

F. Manuals: Obtain data from the various manufacturers and submit instruction, operation, and maintenance manuals as required and to the extent required under other Sections.

G. Contents: Each manual shall have an index listing the contents. Information in the manuals shall include not less than:

1. General introductions and overall equipment description, purpose, functions and simplified theory of operation.
2. Specifications
3. Installation instructions, procedures, sequences, and precautions, including tolerances for level, horizontal and vertical alignment.
4. Grouting requirements.
5. List showing lubricants for each item of mechanical equipment and recommended lubrication intervals.
6. Start-up and beginning operation procedures.
7. Operational procedures.
8. Shutdown procedures.
9. Maintenance and calibration procedures
10. Parts lists
11. Name, address and telephone number of each manufacturer's local representative.

H. Manual Submittals: Unless otherwise specified, each submittal shall include two copies of each manual, one of which will be returned to the Contractor, marked to show the required review. When approved, deliver four copies to Architect unless otherwise specified.

I. "As-Built" drawings of ductwork and piping, including all elbows, transitions, damper and valve locations shall be provided prior to commencement of air and water balance.

1.12 QUALITY OF EQUIPMENT, MATERIALS AND WORKMANSHIP

A. Unless otherwise specified, equipment and materials used in the installation shall be new and in perfect condition when installed. Articles provided for the same general purpose or use shall be of the same make. Workmanship shall be of the best quality and none but competent mechanics skilled in their trades shall be employed. Furnish the services of an experienced superintendent, who shall be constantly in charge of the work, together with all necessary journeymen, helpers and laborers required.

1.13 SEISMIC DESIGN

A. Contractor shall be responsible for anchors and connections of mechanical work to the building structure including calculations for approval by structural engineer or for approval by inspector of record, as applies, for items or work, where approval is deferred or where alternate support or anchorage detail is proposed to prevent damage as a result of an earthquake, including manufactured equipment, the connection and integrity of shop fabricated and field fabricated materials and equipment. The anchorage of all pipes, ducts, conduits, fixtures, equipment, etc. shall withstand the lateral forces and shall accommodate calculated building displacement as required by the California Building Code, and local city/county codes. (Building equipment and connections therefore shall be designed to resist lateral seismic forces equal to 1.0 of equipment weight to working allowable stress. Cantilever posts supporting equipment shall be designed to resist lateral seismic forces equal to 0.5 of equipment weight to allowable working stress. Conform to the following:

1. In accordance with Title 24, 2019 CBC Chapter 16A, details shall be provided for the seismic anchorage of all mechanical and electrical equipment, anchorage details shall be based upon appropriate design calculations.
2. For equipment weighing 400 pounds or more anchorage details and appropriate design calculations shall be submitted as part of the mechanical and electrical drawings. "Deferred Approval" items will not be permitted unless specifically approved by the plan check supervisor.
   a. Exception: Attachments of equipment weighting less than 400 pounds and supported directly on the floor or roof structure, furniture, or temporary or movable equipment and equipment weighing less than 20 pounds that is supported by vibration isolation devices suspended from the roof, wall or floor, need not be detailed on the plans provided the following notes are included on the mechanical and electrical plans.

3. The seismic anchorage of mechanical and electrical equipment shall conform to C.C.R. Title 24, 2019 CBC Chapter 16A. Anchorage details for roof/floor-mounted equipment shall be shown on plans.

1.14 SUBSTITUTIONS AND CHANGES

A. The design has been based on data from certain manufacturers, suitable for each application. Recommendations for alternative manufacturers are made for each product, except when "no substitutions permitted" is indicated.

B. It is the intent of the Owner to have this project constructed with materials, products and system originally designed and specified into the project.

C. Alternatives that may require the modification, realignment and/or adjustment of other associated components, including impact on other trades, shall be accomplished at no additional cost or time to the contract and shall have the approval of the Architect.

D. Substitutions shall be submitted addressing all features listed in the specifications. Features that deviate from the plans and specifications shall be clearly identified including justification for deviations. Design West Engineers will review initial submittal on substitutes only. Subsequent submittals made to correct deficiencies in original submittals will be reviewed at Contractor's expense based on Design West Engineer's hourly rate for engineering services.

E. Should the Contractor elect to propose substitutions for the Owner's interest, the substitutions shall be in compliance with Division 01.

1.15 APPROVALS

A. The Architect will have the right to accept or reject equipment, materials, workmanship, tests and determine when the Contractor has complied with the requirements herein specified.

1.16 SELECTION AND ORDERING OF EQUIPMENT AND MATERIALS

A. Immediately after award of the Contract and after the approval of submittals by the Architect, the Contractor shall arrange for the purchase and delivery of equipment and materials required, in ample quantities and at the proper time. He shall deliver to the Architect a complete list of equipment and materials ordered, giving descriptions, plate numbers, brochures, name of the wholesalers, date of the orders and approximate delivery dates.

1.17 LOCATIONS AND ACCESSIBILITY

A. Drawings show pipe and ductwork diagrammatically. Conform to Drawings as closely as possible in layout work. Vary run of piping, run and shape of ductwork and make offsets during progress of work as required to meet structural and other interferences as approved by Architect. Install piping and ductwork to best suit field conditions after coordinating with other trades. Run exposed piping and ductwork parallel to, or at right angle to, building walls. Keep horizontal lines as close to bottom of structures as possible. Conform to ceiling heights established on Drawings.

B. Install equipment in such a manner as to be readily accessible for maintenance and repairs. Install piping, ducts and conduit in such a manner as to preserve headroom, avoid obstructions and keep openings and passageways clear.

C. Installation at valves, thermometers, gauges, cleanouts, dampers, controls, steam and water specialties, duct access doors or any other indicating equipment or specialties requiring reading, adjustment, inspection, maintenance shall be conveniently and accessible located with reference to the finished building.

D. Where wall and ceiling access doors are required but not shown, such doors shall be furnished under other sections and as directed by the Architect. Coordinate this requirement with appropriate trade.

E. If changes in the indicated locations or arrangements are required, they shall be made without additional charges.

F. In an existing area, where required, remove, reinstall, reconnect or replace, etc., any existing work to accommodate new work without any additional cost to the Owner. Material shall match existing, unless otherwise specified or approved in writing by the Architect.

G. Provide sheaves and belts if required, to Test, Adjust and Balance Agency, to allow air moving equipment to meet flow requirements specified at no additional cost to the Owner.

1.18 COORDINATION OF TRADES

A. Contractor shall coordinate all trades in the interest of obtaining the most practical overall arrangement of equipment, piping, conduit, and ducts and to maintain maximum headroom and accessibility.

B. No extras will be allowed for changes made necessary by interference between trades.

C. Submit Composite Drawings in accordance with Special Conditions. Include dimensioned plans, elevations, sections and details and give complete information particularly as to the kinds and types of materials and equipment, size and location of sleeves, inserts, attachments, chases, openings, conduits, ducts, boxes, lighting, structural interferences. Coordinate these Composite Drawings and field layouts in the field for proper relationship to work of applicable trades based on field conditions. Contractor shall have competent personnel readily available for coordinating, checking, and supervision of field layouts. The procedures for submittals and resubmittals, and final distribution shall be as specified in Division 01. Do not start installation of work involved under Composite Drawings until the Architect reviews applicable submittal. Discrepancies between the Drawings and Composite Drawings shall be specifically noted and identified on the Composite Drawings. Drawings for the various trades involved shall be submitted as required and reviewed prior to preparation of Composite Drawings.
   1. Equipment Foundations and Bases: Furnish certified details and drawings for approval before fabrication. Furnish parts necessary for each foundation sub base and support.
   2. Pipe Sleeves and Inserts: Furnish and install pipe sleeves and pipe support inserts before concrete is poured.
   3. Roof, Wall and Floor Openings: Furnish Shop Drawings showing exact locations and sizes of openings through roofs, walls and floors.
   4. Concrete: Conform to Concrete Section of the Specifications.

1.19 GUARANTEES

A. Contractor shall guarantee workmanship, equipment and materials installed under his contract for a period of not less than one (1) year from the date of Substantial Completion. Should any defects occur during this period, the Contractor shall promptly repair or replace the defective item and any other damage caused to the building free of charge to the Owner, including cost of labor and materials.

B. Guarantee included in this section to cover:
   1. Faulty or inadequate design of equipment or material installed
   2. Improper assembly or erection
   3. Defective workmanship or material
   4. Incorrect or inadequate operation or other failure

C. He shall guarantee the complete and perfect operation of the entire system and that equipment will be supported in such a way as to be free of objectionable vibration and noise

D. Furnish the parts and labor to replace any items found to be defective in the refrigeration equipment with the guarantee period

E. In addition to other guarantees, furnish free maintenance for the refrigeration equipment, including replacement of refrigerant and oil, for a period of one (1) year. This shall include regular monthly maintenance and "On Call" service if required.

F. For equipment bearing a manufacturer's warranty in excess of one year, furnish a copy of the warranty to the Owner, who shall be named as beneficiary.

1.20 PROTECTION OF EQUIPMENT AND MATERIALS

A. Provide adequate storage facilities for equipment and materials on the site and shall make provisions to protect such materials and equipment from damage.

1.21 CLOSING-IN OF UNINSPECTED WORK

A. Contractor shall not allow or cause any of the work, specifically ductwork and piping, to be covered up or enclosed until it has been inspected, tested, and approved by the Architect. Should any of work be covered up or enclosed before such inspection and test, shall at their own expense, uncover the work and after it has been inspected, tested, and approved, make repairs with such materials as may be necessary to restore work to its original and proper condition.

1.22 BUILDING FOOTING CLEARANCES

A. Under no circumstances shall pipes, ducts, or conduits penetrate footings. They shall cross below footings or through sleeves above footings. Those running parallel to footings shall have the minimum clearance from the cone of influence indicated on the Drawings or as required by Code.

1.23 DAMAGE BY LEAKS

A. Contractor shall be responsible for all damage to any part of the premises caused by rain leaks through or around ducts or pipes, leaks or breaks in piping, equipment or fixtures furnished or installed by him for a period of one (1) year from the date of Substantial Completion.

1.24 EQUIPMENT LABELS

A. Equipment provided under this Section shall be provided with the manufacturer's metal identification labels attached to each individual piece of equipment showing complete performance characteristics, size, model and serial number.

1.25 PRELIMINARY OPERATION

A. Should the Owner request that any portion of the plant, apparatus, or equipment be operated for the Owner's beneficial use prior to the final completion and acceptance of the work, the Contractor shall conform to Beneficial Occupancy Provisions of the General Conditions. Such operation shall be under the supervision and direction of the Contractor. Such preliminary operation shall not be construed as an acceptance of any of the work.

1.26 MAINTAINING EXISTING SERVICES

A. The premises and existing building at the site will be in use at the time the work of this Section is in progress. Contractor shall conduct his work so as to cause no inconvenience or danger to the personnel on the premises.

B. He shall maintain continuity of service to the existing mechanical systems, except for designated intervals during which connections can be made. The scheduling of the shut down period shall be at a time directed by the Architect.

C. In some instances, it may be necessary to defer work in certain areas and locations until such time as existing facilities can be relocated or rearranged by the Owner. Therefore, whenever it becomes necessary for the Contractor to perform work under this contract in areas in which the Owner's work is being performed. This contractor shall advise the Architect relative to this requirement and shall follow closely the directive issued by the Architect insofar as time and procedure are concerned. Allow Owner 72 hours prior notice.

D. This contractor shall include in his bid all premium time to which he may be subjected for performing work in such procedure and at such time as may be necessary to cause the least interference with the function of the Owner.

1.27 ELECTRICAL WORK

A. Coordinate with Division 26 in making the line and low voltage electrical connections and be responsible for the operation of the equipment furnished under this section.

B. Voltage for electrical work will be included in Division 26. However, any control wiring which is required that is not shown on the control diagram shall be as described under this Section. In the event that the Contractor chooses to provide equipment that requires extra expense in the power or control wiring, he shall pay additional electrical costs.

C. Safety switches, starters, circuit breakers, unless provided as a portion of package equipment, and the electrical connections of mechanical equipment to the electrical power service shall be provided under Division 26.

D. Interconnecting wiring, safety switches, relays, controllers and motor starters which are integral components of packaged equipment shall be provided as an integral part of that equipment.

E. All interconnecting power wiring and conduits shall be provided by Division 26.

F. Control wiring shall be provided by Division 22, unless otherwise indicated on the drawings.

G. Conduit for control wiring shall be provided by Division 26.

END OF SECTION

SECTION 22 0517

SLEEVES AND SLEEVE SEALS FOR PLUMBING PIPING

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:
   1. Sleeves.
   2. Sleeve-seal systems.
   3. Grout.

1.02 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

PART 2 PRODUCTS

2.01 SLEEVES

A. Cast-Iron Wall Pipes: Cast or fabricated of cast or ductile iron and equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop unless otherwise indicated.

B. Galvanized-Steel Wall Pipes: ASTM A 53/A 53M, Schedule 40, with plain ends and welded steel collar; zinc coated.

C. Galvanized-Steel-Pipe Sleeves: ASTM A 53/A 53M, Type E, Grade B, Schedule 40, zinc coated, with plain ends.

D. PVC-Pipe Sleeves: ASTM D 1785, Schedule 40.

E. Galvanized-Steel-Sheet Sleeves: 0.0239-inch (0.6-mm) minimum thickness; round tube closed with welded longitudinal joint.

2.02 SLEEVE-SEAL SYSTEMS

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. Advance Products & Systems, Inc
   2. CALPICO, Inc
   3. Metraflex Company
   4. Pipeline Seal and Insulator, Inc
   5. Proco Products, Inc

C. Description: Modular sealing-element unit, designed for field assembly, for filling annular space between piping and sleeve.
   1. Sealing Elements: EPDM-rubber interlocking links shaped to fit surface of pipe. Include type and number required for pipe material and size of pipe.
   2. Pressure Plates: Carbon steel.
   3. Connecting Bolts and Nuts: Carbon steel, with corrosion-resistant coating, of length required to secure pressure plates to sealing elements.

2.03 GROUT

A. Standard: ASTM C 1107/C 1107M, Grade B, post-hardening and volume-adjusting, dry, hydraulic-cement grout.

B. Characteristics: Nonshrink; recommended for interior and exterior applications.

C. Design Mix: 5000-psi (34.5-MPa), 28-day compressive strength.

D. Packaging: Premixed and factory packaged.

PART 3 EXECUTION

3.01 SLEEVE INSTALLATION

A. Install sleeves for piping passing through penetrations in floors, partitions, roofs, and walls.

B. For sleeves that will have sleeve-seal system installed, select sleeves of size large enough to provide 1-inch (25-mm) annular clear space between piping and concrete slabs and walls.
   1. Sleeves are not required for core-drilled holes.

C. Install sleeves in concrete floors, concrete roof slabs, and concrete walls as new slabs and walls are constructed.
   1. Cut sleeves to length for mounting flush with both surfaces.
      a. Exception: Extend sleeves installed in floors of mechanical equipment areas or other wet areas 2 inches (50 mm) above finished floor level.
   2. Using grout, seal the space outside of sleeves in slabs and walls without sleeve-seal system.

D. Install sleeves for pipes passing through interior partitions.
   1. Cut sleeves to length for mounting flush with both surfaces.
   2. Install sleeves that are large enough to provide 1/4-inch (6.4-mm) annular clear space between sleeve and pipe or pipe insulation.
   3. Seal annular space between sleeve and piping or piping insulation; use joint sealants appropriate for size, depth, and location of joint. Comply with requirements for sealants specified in Section 079200 "Joint Sealants."

E. Fire-Barrier Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at pipe penetrations. Seal pipe penetrations with firestop materials. Comply with requirements for firestopping specified in Section 078413 "Penetration Firestopping."

3.02 SLEEVE-SEAL-SYSTEM INSTALLATION

A. Install sleeve-seal systems in sleeves in exterior concrete walls and slabs-on-grade at service piping entries into building.

B. Select type, size, and number of sealing elements required for piping material and size and for sleeve ID or hole size. Position piping in center of sleeve. Center piping in penetration, assemble sleeve-seal system components, and install in annular space between piping and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make a watertight seal.

3.03 SLEEVE AND SLEEVE-SEAL SCHEDULE

A. Use sleeves and sleeve seals for the following piping-penetration applications:
   1. Exterior Concrete Walls above Grade:
      a. Piping Smaller than NPS 6 (DN 150): Cast-iron wall sleeves.
      b. Piping NPS 6 (DN 150) and Larger: Cast-iron wall sleeves.
   2. Exterior Concrete Walls below Grade:
      a. Piping Smaller than NPS 6 (DN 150): Cast-iron wall sleeves with sleeve-seal system.
         1) Select sleeve size to allow for 1-inch (25-mm) annular clear space between piping and sleeve for installing sleeve-seal system.
      b. Piping NPS 6 (DN 150) and Larger: Cast-iron wall sleeves with sleeve-seal system.
         1) Select sleeve size to allow for 1-inch (25-mm) annular clear space between piping and sleeve for installing sleeve-seal system.
   3. Concrete Slabs-on-Grade:
      a. Piping Smaller than NPS 6 (DN 150): Cast-iron wall sleeves with sleeve-seal system.
         1) Select sleeve size to allow for 1-inch (25-mm) annular clear space between piping and sleeve for installing sleeve-seal system.
      b. Piping NPS 6 (DN 150) and Larger: Cast-iron wall sleeves with sleeve-seal system.
         1) Select sleeve size to allow for 1-inch (25-mm) annular clear space between piping and sleeve for installing sleeve-seal system.
   4. Concrete Slabs above Grade:
      a. Piping Smaller than NPS 6 (DN 150): Galvanized-steel-pipe sleeves.
      b. Piping NPS 6 (DN 150) and Larger: Galvanized-steel-pipe sleeves.
   5. Interior Partitions:
      a. Piping Smaller than NPS 6 (DN 150): Galvanized-steel-pipe sleeves.
      b. Piping NPS 6 (DN 150) and Larger: Galvanized-steel-sheet sleeves.

END OF SECTION

SECTION 22 0518

ESCUTCHEONS FOR PLUMBING PIPING

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:
   1. Escutcheons.

1.02 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

PART 2 PRODUCTS

2.01 ESCUTCHEONS

A. One-Piece, Cast-Brass Type: With polished, chrome-plated finish and setscrew fastener.

B. One-Piece, Deep-Pattern Type: Deep-drawn, box-shaped brass with chrome-plated finish and spring-clip fasteners.

C. One-Piece, Stamped-Steel Type: With chrome-plated finish and spring-clip fasteners.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install escutcheons for piping penetrations of walls, ceilings, and finished floors.

B. Install escutcheons with ID to closely fit around pipe, tube, and insulation of piping and with OD that completely covers opening.
   1. Escutcheons for New Piping:
      a. Piping with Fitting or Sleeve Protruding from Wall: One-piece, deep-pattern type.
      b. Chrome-Plated Piping: One-piece, cast-brass type with polished, chrome-plated finish.
      c. Insulated Piping: One-piece, stamped-steel type.
      d. Bare Piping at Wall and Floor Penetrations in Finished Spaces: One-piece, cast-brass type with polished, chrome-plated finish.
      e. Bare Piping at Wall and Floor Penetrations in Finished Spaces: One-piece, stamped-steel type.
      f. Bare Piping at Ceiling Penetrations in Finished Spaces: One-piece, cast-brass type with polished, chrome-plated finish.
      g. Bare Piping at Ceiling Penetrations in Finished Spaces: One-piece, stamped-steel type.
      h. Bare Piping in Unfinished Service Spaces: One-piece, cast-brass type with rough-brass finish.
      i. Bare Piping in Unfinished Service Spaces: One-piece, stamped-steel type.
      j. Bare Piping in Equipment Rooms: One-piece, cast-brass type with rough-brass finish.
      k. Bare Piping in Equipment Rooms: One-piece, stamped-steel type.

C. Install floor plates with ID to closely fit around pipe, tube, and insulation of piping and with OD that completely covers opening.
   1. New Piping: One-piece, floor-plate type.

3.02 FIELD QUALITY CONTROL

A. Replace broken and damaged escutcheons and floor plates using new materials.

END OF SECTION

SECTION 22 0553

IDENTIFICATION FOR PLUMBING PIPING AND EQUIPMENT

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Nameplates.

B. Tags.

C. Stencils.

D. Pipe markers.

E. Ceiling tacks.

1.02 RELATED REQUIREMENTS

A. Section 09 9123 - Interior Painting: Identification painting.

1.03 REFERENCE STANDARDS

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. List: Submit list of wording, symbols, letter size, and color coding for mechanical identification.

PART 2 PRODUCTS

2.01 IDENTIFICATION APPLICATIONS

A. Piping: Pipe markers.

B. Pumps: Nameplates.

C. Small-sized Equipment: Tags.

D. Valves: Tags and ceiling tacks where located above lay-in ceiling.

E. Water Treatment Devices: Nameplates.

2.02 MANUFACTURERS

A. Brady Corporation: www.bradycorp.com.

B. Champion America, Inc: www.Champion-America.com.

C. Seton Identification Products: www.seton.com/aec.

2.03 NAMEPLATES

A. Manufacturers:
   1. Brimar Industries, Inc: www.pipemarker.com/#sle.
   2. Kolbi Pipe Marker Co: www.kolbipipemarkers.com.
   3. Seton Identification Products: www.seton.com.

B. Description: Laminated three-layer plastic with engraved letters.
   1. Letter Color: White.
   2. Letter Height: 1/4 inch (6 mm).
   3. Background Color: Black.

2.04 TAGS

A. Manufacturers:
   1. Advanced Graphic Engraving: www.advancedgraphicengraving.com.
   2. Brady Corporation: www.bradycorp.com.
   3. Brimar Industries, Inc: www.pipemarker.com/#sle.
   4. Kolbi Pipe Marker Co: www.kolbipipemarkers.com.
   5. Seton Identification Products: www.seton.com.

B. Metal Tags: Brass with stamped letters; tag size minimum 1-1/2 inch (40 mm) diameter with smooth edges.

2.05 STENCILS

A. Manufacturers:
   1. Brady Corporation: www.bradycorp.com.
   2. Kolbi Pipe Marker Co.: www.kolbipipemarkers.com.
   3. Seton Identification Products: www.seton.com.

B. Stencils: With clean cut symbols and letters of following size:
   1. 3/4 to 1-1/4 inch (20-30 mm) Outside Diameter of Insulation or Pipe: 8 inch (200 mm) long color field, 1/2 inch (15 mm) high letters.
   2. 1-1/2 to 2 inch (40-50 mm) Outside Diameter of Insulation or Pipe: 8 inch (200 mm) long color field, 3/4 inch (20 mm) high letters.
   3. 2-1/2 to 6 inch (65-150 mm) Outside Diameter of Insulation or Pipe: 12 inch (300 mm) long color field, 1-1/4 inch (30 mm) high letters.

C. Stencils shall be identified as indicated below including direction of flow
   1. Refrigerant Suction Line - R.S.L.
   2. Refrigerant Liquid Line - R.L.L.
   3. Gravity Condensate - G.C.
   4. Domestic Cold Water - D.C.W.
   5. Domestic Hot Water - D.H.W.
   6. Domestic Hot Water Return - D.H.W.R.

D. Stencil Paint: Semi-gloss enamel, colors conforming to ASME A13.1.

2.06 CEILING TACKS

A. Manufacturers:
   1. Craftmark: www.craftmarkid.com.

B. Description: Steel with 3/4 inch (20 mm) diameter color coded head.

C. Color code as follows:
   1. Plumbing Valves: Green.

PART 3 EXECUTION

3.01 PREPARATION

A. Degrease and clean surfaces to receive adhesive for identification materials.

3.02 INSTALLATION

A. Install plastic nameplates with corrosive-resistant mechanical fasteners, or adhesive. Apply with sufficient adhesive to ensure permanent adhesion and seal with clear lacquer.

B. Install plastic pipe markers in accordance with manufacturer's instructions.

C. Install plastic tape pipe markers complete around pipe in accordance with manufacturer's instructions.

D. Install underground plastic pipe markers 6 to 8 inches (150 to 200 mm) below finished grade, directly above buried pipe.

E. Identify air handling units, pumps, heat transfer equipment, tanks, and water treatment devices with plastic nameplates. Small devices, such as in-line pumps, may be identified with tags.

F. Identify valves in main and branch piping with tags.

END OF SECTION

SECTION 22 07 19

PLUMBING PIPING INSULATION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Piping insulation.

B. Jackets and accessories.

1.02 REFERENCE STANDARDS

A. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate; 2014.

B. ASTM B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate [Metric]; 2014.

C. ASTM C534/C534M - Standard Specification for Preformed Flexible Elastomeric Cellular Thermal Insulation in Sheet and Tubular Form; 2014.

D. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2015a.

E. ASTM E96/E96M - Standard Test Methods for Water Vapor Transmission of Materials; 2014.

F. NFPA 255 - Standard Method of Test of Surface Burning Characteristics of Building Materials; National Fire Protection Association; 2006.

G. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials; Current Edition, Including All Revisions.

1.03 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide product description, thermal characteristics, list of materials and thickness for each service, and locations.

C. Manufacturer's Instructions: Indicate installation procedures that ensure acceptable workmanship and installation standards will be achieved.

1.04 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with not less than three years of documented experience.

B. Applicator Qualifications: Company specializing in performing the type of work specified in this section with minimum three years of experience.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Accept materials on site, labeled with manufacturer's identification, product density, and thickness.

1.06 FIELD CONDITIONS

A. Maintain ambient conditions required by manufacturers of each product.

B. Maintain temperature before, during, and after installation for minimum of 24 hours.

PART 2 PRODUCTS

2.01 REGULATORY REQUIREMENTS

A. Surface Burning Characteristics: Flame spread index/Smoke developed index of 25/50, maximum, when tested in accordance with ASTM E84 or UL 723.

2.02 FLEXIBLE ELASTOMERIC CELLULAR INSULATION

A. Manufacturer:

1. Armacell LLC; _____: www.armacell.us/#sle.

B. Insulation: Preformed flexible elastomeric cellular rubber insulation complying with ASTM C534/C534M Grade 3; use molded tubular material wherever possible.

1. 'K' value: ASTM C 177; 0.27 at 75 degrees F.
2. Minimum Service Temperature: Minus 40 degrees F.
3. Maximum Service Temperature: 220 degrees F.
4. Water Vapor Permeability: 0.17 perm-inches, when tested in accordance with ASTM E 96.
5. Connection: Waterproof vapor barrier adhesive.

C. Elastomeric Foam Adhesive: Air dried, contact adhesive, compatible with insulation.

1. Manufacturers:
   a. Armstrong 520 Adhesive.
   b. Substitutions: See Section 01 60 00 - Product Requirements.
2. Air dried, contact adhesive, compatible with insulation.

2.03 JACKETS

A. PVC Plastic.

1. Manufacturers:
   a. Johns-Manville Model Zeston 2000.
   b. Substitutions: See Division 1.
2. Jacket: One piece molded type fitting covers and sheet material, off-white color.
   a. Minimum Service Temperature: 0 degrees F.
   b. Maximum Service Temperature: 150 degrees F.
   c. Moisture Vapor Permeability: 0.002 perm inch, maximum, when tested in accordance with ASTM E96/E96M.
   d. Thickness: 10 mil.
   e. Connections: Brush on welding adhesive.

B. Aluminum Jacket: ASTM B209 (ASTM B209M) formed aluminum sheet.

1. Thickness: 0.016 inch sheet.
2. Finish: Smooth.

3. Joining: Longitudinal slip joints and 2 inch laps.
4. Fittings: 0.016 inch thick die shaped fitting covers with factory attached protective liner.
5. Metal Jacket Bands: 3/8 inch wide; 0.015 inch thick aluminum.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that piping has been tested before applying insulation materials.

B. Verify that surfaces are clean and dry, with foreign material removed.

3.02 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Install in accordance with North American Insulation Manufacturers Association (NAIMA) National Insulation Standards.

C. Exposed Piping: Locate insulation and cover seams in least visible locations.

D. Continue insulation through walls, sleeves, pipe hangers, and other pipe penetrations. Finish at supports, protrusions, and interruptions. At fire separations, refer to Division 7.

E. Exterior Applications: Provide vapor barrier jacket. Insulate fittings, joints, and valves with insulation of like material and thickness as adjoining pipe, and finish with glass mesh reinforced vapor barrier cement. Cover with aluminum jacket with seams located on bottom side of horizontal piping.

3.03 SCHEDULES

A. Plumbing Systems:
   1. Domestic Hot Water Supply:
      a. Glass Fiber Insulation (2016 Title 24):
         1) Pipe Size Range: 1 inch and under.
         2) Thickness: 1 inch.
         3) Pipe Size Range: Above 1 inch.
         4) Thickness: 1-1/2 inch.

B. Heating Systems: Glass fiber insulation with all service jacket:
   1. Required glass fiber insulation thickness for all heating system piping listed herein (based on 2016 Title 24):
      a. 105 to 140 degrees F: Less than 1" pipe size - 1" thickness; 1" and above pipe size - 1-1/2" thickness.
      b. 141 to 200 degrees F: Through 1-1/4" pipe size - 1-1/2" thickness; 1-1/2" and larger pipe size - 2" thickness.
      c. 201 to 250 degrees F: Through 3" pipe size - 2-1/2" thickness; 4" and larger pipe size - 3" thickness.
      d. 251 to 350 degrees F: Less than 1" - 3" thickness; 1" through 1-1/4" pipe size - 4" thickness; 1-1/2" and above pipe size - 4-1/2" thickness.
      e. Above 350 degrees F: Less than 1" pipe size - 4-1/2" thickness; 1" and above pipe size - 5" thickness.

C. Cooling Systems:
   1. Chilled Water: Glass Fiber Insulation with all service jacket and vapor barrier (2016 T24):

a. 40 to 60 degrees F: smaller than 1-1/2" pipe size - 3/4" thickness (residential - 1/2" thinkness); 1-1/2" and larger pipe size - 1" thickness.

b. Below 40 degrees F: Less than 1" pipe size - 1" Thickness; 1" pipe size and above - 1-1/2" thickness. (2016 T-24)

2. Cold Condensate Drains:

a. Condensate Drains from Cooling Coils: Where drains are routed inside occupied space - Cellular Foam Insulation - 1/2" thickness.

END OF SECTION

SECTION 22 0719.11

UNDER-LAVATORY PIPE AND SUPPLY COVERS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Under-lavatory pipe and supply covers.

1.02 REFERENCE STANDARDS

A. 28 CFR 36 - Nondiscrimination by Public Accommodations and in Commercial Facilities; Final Rule; Department of Justice; current edition.

B. 36 CFR 1191 - Americans with Disabilities Act (ADA) Accessibility Guidelines for Buildings and Facilities; Architectural Barriers Act (ABA) Accessibility Guidelines; current edition.

C. ABA Standards - ABA Accessibility Standards; 2004 (Amended 2015).

D. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design; 2010.

E. ASME A112.18.9 - Protectors/Insulators for Exposed Waste and Supplies on Accessible Fixtures; 2011.

F. ASTM C1822 - Standard Specification for Insulating Covers on Accessible Lavatory Piping; 2015.

G. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2016.

H. ASTM G21 - Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi; 2015.

I. ATBCB ADAAG - Americans with Disabilities Act Accessibility Guidelines; 2004.

J. IAPMO (UPC) - Uniform Plumbing Code; 2012.

K. ICC (IBC) - International Building Code; 2018.

L. ICC A117.1 - Accessible and Usable Buildings and Facilities; 2017.

M. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials; Current Edition, Including All Revisions.

1.03 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide catalog illustrations of covers, sizes, and finishes.

C. Warranty: Submit manufacturer warranty and ensure forms have been completed in Owner's name and registered with manufacturer.

1.04 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum three years of documented experience.

1.05 WARRANTY

A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.

PART 2 PRODUCTS

2.01 UNDER-LAVATORY PIPE AND SUPPLY COVERS

A. Manufacturers:
   1. Plumberex Specialty Products, Inc; _____: www.plumberex.com/#sle.

B. General:
   1. Insulate exposed drainage piping including hot, cold, and tempered water supplies under lavatories or sinks per ADA Standards.
   2. Adhesives, sewing threads, and two-ply laminated materials are prohibited.
   3. Exterior Surfaces: Smooth nonabsorbent with no finger recessed indentations for easy cleaning.
   4. Construction: 1/8 inch (3.2 mm) PVC with antimicrobial, antifungal, and ultraviolet light (UV) resistant properties.
      a. Provide one piece injected molded design with internal bridge at top of J-bend to prevent separating.

b. Thermal Resistance: R value of 0.504 or lower when tested by ASTM C177.
c. Microbial and Fungal Resistance for Interior and Exterior: Comply with ASTM G21.

C. ASTM E84 Compliant, Under-Lavatory Insulators:
1. Manufacturers:
a. Plumberex Specialty Products, Inc: Plumberex Trap Gear; www.plumberex.com/#sle.
2. Construction: Soft, non-laminated, flexible PVC with antimicrobial, antifungal, and UV-resistant properties. Fusion molded one piece universal design for multiple P-trap configurations. Adhesives, sewing threads, and two ply laminated materials shall not be allowed. Exterior surfaces shall be smooth nonabsorbent with no finger recessed indentations for easy cleaning. Supply riser shall be flexible and a minimum of 15 inches (381 mm) inches in length.
3. Provide with weep hole for condensation drainage and ventilation.
4. Fasteners: Reusable, fusion bonded Velcro and tamper resistant snap-locking fasteners with no sharp or abrasive external surfaces. No cable tie fasteners allowed.
5. Comply with:
a. ASTM E84/UL 723 to comply with flame spread and smoke development rating of 25/450.
b. ASTM C1822 Type I.
c. ADA Standards.
d. 36 CFR 1191.
e. ICC (IBC).
f. ADAAG Standards 2004 and 28 CFR 36.
g. GSA and DOD ABA Standards.
h. ICC A117.1.
i. IAPMO (UPC).
6. Color: High gloss color to match fixture.

D. Under-Lavatory Covers with Snap-Lock Fasteners:
1. Manufacturers:
a. Plumberex Specialty Products, Inc: Plumberex Pro-Extreme; www.plumberex.com/#sle.
2. Construction: PVC with antimicrobial, antifungal, and UV-resistant properties, one piece injected molded design with internal bridge at top of J-bend to prevent separating.
3. Fasteners: Reusable, snap-locking fasteners with no sharp or abrasive external surfaces. No cable ties allowed.
4. Maintenance: Valve and supply cover shall be accessible for maintenance without removal and with removable, reusable access cap.
5. Comply with:
a. ASTM C1822 Type III.
b. ADA Standards.
c. 36 CFR 1191.
d. ADAAG Standards and 28 CFR 36.
e. GSA and DOD ABA Standards.
f. ICC A117.1.
g. Requirement to protect against contact with sharp or abrasive surfaces.
6. Provide with weep hole for condensation drainage and ventilation.
7. Vandal Resistance: Internal line grooves for trimming not easily torn by hand. All trim line grooves shall require tool cutting only.
8. Color: High gloss white.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install under-lavatory guards according to manufacturer's written instructions.
B. No sharp edges or objects allowed under sink or lavatory.

END OF SECTION

SECTION 22 10 05
PLUMBING PIPING

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Pipe, pipe fittings, specialties, and connections for piping systems.
   1. Sanitary sewer.
   2. Domestic water.
   3. Valves.
   4. Check.
   5. Strainers.

1.2 REFERENCE STANDARDS

A. ASME B16.18 - Cast Copper Alloy Solder Joint Pressure Fittings; 2012.

B. ASME B16.22 - Wrought Copper and Copper Alloy Solder-Joint Pressure Fittings; 2013.

C. ASTM B32 - Standard Specification for Solder Metal; 2008 (Reapproved 2014).

D. ASTM B42 - Standard Specification for Seamless Copper Pipe, Standard Sizes; 2015a.

E. ASTM B88 - Standard Specification for Seamless Copper Water Tube; 2014.

F. ASTM B813 - Standard Specification for Liquid and Paste Fluxes for Soldering of Copper and Copper Alloy Tube; 2010.

G. ASTM B828 - Standard Practice for Making Capillary Joints by Soldering of Copper and Copper Alloy Tube and Fittings; 2002 (Reapproved 2010).

H. AWWA C651 - Disinfecting Water Mains; 2005.

I. CISPI 301 - Standard Specification for Hubless Cast Iron Soil Pipe and Fittings for Sanitary and Storm Drain, Waste and Vent Piping Applications; 2009.

J. CISPI 310 - Specification for Coupling for Use in Connection with Hubless Cast Iron Soil Pipe and Fittings for Sanitary and Storm Drain, Waste, and Vent Piping Applications; 2011.

K. California Code of Regulations, Title 24, Part 5: California Plumbing Code (CPC), latestedition.

L. NSF 61 - Drinking Water System Components - Health Effects; 2014 (Errata 2015).

M. NSF 372 - Drinking Water System Components - Lead Content; 2011.

1.3 SUBMITTALS

A. See Division 1 for submittal procedures.

B. Product Data: Provide data on pipe materials, pipe fittings, valves, and accessories. Provide manufacturers catalog information. Indicate valve data and ratings.

C. Pipe Test Reports: Submit pipe pressure test reports for all piping installed under this contract indicating that piping systems have been tested in accordance with the California Plumbing Code.

1.4 REGULATORY REQUIREMENTS

A. Perform Work in accordance with State of California plumbing code.

B. All wetted parts of pipe, valves, equipment and appurtenances for use in potable water systems shall be in compliance with the Reduction of Lead in Drinking Water Act, amendments to Section 1417 of the Safe Drinking Water Act which are effective January 4, 2014. Lead content shall not exceed 0.25% byweight.

1.5 DELIVERY, STORAGE,AND HANDLING

A. Accept valves on site in shipping containers with labeling in place. Inspect for damage.

B. Provide temporary protective coating on cast iron and steel valves.

C. Provide temporary end caps and closures on piping and fittings. Maintain in place until installation.

D. Protect piping systems from entry of foreign materials by temporary covers, completing sections of the work, and isolating parts of completedsystem.

PART 2 PRODUCTS

2.1 SANITARY SEWER PIPING, BURIED WITHIN 5 FEET OFBUILDING

A. Cast Iron Pipe: CISPI 301,hubless.
   1. Fittings: Castiron.
   2. Joints: CISPI 310, neoprene gasket and stainless steel clamp and shield assemblies.

2.2 DOMESTIC WATER PIPING, BURIED WITHIN 5 FEET OF BUILDING

A. Copper Pipe: ASTM B42, harddrawn.
   1. Fittings: ASME B16.18, cast copper alloy or ASME B16.22 wrought copper andbronze.
   2. Joints: ASTM B32, alloy Sn95 solder.

2.3 DOMESTIC WATER PIPING, ABOVEGRADE

A. Copper Tube: ASTM B88 (ASTM B88M), Type L (B), Drawn (H).
   1. Fittings: ASME B16.18, cast copper alloy or ASME B16.22, wrought copper andbronze.
   2. Joints: ASTM B32, alloy Sn95 solder.

2.4 'LEAD FREE' BALL VALVES

A. Manufacturers:
   1. Nibco, Inc. Model:S-685-66-LF

B. Construction: 2" and smaller, bronze body, 2 piece, MSS SP-110; NSF 61-G; 600 psig, full port, stainless steel ball, teflon seats and packing, blow out proof stem, lever handle, solder ends.

2.5 SPRING LOADED CHECKVALVES

A. Manufacturers:
   1. Hammond Valve; www.hammondvalve.com.
   2. Crane Company; www.cranecpe.com.
   3. Milwaukee Valve Company; www.milwaukeevalve.com.

B. Class 125, iron body, bronze trim, stainless steel springs, bronze disc, Buna N seals, wafer style ends.

2.6 STRAINERS

A. Manufacturers:
   1. Armstrong International, Inc; www.armstronginternational.com/#sle.
   2. Green Country FilterManufacturing; www.greencountryfilter.com/#sle.

B. Size 2 inch andUnder:
   1. Threaded brass body for 175 psi CWP, Y pattern with 1/32 inch stainless steel perforated screen.
   2. Class 150, threaded bronze body 300 psi CWP, Y pattern with 1/32 inch stainless steel perforated screen.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that excavations are to required grade, dry, and not over-excavated.

3.2 INSTALLATION

A. Install and test all plumbing piping systems in strict accordance with the California Plumbing Code.

B. Install in accordance with manufacturer'sinstructions.

C. Provide non-conducting dielectric connections wherever jointing dissimilar metals.

D. Route piping in orderly manner and maintain gradient. Route parallel and perpendicular to walls.

E. Install piping to maintain headroom, conserve space, and not interfere with use of space.

F. Group piping whenever practical at common elevations.

G. Copper Pipe and Tube: Make soldered joints in accordance with ASTM B828, using specified solder, and flux meeting ASTM B813; in potable water systems use flux also complying with NSF 61 and NSF 372.

3.3 TOLERANCES

A. Drainage Piping: Establish invert elevations within 1/2 inch vertically of location indicated and slope to drain at minimum of 1/4 inch per foot slope.

B. Water Piping: Slope at minimum of 1/32 inch per foot and arrange to drain at low points.

3.4 DISINFECTION OF DOMESTIC WATER PIPING SYSTEM

A. Prior to starting work, verify system is complete, flushed and clean.

B. Ensure acidity (pH) of water to be treated is between 7.4 and 7.6 by adding alkali (caustic soda or soda ash) or acid (hydrochloric).

C. Inject disinfectant, free chlorine in liquid, powder, tablet or gas form, throughout system to obtain 50 to 80 mg/L residual.

D. Flush disinfectant from system until residual equal to that of incoming water or 1.0 mg/L.

E. Take samples no sooner than 24 hours after flushing, from 10 percent of outlets and from water entry, and analyze in accordance with AWWA C651.

3.5 SERVICE CONNECTIONS

A. Provide new sanitary sewer services. Before commencing work check invert elevations required for sewer connections, confirm inverts and ensure that these can be properly connected with slope for drainage and cover to avoid freezing.

3.6 SCHEDULES

A. Pipe Hanger Spacing:
   1. Metal Piping:
      a. Pipe Size: 1/2 inches to 1-1/4 inches:
         1) Maximum Hanger Spacing: 6.5 ft.
         2) Hanger Rod Diameter: 3/8 inches.
      b. Pipe Size: 1-1/2 inches to 2 inches:
         1) Maximum Hanger Spacing: 10 ft.
         2) Hanger Rod Diameter: 3/8 inch.
      c. Pipe Size: 2-1/2 inches to 3 inches:
         1) Maximum Hanger Spacing: 10 ft.
         2) Hanger Rod Diameter: 1/2 inch.

END OF SECTION

SECTION 22 1006

PLUMBING PIPING SPECIALTIES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Drains.

B. Cleanouts.

C. Hose bibbs.

D. Hydrants.

E. Refrigerator valve and recessed box.

F. Backflow preventers.

G. Water hammer arrestors.

1.02 REFERENCE STANDARDS

A. ASME A112.6.3 - Floor and Trench Drains; 2001 (R2007).

B. ASME A112.6.4 - Roof, Deck, and Balcony Drains; 2008 (Reaffirmed 2012).

C. ASSE 1011 - Hose Connection Vacuum Breakers; 2004.

D. ASSE 1012 - Backflow Preventer with Intermediate Atmospheric Vent; 2009.

E. ASSE 1013 - Reduced Pressure Principle Backflow Preventers and Reduced Pressure Principle Fire Protection Backflow Preventers; 2011.

F. ASSE 1019 - Performance Requirements for Wall Hydrant with Backflow Protection and Freeze Resistance; 2011.

G. NSF 61 - Drinking Water System Components - Health Effects; 2016.

H. NSF 372 - Drinking Water System Components - Lead Content; 2016.

I. PDI-WH 201 - Water Hammer Arresters; 2010.

1.03 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide component sizes, rough-in requirements, service sizes, and finishes.

1.04 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with not less than three years documented experience.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Accept specialties on site in original factory packaging. Inspect for damage.

PART 2 PRODUCTS

2.01 GENERAL REQUIREMENTS

A. Specialties in Potable Water Supply Systems: Provide products that comply with NSF 61 and NSF 372 for maximum lead content.

2.02 DRAINS

A. Manufacturers:
   1. Josam Company; www.josam.com.
   2. Jay R. Smith Manufacturing Company: www.jayrsmith.com.
   3. Zurn Industries, LLC; www.zurn.com.
   4. Mifab: www.mifab.com

B. Roof Drains:
   1. Assembly: ASME A112.6.4.
   2. Body: Lacquered cast iron with sump.

3. Strainer: Removable polyethylene dome with vandal proof screws.

C. Roof Overflow Drains:
1. Lacquered cast iron body and clamp collar and bottom clamp ring; pipe extended to 2 inches (51 mm) above flood elevation.

D. Area Drains:
1. Assembly: ASME A112.6.4.
2. Body: Lacquered cast iron with sump.
3. Strainer: Round nickel-bronze.
4. Accessories: Membrane flange and membrane clamp with integral gravel stop, with adjustable under deck clamp.

E. Floor Drain:
1. ASME A112.6.3; lacquered cast iron or stainless steel, two piece body with double drainage flange, weep holes, reversible clamping collar, and round, adjustable nickel-bronze strainer.

F. Floor Sink:
1. Cast iron 8 inch square, 6 inch deep flanged receptor with seepage holes, acid resistant coated interior, loose set acid resistant coated cast iron grate, and aluminum dome bottom strainer.

2.03 CLEANOUTS

A. Manufacturers:
1. Jay R. Smith Manufacturing Company: www.jayrsmith.com.
2. Josam Company: www.josam.com.
3. Zurn Industries, LLC: www.zurn.com.
4. Mifab: www.mifab.com

2.04 HOSE BIBBS

A. Manufacturers:
1. Jay R. Smith Manufacturing Company: www.jayrsmith.com.
2. Woodford: www.woodfordmfg.com.
3. Zurn Industries, LLC: www.zurn.com.
4. Mifab: www.mifab.com

2.05 HYDRANTS

A. Wall Hydrants:
1. ASSE 1019; freeze resistant, self-draining type with chrome plated wall plate hose thread spout, handwheel, and integral vacuum breaker.

2.06 REFRIGERATOR VALVE AND RECESSED BOX

A. Box Manufacturers:
1. IPS Corporation/Water-Tite: www.ipscorp.com.
2. Oatey Supply Chain Services, Inc: www.oatey.com.

B. Valve Manufacturers:
1. IPS Corporation/Water-Tite: www.ipscorp.com.
2. Zurn Industries, LLC: www.zurn.com.

2.07 BACKFLOW PREVENTERS

A. Manufacturers:
1. Conbraco Industries, Inc: www.apollovalves.com.
2. Watts Regulator Company, a part of Watts Water Technologies: www.wattsregulator.com.
3. Zurn Industries, LLC: www.zurn.com.

B. Reduced Pressure Backflow Preventers:
1. ASSE 1013; bronze body with bronze internal parts and stainless steel springs; two independently operating, spring loaded check valves; diaphragm type differential pressure relief valve located between check valves; third check valve that opens under back pressure in case of diaphragm failure; non-threaded vent outlet; assembled with two gate valves, strainer, and four test cocks.

2.08 WATER HAMMER ARRESTORS

A. Manufacturers:
   1. Precision Plumbing Products: www.pppinc.com.
   2. Watts Regulator Company, a part of Watts Water Technologies: www.wattsregulator.com.
   3. Zurn Industries, LLC: www.zurn.com.
   4. Mifab: www.mifab.com

PART 3 EXECUTION

3.01 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Extend cleanouts to finished floor or wall surface. Lubricate threaded cleanout plugs with mixture of graphite and linseed oil. Ensure clearance at cleanout for rodding of drainage system.

C. Install floor cleanouts at elevation to accommodate finished floor.

D. Install approved potable water protection devices on plumbing lines where contamination of domestic water may occur; on boiler feed water lines, janitor rooms, fire sprinkler systems, premise isolation, irrigation systems, flush valves, interior and exterior hose bibbs.

E. Pipe relief from backflow preventer to nearest drain.

END OF SECTION

SECTION 22 3000

PLUMBING EQUIPMENT

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Water Heaters:
   1. Commercial gas fired.

B. Acid neutralizers.

C. Deionization equipment.

D. In-line circulator pumps.

1.02 REFERENCE STANDARDS

A. ANSI Z21.10.1 - Gas Water Heaters - Volume I - Storage Water Heaters with Input Ratings of 75,000 Btu per Hour or Less; 2014.

B. ANSI Z21.10.3 - Gas-Fired Water Heaters - Volume III - Storage Water Heaters with Input Ratings Above 75,000 Btu per Hour, Circulating and Instantaneous; 2016.

C. ASME BPVC-VIII-1 - Boiler and Pressure Vessel Code, Section VIII, Division 1 - Rules for Construction of Pressure Vessels; 2015.

D. CSA P.3 - Testing Method for Measuring Energy Consumption and Determining Efficiencies of Gas-Fired Storage Water Heaters; 2004 (Reaffirmed 2015).

E. ICC (IPC) - International Plumbing Code; 2015.

F. UL 778 - Standard for Motor-Operated Water Pumps; Current Edition, Including All Revisions.

G. UL 1453 - Standard for Electric Booster and Commercial Storage Tank Water Heaters; Current Edition, Including All Revisions.

1.03 SUBMITTALS

A. Product Data:
   1. Provide dimension drawings of water heaters indicating components and connections to other equipment and piping.
   2. Indicate pump type, capacity, power requirements.
   3. Provide certified pump curves showing pump performance characteristics with pump and system operating point plotted. Include NPSH curve when applicable.
   4. Provide electrical characteristics and connection requirements.

B. Warranty Documentation: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

1.04 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum three years of documented experience.

B. Certifications:
   1. Water Heaters: NSF approved.
   2. Gas Water Heaters: Certified by CSA International to ANSI Z21.10.1, as applicable, in addition to requirements specified elsewhere.

C. Identification: Provide pumps with manufacturer's name, model number, and rating/capacity identified by permanently attached label.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Provide temporary inlet and outlet caps. Maintain caps in place until installation.

1.06 WARRANTY

A. Provide five year manufacturer warranty for domestic water heaters.

PART 2 PRODUCTS

2.01 WATER HEATERS

A. Manufacturers:
1. A.O. Smith Water Products Co: www.hotwater.com.
2. Bock Water Heaters, Inc: www.bockwaterheaters.com.
3. Rheem Manufacturing Company: www.rheem.com.

B. Commercial Gas Fired:
1. Type: Automatic, natural gas-fired, vertical storage.
2. Performance:
3. Tank: Glass lined welded steel ASME labeled; multiple flue passages, 4 inch (100 mm) diameter inspection port, thermally insulated with minimum 2 inches (50 mm) glass fiber, encased in corrosion-resistant steel jacket; baked-on enamel finish; floor shield and legs.
4. Accessories:
a. Water Connections: Brass.
b. Dip Tube: Brass.
c. Drain valve.
d. Anode: Magnesium.
5. Certified For The Following Applications:
a. Automatic storage water heater.

2.02 ACID NEUTRALIZERS

A. Manufacturers:
1. Aquapure, 3M Purification, Inc: www.aquapure.com.
2. Viqua, a division of Trojan Technologies ULC: www.viqua.com.
3. MIFAB: www.mifab.com.

B. Performance:
1. Media consists of limestone mineral media.

C. Mineral Tank: Glass fiber reinforced tank.

2.03 DEIONIZATION EQUIPMENT

A. Manufacturers:
1. Culligan International Company; _____: www.culligan.com.
2. Marlo Incorporated; _____: www.marlo-inc.com.

2.04 IN-LINE CIRCULATOR PUMPS

A. Manufacturers:
1. Armstrong Fluid Technology: www.armstrongfluidtechnology.com.
2. Bell & Gossett, a xylem brand: www.bellgossett.com.
3. Taco Pumps: www.taco-hvac.com.

B. Casing: Bronze, rated for 125 psig (860 kPa) working pressure, with stainless steel rotor assembly.

C. Impeller: Bronze.

D. Shaft: Alloy steel with integral thrust collar and two oil lubricated bronze sleeve bearings.

E. Seal: Carbon rotating against a stationary ceramic seat.

F. Drive: Flexible coupling.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install plumbing equipment in accordance with manufacturer's instructions, as required by code, and complying with conditions of certification, if any.

B. Coordinate with plumbing piping and related fuel piping work to achieve operating system.

C. Pumps:

1. Ensure pumps operate at specified system fluid temperatures without vapor binding and cavitation, are non-overloading in parallel or individual operation, and operate within 25 percent of midpoint of published maximum efficiency curve.

END OF SECTION

SECTION 22 4000
PLUMBING FIXTURES

PART 1 GENERAL

1.1 SECTION INCLUDES A. WATER CLOSETS.

2.1 Lavatories.

2.2 Sinks.

2.3 Drinking fountains.

2.4 SUBMITTALS

2.5 A. See Division 1 for submittal procedures.

2.6 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum three years of documented experience.

2.7 DELIVERY, STORAGE, AND HANDLING

A. Accept fixtures on site in factory packaging. Inspect for damage.

B. Protect installed fixtures from damage by securing areas and by leaving factory packaging in place to protect fixtures and prevent use.

PART 2 PRODUCTS

3.1 GENERAL REQUIREMENTS

A. Potable Water Systems: Provide plumbing fittings and faucets that comply with NSF 61 and NSF 372 for maximum lead content; label pipe and fittings.

3.2 REGULATORY REQUIREMENTS

A. Comply with applicable codes for installation of plumbing systems.

1. Comply with the requirements of CBC 11B.

2. The force to activate controls shall be no greater than 5 lb/f.

3. Faucets shall remain open for at least 10 seconds when self-closing valves are used.

4. Comply with UL (DIR) requirements.

5. Perform work in accordance with local health department regulations.

3.3 FLUSH VALVE WATER CLOSETS

A. Water Closets: Vitreous china, wall mounted, top spud. ADA Compliant.

1. See plumbing schedule on drawings.

2. Flush Valves:

a. Battery Powered motion activated flush valve type with push button over-ride activation.

b. See plumbing schedule on drawings.

3.4 LAVATORIES

3.5 Lavatories: Wall mounted, Porcelain, deck mounted metering faucet. ADA Compliant.

3.6 See plumbing schedule on drawings.

3.7 SINKS

3.8 Sinks: Drop-In Type.

A. Drop-In Type, Stainless Steel 304 construction with rotating faucet, mixing valve.

B. See plumbing schedule on drawings.

3.9 DRINKING FOUNTAINS

3.10 Drinking Fountains:

A. Stainless Steel, wall mounted, with Hi-Lo barrier free type. ADA Compliant.

B. See plumbing schedule on drawings.

PART 3 EXECUTION

4.1 EXAMINATION

A. Verify that walls and floor finishes are prepared and ready for installation of fixtures.

B. Verify that electric power is available and of the correct characteristics.

4.2 INSTALLATION

A. Install each fixture with trap, easily removable for servicing and cleaning.

B. Install components level and plumb.

C. Install wall/floor mounted clean outs at end of line fixtures or as indicated on plans.

4.3 CLEANING

4.4 Clean plumbing fixtures and equipment.

4.5 PROTECTION

A. Protect installed products from damage due to subsequent construction operations.

B. Repair or replace damaged products before Date of Substantial Completion.

END OF SECTION

SECTION 23 0010

BASIC MECHANICAL REQUIREMENTS

PART 1. GENERAL

1.01 SECTION INCLUDES

A. Basic Mechanical Requirements specifically applicable to Division 23 Sections, in addition to Division 01 - General Requirements.

1.02 DESCRIPTION

A. Furnish materials and perform labor required to execute this work as indicated on the drawings, as specified and as required to complete the work of this section, except as otherwise herein specifically excluded.

1.03 REFERENCES

A. Section 23 08 01 - Commissioning of Building Systems

1.04 WORK INCLUDED

A. The complete Heating, Ventilating and Air Conditioning (HVAC) systems, including but not limited to these major items.
   1. Coordinate work of this Section with related trades.
   2. Verify applicable dimensions at the jobsite.
   3. Duct systems; supply, return and exhaust complete with fire dampers, combination fire-smoke dampers, and manual dampers.
   4. Diffusers and registers.
   5. Exhaust supply, return fans and air curtains.
   6. Furnishing and installation of miscellaneous hangers, supports, sleeves, inserts, anchors and other auxiliary equipment for systems under this Division.
   7. Duct lining and insulation.
   8. Shop drawings.
   9. Equipment identification.
   10. Equipment and systems adjustments and balancing.
   11. Air, water and gas systems testing, adjusting and balancing.
   12. Written operating and maintenance instructions.
   13. Record drawings.
   14. Guarantee

1.05 WORK SPECIFIED ELSEWHERE

A. Concrete, Architectural Sheet Metal, Door and Exterior Wall Louvers, Painting and Electrical.

1.06 SITE INSPECTION

A. Contractor shall familiarize himself with the conditions at the site. No allowance will be made subsequently for any error through negligence in observing the site conditions. Contractor shall observe and make cost allowance for any mechanical and/or electrical items that must be relocated to accommodate the installation or servicing of any item covered under this contract.

1.07 ORDINANCES, REGULATIONS AND CODES

A. References to Technical Societies, Trade Organizations, Governmental Agencies is made in Division 15 in accordance with the following abbreviations.
   1. AFI - Air Filter Institute
   2. AMCA - Air Moving & Conditioning Association
   3. ARI - Air Conditioning & Refrigeration Institute
   4. ASHRAE - American Society of Heating, Refrigerating and Air Conditioning Engineers
   5. ASME - American Society of Mechanical Engineers
   6. ASTM - American Society of Testing Materials
   7. AWSC - American Welding Society Code
   8. ANSI - American National Standards Institute
   9. CBC - California Building Code

10. CCR - California Code of Regulations
11. CEC - California Electrical Code
12. CFC - California Fire Codes
13. CMC - California Mechanical Code
14. CPC - California Plumbing Code
15. FIA - Factory Insurance Association
16. NAFM - National Association of Fan Manufacturers
17. NEMA - National Electrical Manufacturer's Association
18. NFPA - National Fire Protection Association
19. ORS - Office of Regulatory Services
20. SCAQMD - South Coast Air Quality Management District
21. SMACNA - Sheet Metal and Air Conditioning Contractors National Association
22. UFC - Uniform Fire Code
23. UL - Underwriter's Laboratories
24. UPC - Uniform Plumbing Code

B. Requirements of Regulatory Agencies: Materials and installation shall comply with applicable local, state, and national codes and ordinances. Rulings and interpretations of the enforcing agencies shall be considered as part of the local codes. No extras will be permitted for furnishing items required by the local codes but not specified or shown on the drawings.

C. Codes and Standards:
1. IBC and California Amendments (California Building Code - Part 2, Title 24, CCR).
2. UMC and California Amendments (California Mechanical Code - Part 4, Title 24 CCR).
3. UPC and California Amendments (California Plumbing Code - Part 5, Title 24 CCR).
4. Uniform Fire Code with State Amendments (California Fire Code - Part 9, Title 24 CCR).
5. National Fire Protection Associations - National Fire Code.

D. Nothing in these drawings and specifications is to be construed to permit work in violation thereof. Ordinances, regulations and codes are to be construed as minimum requirements.

E. The responsibility of the Architect to conduct construction reviews of the Contractor's performance is not intended to include the adequacy of the Contractor's safety measures in, on, or near the construction site.

F. Ventilating, refrigeration and electrical equipment and appliances are required to be approved by the Underwriters' Laboratories, Inc., or other nationally recognized testing agency and installed per the testing agency's specifications.

1.08 PERMITS, FEES AND INSPECTIONS

A. Obtain and pay for all necessary permits, fees, assessments, complimentary drawings, required by any legally constituted public authorities having jurisdiction.

1.09 DRAWINGS AND SPECIFICATIONS

A. The Architect's decision will be final on interpretation of the Drawings and Specifications.

B. The Drawings and Specifications are complimentary. Any work called for on the Drawings and not mentioned in the Specifications, or vice versa, shall be performed as though fully set forth in both.

C. Piping, ductwork and other equipment shown as existing has been taken from the Owner's drawings. Contractor shall verify exact location in field before proceeding with the work.

D. Where codes, standards, drawings or specifications conflict, the most stringent shall prevail, unless prior approval for variance is obtained. Specific details on the drawings shall supercede the specification in the event of a conflict.

E. Alternate support or seismic detail shall have prior approval by the Architect; and the Contractor shall obtain agency approval without any additional cost or time to the contract and without any time penalty on the work schedule.

1.10 SUBMITTALS

A. Before starting work, the Contractor shall furnish for the approval of the Architect, Shop Drawings and Submitalls with Itemized Equipment Lists, complete in all details that they proposes to install. All items shall be submitted at the same time.

B. Submittals must be specific to this project with respect to model number, capacities, performance, etc., generic submittals will not be accepted.

C. Variations or deviations on submitted items from that specified must be clearly tagged and / or identified

D. Submittals shall include, but not necessarily be limited to the following which are mandatory:

1. Draw Equipment Layouts to ¼" scale, including equipment, piping accessories, and showing clearances for operating and servicing.
2. Schedule of pipe, fittings, valves, with manufacturer and catalog number.
3. Specialties, valves, gauges and thermometers of all types.
4. Foundations, supports, hangers, inserts.
5. Earthquake supports and calculations.
6. Insulation.
7. Ventilation and air conditioning equipment, specialties and the air control systems.
8. Fans, fan characteristic curves, fan tests.
9. Dampers, louvers, grilles, registers, diffusers.
10. Shop fabrication drawings and installation drawings of ductwork and piping layouts. Submit for approval prior to fabrication. Drawings shall indicate dimensions from bottom of piping and ductwork to finish floor level.
11. Wiring diagrams, control panel board, motor starters and controls for electrically operated equipment furnished by mechanical trades.
12. Automatic control system diagrams.
13. Exhaust, supply and return fans.
14. Access panels.
15. Hangers, inserts, supports, anchors.
16. Pipe, fittings and specialties.
17. Pipe isolators.
18. Sleeves, escutcheons, caulking, waterproofing, fireproofing.
19. Expansion joints, guides and anchors.
20. Shop fabrications drawings and calculations.
21. Special and miscellaneous products furnished under this section and not listed herein.

1.11 RECORD DRAWINGS AND MANUALS

A. Record Set During the Work: At site, maintain at least one set of Drawings as a Field Record Set. Also maintain at least one copy of all Addenda, Modifications, approved submittals, correspondence, and transmittals at site. Keep Drawings and data in good order and readily available to Architect and Owner.

B. Changes: Clearly and correctly mark Record Drawings to show changes made during the construction process at the time the changed work is installed. No such changes shall be made in the work unless authorized by the Architect.

C. Final Record Drawings: Conform to Division 01 requirements.

D. Preparation of Final Record Drawings: Contractor shall transfer recorded changes in the work indicated on the Field Record Set to the record set. Changes shall be neatly and clearly drawn and noted by skilled draftsmen, and shown technically correct.

E. Approval: Prior to Architect's inspection for Substantial Completion, submit the Final Record Drawings to the Architect for review, and make such revisions as may be necessary for Final Record Drawings to be a true, complete, and accurate record of the work.

F. Manuals: Obtain data from the various manufacturers and submit instruction, operation, and maintenance manuals as required and to the extent required under other Sections.

G. Contents: Each manual shall have an index listing the contents. Information in the manuals shall include not less than:

1. General introductions and overall equipment description, purpose, functions and simplified theory of operation.
2. Specifications
3. Installation instructions, procedures, sequences, and precautions, including tolerances for level, horizontal and vertical alignment.
4. Grouting requirements.
5. List showing lubricants for each item of mechanical equipment and recommended lubrication intervals.
6. Start-up and beginning operation procedures.
7. Operational procedures.
8. Shutdown procedures.
9. Maintenance and calibration procedures
10. Parts lists
11. Name, address and telephone number of each manufacturer's local representative.

H. Manual Submittals: Unless otherwise specified, each submittal shall include two copies of each manual, one of which will be returned to the Contractor, marked to show the required review. When approved, deliver four copies to Architect unless otherwise specified.

I. "As-Built" drawings of ductwork and piping, including all elbows, transitions, damper and valve locations shall be provided prior to commencement of air and water balance.

1.12 QUALITY OF EQUIPMENT, MATERIALS AND WORKMANSHIP

A. Unless otherwise specified, equipment and materials used in the installation shall be new and in perfect condition when installed. Articles provided for the same general purpose or use shall be of the same make. Workmanship shall be of the best quality and none but competent mechanics skilled in their trades shall be employed. Furnish the services of an experienced superintendent, who shall be constantly in charge of the work, together with all necessary journeymen, helpers and laborers required.

1.13 SEISMIC DESIGN

A. Contractor shall be responsible for anchors and connections of mechanical work to the building structure including calculations for approval by structural engineer or for approval by inspector of record, as applies, for items or work, where approval is deferred or where alternate support or anchorage detail is proposed to prevent damage as a result of an earthquake, including manufactured equipment, the connection and integrity of shop fabricated and field fabricated materials and equipment. The anchorage of all pipes, ducts, conduits, fixtures, equipment, etc. shall withstand the lateral forces and shall accommodate calculated building displacement as required by the California Building Code, and local city/county codes. (Building equipment and connections therefore shall be designed to resist lateral seismic forces equal to 1.0 of equipment weight to working allowable stress. Cantilever posts supporting equipment shall be designed to resist lateral seismic forces equal to 0.5 of equipment weight to allowable working stress. Conform to the following:

1. In accordance with Title 24, 2019 CBC Chapter 16A, details shall be provided for the seismic anchorage of all mechanical and electrical equipment, anchorage details shall be based upon appropriate design calculations.
2. For equipment weighing 400 pounds or more anchorage details and appropriate design calculations shall be submitted as part of the mechanical and electrical drawings. "Deferred Approval" items will not be permitted unless specifically approved by the plan check supervisor.
   a. Exception: Attachments of equipment weighting less than 400 pounds and supported directly on the floor or roof structure, furniture, or temporary or movable equipment and equipment weighing less than 20 pounds that is supported by vibration isolation devices suspended from the roof, wall or floor, need not be detailed on the plans provided the following notes are included on the mechanical and electrical plans.
3. The seismic anchorage of mechanical and electrical equipment shall conform to C.C.R. Title 24, 2019 CBC Chapter 16A. Anchorage details for roof/floor-mounted equipment shall be shown on plans.

1.14 SUBSTITUTIONS AND CHANGES

A. The design has been based on data from certain manufacturers, suitable for each application. Recommendations for alternative manufacturers are made for each product, except when "no substitutions permitted" is indicated.

B. It is the intent of the Owner to have this project constructed with materials, products and system originally designed and specified into the project.

C. Alternatives that may require the modification, realignment and/or adjustment of other associated components, including impact on other trades, shall be accomplished at no additional cost or time to the contract and shall have the approval of the Architect.

D. Substitutions shall be submitted addressing all features listed in the specifications. Features that deviate from the plans and specifications shall be clearly identified including justification for deviations. Design West Engineers will review initial submittal on substitutes only. Subsequent submittals made to correct deficiencies in original submittals will be reviewed at Contractor's expense based on Design West Engineer's hourly rate for engineering services.

E. Should the Contractor elect to propose substitutions for the Owner's interest, the substitutions shall be in compliance with Division 01.

1.15 APPROVALS

A. The Architect will have the right to accept or reject equipment, materials, workmanship, tests and determine when the Contractor has complied with the requirements herein specified.

1.16 SELECTION AND ORDERING OF EQUIPMENT AND MATERIALS

A. Immediately after award of the Contract and after the approval of submittals by the Architect, the Contractor shall arrange for the purchase and delivery of equipment and materials required, in ample quantities and at the proper time. He shall deliver to the Architect a complete list of equipment and materials ordered, giving descriptions, plate numbers, brochures, name of the wholesalers, date of the orders and approximate delivery dates.

1.17 LOCATIONS AND ACCESSIBILITY

A. Drawings show pipe and ductwork diagrammatically. Conform to Drawings as closely as possible in layout work. Vary run of piping, run and shape of ductwork and make offsets during progress of work as required to meet structural and other interferences as approved by Architect. Install piping and ductwork to best suit field conditions after coordinating with other trades. Run exposed piping and ductwork parallel to, or at right angle to, building walls. Keep horizontal lines as close to bottom of structures as possible. Conform to ceiling heights established on Drawings.

B. Install equipment in such a manner as to be readily accessible for maintenance and repairs. Install piping, ducts and conduit in such a manner as to preserve headroom, avoid obstructions and keep openings and passageways clear.

C. Installation at valves, thermometers, gauges, cleanouts, dampers, controls, steam and water specialties, duct access doors or any other indicating equipment or specialties requiring reading, adjustment, inspection, maintenance shall be conveniently and accessible located with reference to the finished building.

D. Where wall and ceiling access doors are required but not shown, such doors shall be furnished under other sections and as directed by the Architect. Coordinate this requirement with appropriate trade.

E. If changes in the indicated locations or arrangements are required, they shall be made without additional charges.

F. In an existing area, where required, remove, reinstall, reconnect or replace, etc., any existing work to accommodate new work without any additional cost to the Owner. Material shall match existing, unless otherwise specified or approved in writing by the Architect.

G. Provide sheaves and belts if required, to Test, Adjust and Balance Agency, to allow air moving equipment to meet flow requirements specified at no additional cost to the Owner.

1.18 COORDINATION OF TRADES

A. Contractor shall coordinate all trades in the interest of obtaining the most practical overall arrangement of equipment, piping, conduit, and ducts and to maintain maximum headroom and accessibility.

B. No extras will be allowed for changes made necessary by interference between trades.

C. Submit Composite Drawings in accordance with Special Conditions. Include dimensioned plans, elevations, sections and details and give complete information particularly as to the kinds and types of materials and equipment, size and location of sleeves, inserts, attachments, chases, openings, conduits, ducts, boxes, lighting, structural interferences. Coordinate these Composite Drawings and field layouts in the field for proper relationship to work of applicable trades based on field conditions. Contractor shall have competent personnel readily available for coordinating, checking, and supervision of field layouts. The procedures for submittals and resubmittals, and final distribution shall be as specified in Division 01. Do not start installation of work involved under Composite Drawings until the Architect reviews applicable submittal. Discrepancies between the Drawings and Composite Drawings shall be specifically noted and identified on the Composite Drawings. Drawings for the various trades involved shall be submitted as required and reviewed prior to preparation of Composite Drawings.
   1. Equipment Foundations and Bases: Furnish certified details and drawings for approval before fabrication. Furnish parts necessary for each foundation sub base and support.
   2. Pipe Sleeves and Inserts: Furnish and install pipe sleeves and pipe support inserts before concrete is poured.
   3. Roof, Wall and Floor Openings: Furnish Shop Drawings showing exact locations and sizes of openings through roofs, walls and floors.
   4. Concrete: Conform to Concrete Section of the Specifications.

1.19 GUARANTEES

A. Contractor shall guarantee workmanship, equipment and materials installed under his contract for a period of not less than one (1) year from the date of Substantial Completion. Should any defects occur during this period, the Contractor shall promptly repair or replace the defective item and any other damage caused to the building free of charge to the Owner, including cost of labor and materials.

B. Guarantee included in this section to cover:
   1. Faulty or inadequate design of equipment or material installed
   2. Improper assembly or erection
   3. Defective workmanship or material
   4. Incorrect or inadequate operation or other failure

C. He shall guarantee the complete and perfect operation of the entire system and that equipment will be supported in such a way as to be free of objectionable vibration and noise

D. Furnish the parts and labor to replace any items found to be defective in the refrigeration equipment with the guarantee period

E. In addition to other guarantees, furnish free maintenance for the refrigeration equipment, including replacement of refrigerant and oil, for a period of one (1) year. This shall include regular monthly maintenance and "On Call" service if required.

F. For equipment bearing a manufacturer's warranty in excess of one year, furnish a copy of the warranty to the Owner, who shall be named as beneficiary.

1.20 PROTECTION OF EQUIPMENT AND MATERIALS

A. Provide adequate storage facilities for equipment and materials on the site and shall make provisions to protect such materials and equipment from damage.

1.21 CLOSING-IN OF UNINSPECTED WORK

A. Contractor shall not allow or cause any of the work, specifically ductwork and piping, to be covered up or enclosed until it has been inspected, tested, and approved by the Architect. Should any of work be covered up or enclosed before such inspection and test, he shall at his own expense, uncover the work and after it has been inspected, tested, and approved, make repairs with such materials as may be necessary to restore work to its original and proper condition.

1.22 BUILDING FOOTING CLEARANCES

A. Under no circumstances shall pipes, ducts, or conduits penetrate footings. They shall cross below footings or through sleeves above footings. Those running parallel to footings shall have the minimum clearance from the cone of influence indicated on the Drawings or as required by Code.

1.23 DAMAGE BY LEAKS

A. Contractor shall be responsible for all damage to any part of the premises caused by rain leaks through or around ducts or pipes, leaks or breaks in piping, equipment or fixtures furnished or installed by him for a period of one (1) year from the date of Substantial Completion.

1.24 EQUIPMENT LABELS

A. Equipment provided under this Section shall be provided with the manufacturer's metal identification labels attached to each individual piece of equipment showing complete performance characteristics, size, model and serial number.

1.25 EXCAVATION, TRENCHING AND BACKFILLING

A. Excavating, trenching and backfilling for utilities within the building area shall be done in conformity with Division 2 - Sitework. Piping shall be installed promptly after excavation in order to keep the trenches open as short a time as possible.

B. Excavating, trenching and backfilling for utilities outside the building area shall be done in conformity with Division 2 - Site work.

C. Any existing underground piping and conduit that is encountered shall be properly shored and protected from damage. Active piping shall be left intact and undamaged.

1.26 PRELIMINARY OPERATION

A. Should the Owner request that any portion of the plant, apparatus, or equipment be operated for the Owner's beneficial use prior to the final completion and acceptance of the work, the Contractor shall conform to Beneficial Occupancy Provisions of the General Conditions. Such operation shall be under the supervision and direction of the Contractor. Such preliminary operation shall not be construed as an acceptance of any of the work.

1.27 ELECTRICAL WORK

A. Coordinate with Division 16 in making the line and low voltage electrical connections and be responsible for the operation of the equipment furnished under this section.

B. Voltage for electrical work will be included in Division 26. However, any control wiring which is required that is not shown on the control diagram shall be as described under this Section. In the event that the Contractor chooses to provide equipment that requires extra expense in the power or control wiring, he shall pay additional electrical costs.

C. Safety switches, starters, circuit breakers, unless provided as a portion of package equipment, and the electrical connections of mechanical equipment to the electrical power service shall be provided under Division 26.

D. Interconnecting wiring, safety switches, relays, controllers and motor starters which are integral components of packaged equipment shall be provided as an integral part of that equipment.

E. All interconnecting power wiring and conduits shall be provided by Division 26.

F. Control wiring shall be provided by Division 23, unless otherwise indicated on the drawings.

G. Conduit for control wiring shall be provided by Division 26.

END OF SECTION

SECTION 23 0529

HANGERS AND SUPPORTS

PART 1 - GENERAL

1.01 SUMMARY

A. This Section includes the following hangers and supports for mechanical system piping and equipment:
   1. Steel pipe hangers and supports.
   2. Trapeze pipe hangers.
   3. Thermal-hanger shield inserts.
   4. Fastener systems.
   5. Pipe stands.
   6. Pipe positioning systems.

B. Related Sections include the following:
   1. Division 05 for structural-steel shapes and plates for trapeze hangers for pipe and equipment supports.
   2. Division 21 Section "Fire-Suppression Piping" for pipe hangers for fire-protection piping.
   3. Division 23 Section "Mechanical Vibration and Seismic Controls" for vibration isolation devices.
   4. Division 23 Section "Pipe Expansion Fittings and Loops" for flexible pipe..
   5. Division 23 Section "Metal Ducts" for duct hangers and supports.

1.02 DEFINITIONS

A. MSS: Manufacturers Standardization Society for The Valve and Fittings Industry Inc.

B. Terminology: As defined in MSS SP-90, "Guidelines on Terminology for Pipe Hangers and Supports."

1.03 PERFORMANCE REQUIREMENTS

A. Design supports for multiple pipes, including pipe stands, capable of supporting combined weight of supported systems, system contents, and test water.

B. Design equipment supports capable of supporting combined operating weight of supported equipment and connected systems and components.

C. Design seismic-restraint hangers and supports for piping and equipment and obtain approval from authorities having jurisdiction.

1.04 SUBMITTALS

A. Product Data: For the following:
   1. Steel pipe hangers and supports.
   2. Thermal-hanger shield inserts.
   3. Powder-actuated fastener systems. Not allowed for this project.
   4. Pipe positioning systems.

B. Shop Drawings: Signed and sealed by a qualified professional engineer. Show fabrication and installation details and include calculations for the following:
   1. Trapeze pipe hangers. Include Product Data for components.
   2. Metal framing systems. Include Product Data for components.
   3. Pipe stands. Include Product Data for components.
   4. Equipment supports.

C. Welding and brazing certificates.

1.05 QUALITY ASSURANCE

A. Welding: Qualify procedures and personnel according to AWS D1.1, "Structural Welding Code--Steel." ASME Boiler and Pressure Vessel Code: Section IX.

B. Welding: Qualify procedures and personnel according to the following:
   1. AWS D1.1, "Structural Welding Code--Steel."
   2. ASME Boiler and Pressure Vessel Code: Section IX.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:

1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, manufacturers specified.

2.02 STEEL PIPE HANGERS AND SUPPORTS

A. Description: MSS SP-58, Types 1 through 58, factory-fabricated components. Refer to Part 3 "Hanger and Support Applications" Article for where to use specific hanger and support types.

B. Galvanized, Metallic Coatings: Pre-galvanized or hot dipped.

C. Nonmetallic Coatings: Plastic coating, jacket, or liner.

D. Padded Hangers: Hanger with fiberglass or other pipe insulation pad or cushion for support of bearing surface of piping.

2.03 TRAPEZE PIPE HANGERS

A. Description: MSS SP-69, Type 59, shop- or field-fabricated pipe-support assembly made from structural-steel shapes with MSS SP-58 hanger rods, nuts, saddles, and U-bolts.

2.04 THERMAL-HANGER SHIELD INSERTS

A. Description: 100-psig-minimum, compressive-strength insulation insert encased in sheet metal shield.

B. Insulation-Insert Material for Cold Piping: Water-repellent treated, ASTM C 533, Type I calcium silicate or ASTM C 552, Type II cellular glass with vapor barrier.

C. Insulation-Insert Material for Hot Piping: Water-repellent treated, ASTM C 533, Type I calcium silicate or ASTM C 552, Type II cellular glass.

D. For Trapeze or Clamped Systems: Insert and shield shall cover entire circumference of pipe.

E. For Clevis or Band Hangers: Insert and shield shall cover lower 180 degrees of pipe.

F. Insert Length: Extend 2 inches beyond sheet metal shield for piping operating below ambient air temperature.

2.05 FASTENER SYSTEMS

A. Mechanical-Expansion Anchors: Insert-wedge-type stainless steel, for use in hardened portland cement concrete with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.

1. Before Installation: Verify suitability for use in lightweight concrete or concrete slabs less than 4 inches thick with project structural engineer.

2.06 PIPE STAND FABRICATION

A. Pipe Stands, General: Shop or field-fabricated assemblies made of manufactured corrosion-resistant components to support roof-mounted piping.

1. Submit: Calculations and details of each pipe stand unit.
2. Available Manufacturer: MIRO Industries.

B. Compact Pipe Stand: One-piece plastic unit with integral-rod-roller, pipe clamps, or V-shaped cradle to support pipe, for roof installation without membrane penetration.

C. Low-Type, Single-Pipe Stand: One-piece stainless-steel base unit with plastic roller, for roof installation without membrane penetration.

D. High-Type, Single-Pipe Stand: Assembly of base, vertical and horizontal members, and pipe support, for roof installation without membrane penetration.

1. Base: Stainless steel.
2. Vertical Members: Two or more cadmium-plated-steel or stainless-steel, continuous-thread rods.
3. Horizontal Member: Cadmium-plated-steel or stainless-steel rod with plastic or stainless-steel, roller-type pipe support.

E. High-Type, Multiple-Pipe Stand: Assembly of bases, vertical and horizontal members, and pipe supports, for roof installation without membrane penetration.
   1. Available Manufacturer: Portable Pipe Hangers.
   2. Bases: One or more plastic.
   3. Vertical Members: Two or more protective-coated-steel channels.
   4. Horizontal Member: Protective-coated-steel channel.
   5. Pipe Supports: Galvanized-steel, clevis-type pipe hangers.

F. Curb-Mounting-Type Pipe Stands: Shop- or field-fabricated pipe support made from structural-steel shape, continuous-thread rods, and rollers for mounting on permanent stationary roof curb.

2.07 PIPE POSITIONING SYSTEMS

A. Description: IAPMO PS 42, system of metal brackets, clips, and straps for positioning piping in pipe spaces for plumbing fixtures for commercial applications.

B. Available Manufacturer: HOLDRITE Corp.; Hubbard Enterprises.

2.08 MISCELLANEOUS MATERIALS

A. Structural Steel: ASTM A 36/A 36M, steel plates, shapes, and bars; black and galvanized.

B. Grout: ASTM C 1107, factory-mixed and -packaged, dry, hydraulic-cement, nonshrink and nonmetallic grout; suitable for interior and exterior applications.
   1. Properties: Non-staining, non-corrosive, and nongaseous.
   2. Design Mix: 5000-psi, 28-day compressive strength.

PART 3 - EXECUTION

3.01 HANGER AND SUPPORT APPLICATIONS

A. Specific hanger and support requirements are specified in Sections specifying piping systems and equipment.

B. Comply with MSS SP-69 for pipe hanger selections and applications that are not specified in piping system Sections.

C. Use hangers and supports with galvanized, metallic coatings for piping and equipment that will not have field-applied finish.

D. Use nonmetallic coatings on attachments for electrolytic protection where attachments are in direct contact with copper tubing.

E. Use padded hangers for bare piping for noise abatement.

F. Piping shall be concealed in chases, partitions, walls, and between floors, unless otherwise directed or specifically noted on Drawings. When penetrating wood studs, joists, and other wood members, provide such members with reinforcement steel straps of Kees Protecta-Plate.

G. For fastening to wood ceilings, beams, or joists, furnish Grinnell figure 128 or 202 pipe hanger flange fastened with drive screws. Under wood floors, 3/8 inch hanger rods shall be hung from 2 inch x 2 inch x 1/4 inch angle clips 3 inches long, with 2 staggered 10d nails, clinched over joist.

H. Horizontal-Piping Hangers and Supports: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
   1. Adjustable, Steel Clevis Hangers (MSS Type 1): For suspension of non-insulated or insulated stationary pipes.
   2. Yoke-Type Pipe Clamps (MSS Type 2): For suspension of 120 to 450 deg F pipes, NPS 4 and larger, requiring up to 4 inches of insulation.
   3. Carbon- or Alloy-Steel, Double-Bolt Pipe Clamps (MSS Type 3): For suspension of pipes, requiring clamp flexibility and up to 4 inches of insulation.
   4. Steel Pipe Clamps (MSS Type 4): For suspension of cold and hot pipes, if little or no insulation is required.
   5. Pipe Hangers (MSS Type 5): For suspension of pipes, NPS 1/2 to NPS 4, to allow off-center closure for hanger installation before pipe erection.

6. Adjustable Swivel Split- or Solid-Ring Hangers (MSS Type 6): For suspension of non-insulated stationary pipes, NPS 3/4 to NPS 8.
7. Adjustable, Steel Band Hangers (MSS Type 7): For suspension of non-insulated stationary pipes, NPS 1/2 to NPS 8.
8. Adjustable Band Hangers (MSS Type 9): For suspension of non-insulated stationary pipes, NPS 1/2 to NPS 8.
9. Adjustable Swivel-Ring Band Hangers (MSS Type 10): For suspension of non-insulated stationary pipes, NPS 1/2 to NPS 2.
10. Split Pipe-Ring with or without Turnbuckle-Adjustment Hangers (MSS Type 11): For suspension of non-insulated stationary pipes, NPS 3/8 to NPS 8.
11. Extension Hinged or 2-Bolt Split Pipe Clamps (MSS Type 12): For suspension of non-insulated stationary pipes, NPS 3/8 to NPS 3.
12. U-Bolts (MSS Type 24): For support of heavy pipes, NPS 1/2 and larger.
13. Clips (MSS Type 26): For support of insulated pipes not subject to expansion or contraction.
14. Pipe Saddle Supports (MSS Type 36): For support of pipes, NPS 4 and larger, with steel pipe base stanchion support and cast-iron floor flange.
15. Pipe Stanchion Saddles (MSS Type 37): For support of pipes, NPS 4 and larger, with steel pipe base stanchion support and cast-iron floor flange and with U-bolt to retain pipe.
16. Adjustable Pipe Saddle Supports (MSS Type 38): For stanchion-type support for pipes, if vertical adjustment is required, with steel pipe base stanchion support and cast-iron floor flange.

I. Vertical-Piping Clamps: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
1. Extension Pipe or Riser Clamps (MSS Type 8): For support of pipe risers.
2. Carbon- or Alloy-Steel Riser Clamps (MSS Type 42): For support of pipe risers, if longer ends are required for riser clamps.

J. Hanger-Rod Attachments: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
1. Steel Turnbuckles (MSS Type 13): For adjustment up to 6 inches for heavy loads.
2. Steel Clevises (MSS Type 14): For 120 to 450 deg F piping installations.
3. Swivel Turnbuckles (MSS Type 15): For use with MSS Type 11, split pipe rings.
4. Malleable-Iron Sockets (MSS Type 16): For attaching hanger rods to various types of building attachments.
5. Steel Weldless Eye Nuts (MSS Type 17): For 120 to 450 deg F piping installations.

K. Building Attachments: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
1. Welded-Steel Brackets: For support of pipes from below, or for suspending from above by using clip and rod. Use one of the following for indicated loads:
   a. Light (MSS Type 31): 750 lb.
   b. Medium (MSS Type 32): 1500 lb.
   c. Heavy (MSS Type 33): 3000 lb.
2. Side-Beam Brackets (MSS Type 34): For sides of wooden beams.

L. Saddles and Shields: Unless otherwise indicated and except as specified in piping system Sections, install the following types:
1. Steel Pipe-Covering Protection Saddles (MSS Type 39): To fill interior voids with insulation that matches adjoining insulation.
2. Protection Shields (MSS Type 40): Of length recommended in writing by manufacturer to prevent crushing insulation.
3. Thermal-Hanger Shield Inserts: For supporting insulated pipe.

M. Comply with MSS SP-69 for trapeze pipe hanger selections and applications that are not specified in piping system Sections.

N. Comply with MFMA-102 for metal framing system selections and applications that are not specified in piping system Sections.

O. Use mechanical-expansion anchors instead of building attachments where required in concrete construction.

P. Use pipe-positioning systems in pipe spaces behind plumbing fixtures to support supply and waste piping for plumbing fixtures.

3.02 HANGER AND SUPPORT INSTALLATION

A. Steel Pipe Hanger Installation: Comply with MSS SP-69 and MSS SP-89. Install hangers, supports, clamps, and attachments as required to properly support piping from building structure.

B. Trapeze Pipe Hanger Installation: Comply with MSS SP-69 and MSS SP-89. Arrange for grouping of parallel runs of horizontal piping and support together on field-fabricated trapeze pipe hangers.
1. Each trapeze pipe hanger requires submittal of calculations and details.
2. Pipes of Various Sizes: Support together and space trapezes for smallest pipe size or install intermediate supports for smaller diameter pipes as specified above for individual pipe hangers.
3. Field fabricate from ASTM A 36/A 36M, steel shapes selected for loads being supported. Weld steel according to AWS D1.1.

C. Metal Framing System Installation: Arrange for grouping of parallel runs of piping and support together on field-assembled metal framing systems.
1. Each metal framing system requires submittal of calculations and details.

D. Thermal-Hanger Shield Installation: Install in pipe hanger or shield for insulated piping.

E. Fastener System Installation:
1. Install mechanical-expansion anchors in concrete after concrete is placed and completely cured. Install fasteners according to manufacturer's written instructions.

F. Pipe Stand Installation:
1. Each pipe stand in requires submittal of calculations and details.
2. Pipe Stand Types except Curb-Mounting Type: Assemble components and mount on smooth roof surface. Do not penetrate roof membrane.
3. Curb-Mounting-Type Pipe Stands: Assemble components or fabricate pipe stand and mount on permanent, stationary roof curb. Refer to Division 07 for curbs specifications.

G. Pipe Positioning System Installation: Install support devices to make rigid supply and waste piping connections to each plumbing fixture. Refer to Division 22 Section "Plumbing Fixtures" for plumbing fixtures.

H. Install hangers and supports complete with necessary inserts, bolts, rods, nuts, washers, and other accessories.

I. Equipment Support Installation: Fabricate from welded-structural-steel shapes.
1. Each equipment support requires submittal of calculations and details.

J. Install hangers and supports to allow controlled thermal and seismic movement of piping systems, to permit freedom of movement between pipe anchors, and to facilitate action of expansion joints, expansion loops, expansion bends, and similar units.

K. Install lateral bracing with pipe hangers and supports to prevent swaying.

L. Install building attachments. Install additional attachments at concentrated loads, including valves, flanges, and strainers, NPS 2-1/2 and larger and at changes in direction of piping.

M. Load Distribution: Install hangers and supports so piping live and dead loads and stresses from movement will not be transmitted to connected equipment.

N. Pipe Slopes: Install hangers and supports to provide indicated pipe slopes and so maximum pipe deflections allowed by ASME B31.1 (for power piping) and ASME B31.9 (for building services piping) are not exceeded.

O. Insulated Piping: Comply with the following:
1. Attach clamps and spacers to piping.
a. Piping Operating above Ambient Air Temperature: Clamp may project through insulation.
b. Piping Operating below Ambient Air Temperature: Use thermal-hanger shield insert with clamp sized to match OD of insert.

c. Do not exceed pipe stress limits according to ASME B31.1 for power piping and ASME B31.9 for building services piping.

2. Install MSS SP-58, Type 39, protection saddles if insulation without vapor barrier is indicated. Fill interior voids with insulation that matches adjoining insulation.
   a. Option: Thermal-hanger shield inserts may be used. Include steel weight-distribution plate for pipe NPS 4 and larger if pipe is installed on rollers.
3. Install MSS SP-58, Type 40, protective shields on cold piping with vapor barrier. Shields shall span an arc of 180 degrees.
   a. Option: Thermal-hanger shield inserts may be used. Include steel weight-distribution plate for pipe NPS 4 and larger if pipe is installed on rollers.
4. Shield Dimensions for Pipe: Not less than the following:
   a. NPS 1/4 to NPS 3-1/2: 12 inches long and 0.048 inch thick.
   b. NPS 4: 12 inches long and 0.06 inch thick.
   c. NPS 5 and NPS 6: 18 inches long and 0.06 inch thick.
   d. NPS 8 to NPS 14: 24 inches long and 0.075 inch thick.
5. Pipes NPS 8 and Larger: Include wood inserts.
6. Insert Material: Length at least as long as protective shield.
7. Thermal-Hanger Shields: Install with insulation same thickness as piping insulation.

3.03 METAL FABRICATIONS

A. Cut, drill, and fit miscellaneous metal fabrications for trapeze pipe hangers and equipment supports.

B. Fit exposed connections together to form hairline joints. Field weld connections that cannot be shop welded because of shipping size limitations.

C. Field Welding: Comply with AWS D1.1 procedures for shielded metal arc welding, appearance and quality of welds, and methods used in correcting welding work, and 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. Finish welds at exposed connections so no roughness shows after finishing and contours of welded surfaces match adjacent contours.

3.04 ADJUSTING

A. Hanger Adjustments: Adjust hangers to distribute loads equally on attachments and to achieve indicated slope of pipe.

B. Trim excess length of continuous-thread hanger and support rods to 1-1/2 inches.

3.05 PAINTING

A. Touch Up: Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint on miscellaneous metal are specified in Division 09.

B. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint to comply with ASTM A 780.

END OF SECTION

SECTION 23 05 53
IDENTIFICATION FOR HVAC PIPING AND EQUIPMENT

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Nameplates.

B. Pipe markers.

C. Ceiling tacks.

1.2 REFERENCE STANDARDS

A. ASME A13.1 – Scheme for the Identification of Piping Systems; 2007.

B. ASTM D709 – Standard Specification for Laminated Thermosetting Materials; 2013.

1.3 SUBMITTALS

A. See Division 1 for submittal procedures.

B. List: Submit list of wording, symbols, letter size, and color coding for mechanical identification.

PART 2 PRODUCTS

2.1 IDENTIFACTION APPLICATIONS

A. Air Handling Units: Nameplates.

B. Fans: Nameplates or Outdoor rated label.

C. Dampers: Ceiling tacks, where located above lay-in ceiling.

D. Piping: Pipe markers.

E. Thermostats: Nameplates.

2.2 NAMEPLATES

A. Nameplates:

1. Letter Color: White.
2. Letter Height: 1/4 Inch.
3. Background Color: Black.
4. Plastic: Conform to ASTM D709.

2.3 PIPE MARKERS

A. Plastic Pipe Markers: Factory fabricated, flexible, semi-rigid plastic, preformed to fit around pipe or pipe covering; minimum information indicated flow direction arrow and identification of fluid being conveyed.

B. Plastic Tape Pipe Markers: Flexible, vinyl film tape with pressure sensitive adhesive backing and printed markings.

2.4 CEILING TACKS

A. Description: Steel with ¾ inch diameter color coded head.

B. Color code as follows:

1. HVAC Equipment: Yellow.
2. Fire Dampers and Smoke Dampers: Red.
3. Heating/Cooling Valves: Blue.

PART 3 EXECUTION

3.1 PREPARATION

A. Degrease and clean surfaces to receive adhesive for identification materials.

3.2 INSTALLATION

A. Install nameplates with corrosive-resistant mechanical fasteners or adhesive. Apply with sufficient adhesive to ensure permanent adhesion and seal with clear lacquer.

B. Install plastic pipe markers in accordance with manufacturer's instructions.

C. Install plastic tape pipe markers complete around pipe in accordance with manufacturer's instructions.

D. Locate ceiling tacks to locate valves or dampers above lay-in panel ceilings. Locate in corner of panel closest to equipment.

END OF SECTION

SECTION 23 05 93

TESTING, ADJUSTING, AND BALANCING FOR HVAC

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Testing, adjustment, and balancing of air systems.

B. Testing, adjustment, and balancing of hydronic, steam, and refrigerating systems.

1.2 REFERENCE STANDARDS

A. AABC (NSTSB) - AABC National Standards for Total System Balance, 7th Edition; 2016.

B. ASHRAE Std 110 - Methods of Testing Performance of Laboratory Fume Hoods; 2016.

C. ASHRAE Std 111 - Measurement, Testing, Adjusting, and Balancing of Building HVAC Systems; 2008.

1.3 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. See Division 1 for submittal procedures.

C. TAB Plan: Submit a written plan indicating the testing, adjusting, and balancing standard to be followed and the specific approach for each system and component.
   1. Submit to Engineer.
   2. Submit six weeks prior to starting the testing, adjusting, and balancing work.
   3. Include at least the following in the plan:
      a. List of all air flow, water flow, sound level, system capacity and efficiency measurements to be performed and a description of specific test procedures, parameters, formulas to be used.
      b. Copy of field checkout sheets and logs to be used, listing each piece of equipment to be tested, adjusted and balanced with the data cells to be gathered for each.
      c. Discussion of what notations and markings will be made on the duct and piping drawings during the process.
      d. Final test report forms to be used.
      e. Procedures for formal deficiency reports, including scope, frequency and distribution.

D. Control System Coordination Reports: Communicate in writing to the controls installer all setpoint and parameter changes made or problems and discrepancies identified during TAB that affect, or could affect, the control system setup and operation.

E. Final Report: Indicate deficiencies in systems that would prevent proper testing, adjusting, and balancing of systems and equipment to achieve specified performance.
   1. Revise TAB plan to reflect actual procedures and submit as part of final report.
   2. Submit draft copies of report for review prior to final acceptance of Project. Provide final copies for Engineer and for inclusion in operating and maintenance manuals.
   3. Include actual instrument list, with manufacturer name, serial number, and date of calibration.
   4. Form of Test Reports: Where the TAB standard being followed recommends a report format use that; otherwise, follow ASHRAE Std 111.
   5. Units of Measure: Report data in I-P (inch-pound) units only.
   6. Include the following on the title page of each report:
      a. Name of Testing, Adjusting, and Balancing Agency.
      b. Address of Testing, Adjusting, and Balancing Agency.
      c. Telephone number of Testing, Adjusting, and Balancing Agency.
      d. Project name.
      e. Project location.
      f. Project Engineer.
      g. Project Engineer.
      h. Project Contractor.
      i. Project altitude.
      j. Report date.

PART 2 PRODUCTS

2.1 GENERAL REQUIREMENTS

A. Test Instruments:
1. Balancing Contractor shall provide all necessary test instruments required to take readings including, but not limited to: Pressure gauges, thermometers, humidity instruments, sling psychrometers, flow meter read out instruments (differential pressure gauges, etc.), air flow hoods, pitot tubes, anemometers, ammeters, voltmeters, tachometers, sound level meters, vibration analyzers, etc., as required to perform measurements required to perform the work of this section and applicable Commissioning specifications provided by commissioning agent. These instruments are considered to be the property of the balancing contractor and required for usual performance of testing and balancing work. No allowance will be made for contractor's failure to provide adequate test instruments.

B. Incidental Equipment and Materials:
1. Balancing Contractor shall provide at his own expense incidental and/or temporary equipment required to make such readings as required for the performance of this work. Such incidentals include but are not limited to: pipe nipples, couplings, tees, elbows, plugs and caps, gauge valves, teflon tape, and other miscellaneous fittings required to make readings required for balancing work. Incidental materials and fittlings shall be removed and the facility restored to 'as found' condition after completion of readings and balancing activities.

C. Tools and Labor:
1. Balancing Contractor shall provide all tools and labor required to effect necessary readings for balancing work, including but not limited to electric drill and bits, wrenches, pliers, screwdrivers, teflon tape, flashlights, rags, pocket knife or leatherman, pencils, pens, test forms, paper, and other minor tools required for work of this section.
2. Provide labor to alter minor piping and other systems to allow temporary installation of test gages and thermometers, etc., required to make necessary readings. This includes removal of plugs on pump castings and temporary installation of piping, valves, gauges and nipples required to attach pressure gauges for readings, drilling required holes in ductwork and subsequent installation of plugs to allow ductwork pitot tube traverses, connections to flow elements, including a reasonable effort to clear obstructions from test ports, etc. Remove temporary fittings, valves and gauges at completion of readings and restore equipment to 'as found' condition.

PART 3 EXECUTION

3.1 GENERAL REQUIREMENTS

A. Perform total system balance in accordance with one of the following:
1. AABC (NSTSB), AABC National Standards for Total System Balance.

B. Begin work after completion of systems to be tested, adjusted, or balanced and complete work prior to Substantial Completion of the project.

C. TAB Agency Qualifications:
1. Company specializing in the testing, adjusting, and balancing of systems specified in this section.
2. Having minimum of three years documented experience.

3. Certified by one of the following:
a. AABC, Associated Air Balance Council: www.aabc.com/#sle; upon completion submit AABC National Performance Guaranty.

3.2 EXAMINATION

A. Verify that systems are complete and operable before commencing work. Ensure the following conditions:
1. Systems are started and operating in a safe and normal condition.
2. Temperature control systems are installed complete and operable.
3. Proper thermal overload protection is in place for electrical equipment.
4. Final filters are clean and in place. If required, install temporary media in addition to final filters.
5. Duct systems are clean of debris.
6. Fans are rotating correctly.
7. Fire and volume dampers are in place and open.
8. Air coil fins are cleaned and combed.
9. Access doors are closed and duct end caps are in place.
10. Air outlets are installed and connected.

11. Duct system leakage is minimized.
12. Hydronic systems are flushed, filled, and vented.
13. Pumps are rotating correctly.
14. Proper strainer baskets are clean and in place.
15. Service and balance valves are open.

B. Submit field reports. Report defects and deficiencies that will or could prevent proper system balance.

C. Beginning of work means acceptance of existing conditions.

3.3 PREPARATION

A. Provide instruments required for testing, adjusting, and balancing operations. Make instruments available to Engineer to facilitate spot checks during testing.

B. Provide additional balancing devices as required.

3.4 RECORDING AND ADJUSTING

A. Ensure recorded data represents actual measured or observed conditions.

B. Permanently mark settings of valves, dampers, and other adjustment devices allowing settings to be restored. Set and lock memory stops.

C. After adjustment, take measurements to verify balance has not been disrupted or that such disruption has been rectified.

D. Leave systems in proper working order, replacing belt guards, closing access doors, closing doors to electrical switch boxes, and restoring thermostats to specified settings.

3.5 AIR SYSTEM PROCEDURE

A. After systems are balanced, work with the controls contractor to determine optimal final setpoint of fan system static pressure controls. Final setpoint shall be determined by supplying design airflow to all zones with no boxes throttling.

B. Adjust air handling and distribution systems to provide required or design supply, return, and exhaust air quantities at site altitude.

C. Measure air quantities at air inlets and outlets.

3.6 SCOPE

A. Test, adjust, and balance the following:
1. Air Handling Units/Fan Coils
2. Air Terminal Units/Mixing Boxes
3. Air Inlets and Outlets.
4. Exhaust Fans

3.7 MINIMUM DATA TO BE REPORTED

A. Electric Motors:
1. Manufacturer.
2. Model/Frame.
3. HP/BHP.
4. Phase, voltage, amperage; nameplate, actual, no load.
5. RPM.

B. Air Moving Equipment:
1. Location.
2. Manufacturer.
3. Model number.
4. Serial number.
5. Air flow, specified and actual.
6. Return air flow, specified and actual.
7. Outside air flow, specified and actual.
8. Total static pressure (total external), specified and actual.

C. Return Air/Outside Air:

1. Identification/location.
2. Design air flow.
3. Actual air flow.

D. Terminal Unit Data:
1. Manufacturer.
2. Type, constant, variable, single, dual duct.
3. Identification/number.
4. Location.
5. Model number.
6. Size.
7. Minimum static pressure.
8. Minimum design air flow.
9. Maximum design air flow.
10. Maximum actual air flow.

E. Air Distribution Tests:
1. Air terminal number.
2. Room number/location.
3. Terminal type.
4. Terminal size.
5. Percent of design air flow.

END OF SECTION

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SECTION 23 07 13
DUCT INSULATION

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Duct insulation.

B. Duct liner.

1.2 REFERENCE STANDARDS

A. ASTM C518 - Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus; 2010.

B. ASTM C553 - Standard Specification for Mineral Fiber Blanket Thermal Insulation for Commercial and Industrial Applications;2013.

C. ASTM C612 - Standard Specification for Mineral Fiber Block and Board Thermal Insulation; 2014.

D. ASTM C916 - Standard Specification for Adhesives for Duct Thermal Insulation; 2014.

E. ASTM C1071 - Standard Specification for Fibrous Glass Duct Lining Insulation (Thermal and Sound Absorbing Material);2012.

F. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2015a.

G. ASTM G21 - Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi; 2015.

H. SMACNA (DCS) - HVAC Duct Construction Standards Metal and Flexible; 2005.

I. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials; Current Edition, Including AllRevisions.

1.3 DELIVERY, STORAGE,AND HANDLING

A. Accept materials on site in original factory packaging, labelled with manufacturer's identification, including product density andthickness.

B. Protect insulation from weather and construction traffic, dirt, water, chemical, and mechanical damage, by storing in original wrapping.

PART 2 PRODUCTS

2.1 REGULATORY REQUIREMENTS

A. Surface Burning Characteristics: Flame spread index/Smoke developed index of 25/50, maximum, when tested in accordance with ASTM E84 or UL 723.

2.2 GLASS FIBER, FLEXIBLE

A. Manufacturer:
   1. Owens Corning Corporation: www.ocbuildingspec.com/#sle.
   2. Johns Manville: www.jm.com

B. Insulation: ASTM C553; flexible, noncombustible blanket.
   1. 'K' value: 0.31 at 75 degrees F, when tested in accordance with ASTM C518.
   2. Maximum Water Vapor Absorption: 5.0 percent byweight.

C. Vapor Barrier Jacket:
   1. Kraft paper with glass fiber yarn and bonded to aluminized film.
   2. Secure with pressure sensitivetape.

D. Vapor Barrier Tape:
   1. Kraft paper reinforced with glass fiber yarn and bonded to aluminized film, with pressure sensitive rubber-basedadhesive.

2.3 GLASS FIBER, RIGID

A. Insulation: ASTM C612; rigid, noncombustible blanket.

1. 'K' Value: 0.24 at 75 degrees F, when tested in accordance with ASTM C518.
2. Maximum Service Temperature: 450 degrees F.
3. Maximum Water Vapor Absorption: 5.0 percent.
4. Minimum Noise Reduction Criteria: Per ASTM C423 0.7 for 1 inch thickness.

B. Vapor Barrier Jacket:
1. Kraft paper with glass fiber yarn and bonded to aluminized film.
2. Secure with pressure sensitive tape.

2.4 DUCT LINER

A. Insulation: Duct liner not allowed under normal circumstances. Contractor to notify engineer and owner in situations where exterior duct insulation would not work properly.

2.5 CELLULAR FOAM DUCT LINER,FLEXIBLE

A. Manufacturer: Armstrong Model AP Armaflex SA, Enviro-Tec or equal.

B. Insulation: Duct liner not allowed under normal circumstances. Contractor to notify engineer and owner in situations where exterior duct insulation would not work properly.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that ducts have been tested before applying insulation materials.

B. Verify that surfaces are clean, foreign material removed, and dry.

3.2 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Install in accordance with NAIMA National Insulation Standards.

C. Insulated ducts conveying air below ambient temperature:
1. Provide insulation with vapor barrier jackets.
2. Finish with tape and vapor barrier jacket.
3. Continue insulation through walls, sleeves, hangers, and other duct penetrations.
4. Insulate entire system including fittings, joints, flanges, fire dampers, flexible connections, and expansion joints.

D. Insulated ducts conveying air above ambient temperature:
1. Provide with or without standard vapor barrier jacket.
2. Insulate fittings and joints. Where service access is required, bevel and seal ends of insulation.

E. Ducts Exposed in Mechanical Equipment Rooms or Finished Spaces (below 10 feet above finished floor): Finish with canvas jacket sized for finish painting.

F. External Duct Insulation Application:
1. Secure insulation with vapor barrier with wires and seal jacket joints with vapor barrier adhesive or tape to match jacket.
2. Secure insulation without vapor barrier with staples, tape, or wires.
3. Install without sag on underside of duct. Use adhesive or mechanical fasteners where necessary to prevent sagging. Lift duct off trapeze hangers and insert spacers.
4. Seal vapor barrier penetrations by mechanical fasteners with vapor barrier adhesive.
5. Stop and point insulation around access doors and damper operators to allow operation without disturbing wrapping.

G. Duct and Plenum Liner Application:
1. Adhere insulation with adhesive for 90 percent coverage.
2. Secure insulation with mechanical liner fasteners. Refer to SMACNA (DCS) for spacing.
3. Seal and smooth joints. Seal and coat transverse joints.
4. Seal liner surface penetrations with adhesive.
5. Duct dimensions indicated are net inside dimensions required for air flow. Increase duct size to allow for insulation thickness.

3.3 SCHEDULES

A. Required Thickness: Insulation thickness shall be selected to provide the following R-values:
1. Ducts on exterior of building or other unconditioned spaces: R-8

a. For maximum K-values as specified herein:
   1) Glass Fiber, Flexible: K = 0.31; Minimum thickness =3"
   2) Glass Fiber, Rigid: K = 0.25; Minimum thickness =2"
   3) Glass Fiber Duct Liner, Flexible: K = 0.27; Minimum thickness = 1"
   4) Glass Fiber Duct Liner, Rigid: K = 0.23; Minimum thickness = 1-1/2"
   5) Glass Fiber Round Duct Liner: K = 0.23; Minimum thickness = 1-1/2"
   6) Cellular Foam Duct Liner, Flexible: K = 0.27; Minimum thickness = 1"

2. Ducts interior to building, not in a directly conditioned space: R-4.2
   a. For maximum K-values as specified herein:
      1) Glass Fiber, Flexible: K = 0.29; Minimum thickness = 1-1/2"
      2) Glass Fiber, Rigid: K = 0.24; Minimum thickness =1"
      3) Glass Fiber Duct Liner, Flexible: K = 0.27; Minimum thickness = 1"
      4) Glass Fiber Duct Liner, Rigid: K = 0.23; Minimum thickness = 1"
      5) Glass Fiber Round Duct Liner: K = 0.23; Minimum thickness = 1"
      6) Cellular Foam Duct Liner, Flexible: K = 0.27; Minimum thickness = 1"
3. Ducts in directly conditioned space: None required.

B. Insulation Types byLocation:
1. Exterior Ducts: Provide Glass Fiber, Rigid insulation on exterior of ductwork with galvanized sheet metal ductshield.
2. Exterior Ducts: Provide Glass Fiber, Rigid insulation between the walls of double wall duct.
3. Exterior Ducts: Provide Glass Fiber Duct Liner, Flexible on all exterior duct.
4. Exterior Ducts: Provide Glass Fiber Duct Liner, Riged on all exterior duct.
5. Interior Ducts - not in conditioned space: Provide Glass Fiber Flexible wrap on exterior of ductwork .
6. Interior Ducts - not in conditioned space: Provide Glass Fiber Rigid board on exterior of ductwork .
7. Interior Ducts - not in conditioned space: Provide Glass Fiber Duct Liner, Flexible on interior of ductwork .
8. Interior Ducts - not in conditioned space: Provide Glass Fiber Duct Liner, Rigid on interior of ductwork .
9. Round Ducts - exterior location: Provide Glass Fiber Round Duct Liner on the interior of ductwork .
10. HVAC Unit Discharge Ducts: Provide Glass Fiber Duct Liner on interior of ductwork for a minimum of the first 10 ft and additional as indicated on the drawing or specification.

END OF SECTION

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SECTION 23 07 19

HVAC PIPING INSULATION

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Piping insulation.

B. Flexible removable and reusable blanket insulation.

C. Jackets and accessories.

1.2 REFERENCE STANDARDS

A. ASTM C552 - Standard Specification for Cellular Glass Thermal Insulation; 2015.

B. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2015a.

C. ASTM E96/E96M - Standard Test Methods for Water Vapor Transmission of Materials; 2014.

D. NFPA 255 - Standard Method of Test of Surface Burning Characteristics of Building Materials; National Fire Protection Association; 2006.

E. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials; Current Edition, Including All Revisions.

1.3 SUBMITTALS

A. See Division 1 for submittal procedures.

B. Product Data: Provide product description, thermal characteristics, list of materials and thickness for each service, and locations.

C. Manufacturer's Instructions: Indicate installation procedures that ensure acceptable workmanship and installation standards will be achieved.

1.4 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with not less than three years of documented experience.

B. Applicator Qualifications: Company specializing in performing the type of work specified in this section with minimum 5 years of experience.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Accept materials on site, labeled with manufacturer's identification, product density, and thickness.

1.6 FIELD CONDITIONS

A. Maintain ambient conditions required by manufacturers of each product.

B. Maintain temperature before, during, and after installation for minimum of 24 hours.

PART 2 PRODUCTS

2.1 REGULATORY REQUIREMENTS

A. Surface Burning Characteristics: Flame spread index/Smoke developed index of 25/50, maximum, when tested in accordance with ASTM E84 or UL 723.

2.2 CELLULAR GLASS

A. Heavy Density Cellular Class fiber insulation with vapor barrier with all service jacket (ASJ). Insulate both refrigerant lines if units is heat pump.

B. Manufacturers:
   1. Pittsburgh Corning Corporation: www.foamglasinsulation.com/#sle.
   2. Owens Corning: www.owenscorning
   3. Substitutions: See Section 01 60 00 - Product Requirements.

C. Block Insulation: ASTM C547, Type I/IV, Grade A or B.
   1. K Value: 0.22 at 100 degrees F.
   2. Service Temperature: -20 to 150 degrees F, maximum.

3. Water Vapor Permeability: 0.01 perm inch maximum per inch.
4. Water Absorption: 0.5 percent by volume, maximum.
5. Thickness:
   a. 1" (R-8.5) thick for <1" diameter pipe for refrigerant systems.
   b. 1.5" (R-14) thick for 1" to 4" diameter pipe for refrigerant systems.

2.3 JACKETS

A. Aluminum Cladding.
   1. Manufacturers:
      a. Johns Manville Corporation: www.jm.com/#sle.
      b. ITW/Childers.
   2. Jacket: One piece molded type fitting covers and sheet material, aluminum.
      a. Minimum Service Temperature: 0 degrees F.
      b. Maximum Service Temperature: 150 degrees F.
      c. Moisture Vapor Permeability: 0.002 perm inch, maximum, when tested in accordance with ASTM E96/E96M.
      d. Thickness: 0.024 inch.
      e. Connections: Brush on welding adhesive.
   3. Covering Adhesive Mastic: Compatible with insulation.
      a. Compatible with insulation.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that piping has been tested before applying insulation materials.

B. Verify that surfaces are clean and dry, with foreign material removed.

3.2 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Install in accordance with NAIMA National Insulation Standards.

C. Exposed Piping: Locate insulation and cover seams in least visible locations.

END OF SECTION

SECTION 23 08 01

COMMISSIONING OF BUILDING SYSTEMS

PART 1 - GENERAL

1.01 INTRODUCTION

A. The Owner directly contracts a commissioning agent for this project. This specification details the roles and responsibilities of each project team member as they apply to commissioning. Each contractor should review this procedure and include adequate time in their proposal.

1.02 RELATED DOCUMENTS

A. Contract drawings and specifications, general provisions of the contract, including general and supplementary conditions, mechanical provisions and Division-1 Specification sections apply to work of this section.

1.03 DESCRIPTION OF WORK

A. The purpose of the commissioning process is to provide the owner/operator of the facility with a high level of assurance that the mechanical systems have been installed in the prescribed manner, and operate within the performance guidelines set in the Design Intent Documents (DID). The CxA shall provide the owner with an unbiased, objective view of the system's design, installation, operation, and performance. This process is not intended to take away or reduce the responsibility of the design team or installing contractors to provide a finished product. Commissioning is intended to enhance the quality of system start-up and aid in the orderly transfer of systems for beneficial use by the owner. The CxA will be a member of both the design and construction team. During the design phase, the CxA will assist the owner in development of the Owner's Project Requirements, review the Basis of Design, produce a design phase commissioning process plan, and develop project-specific commissioning specifications. During the construction phase, the CxA will administer and coordinate commissioning activities with the design team, construction manager, subcontractors, manufacturers and equipment suppliers which will include commissioning coordination meetings, equipment installation inspections, functional performance testing, issues resolution, and documentation of all aforementioned tasks and activities.

1.04 REFERENCES

A. ASHRAE Guideline 0 - 2013

B. ASHRAE Guideline 1-2007

C. ACG Commissioning Guideline – 2013

1.05 ROLES AND RESPONSIBILITIES OF THE COMMISSIONING AGENCY

A. Mission: The primary point of responsibility is to inform the general contractor, the owner and design team on the status, integration, and performance of mechanical and electrical systems within the facility.

B. Information: The CxA shall function as a catalyst and initiator to disseminate information and assist the design and construction teams in implementing completion of the construction process. This shall include system verification, functional performance testing, and conformance with the intended design of each system. Services include

documenting construction observations, verification and functional performance testing, and documenting proper distribution of performance and operating information to the owners O&M staff.

C. Quality Assurance: Assist the responsible parties to maintain a high quality level of installation by meeting or exceeding prevailing standards and specifications.

D. Observation of Tests: The CxA shall observe and coordinate testing as required to assure system performance meets the design intent.

E. Documentation of Tests: The CxA shall document the results of the performance testing directly and/or assure that the appropriate technicians document testing. The CxA shall compile standard forms to be used by the commissioning team for consistency of approach and type of information to be recorded.

F. Deficiencies: The CxA shall provide technical expertise to facilitate and verify the correction of deficiencies found during the commissioning process.

G. Resolution of Deficiencies: The CxA is to remain an independent party with specific technical knowledge of the project. The CxA shall investigate the scope and extent of problems and facilitate communication to determine responsibilities by delineating specifications. The CxA shall monitor resolution for conformance with design intent and prevailing industry standards.

H. Acceptance: The CxA shall document the date of acceptance as determined by the General Contractor, owner and design team.

I. Certificate(s) of Installation, Certificate(s) of Acceptance and Functional Performance Test results may be used in determining the start of the warranty period for HVAC and lighting systems and subsystems.

J. O&M Material: The CxA will review operation and maintenance materials for HVAC systems, indoor lighting systems, water heating systems and covered processes.

1.06 ROLES AND RESPONSIBILITIES OF THE OWNER

A. Assign facilities personnel and schedule them to participate in the various meetings, training sessions and inspections as follows:
   1. It is in the Owner's best interest to have facilities staff attend the following meetings:
      a. Owners training session(s).
      b. Contractors' commissioning kick-off meeting
         1) At the kickoff meeting, the Owner will indicate to GC whether facilities staff will attend any of the meetings detailed below.
   2. It is at the Owner's discretion to have facilities staff attend the following Cx meetings:
      a. Equipment start-up events.
      b. Piping and ductwork testing and acceptance.
      c. Functional performance testing of HVAC, lighting and water heating equipment.

1.07 ROLES AND RESPONSIBILITIES OF THE DESIGN TEAM DURING CONSTRUCTION

A. Provide update to the Basis of Design Narrative.

B. Verify adequate maintenance accessibility for each piece of equipment in shop drawings and actual installation. Visit site periodically and inspect construction.

C. Review TAB report from Contractor against design requirements and issue response to entire commissioning team.

1.08 MECHANICAL SYSTEMS INCLUDED IN THE COMMISSIONING PROCESS

A. HVAC Systems:
1. Air handlers.
2. Fan coil units.
3. Supply fans.
4. Exhaust fans.
5. Terminal units.
6. Control system.
7. Chiller
8. Boiler

1.09 HVAC COMMISSIONING PLAN

A. Commissioning Team
1. The Commissioning Team (CT) shall consist of key parties involved in design, construction and testing of this facility. It is necessary for each agency to appoint team members that will have long-term commitments to this project. Switching team members during the project will reduce the ability of the CT to provide continuity and acceptable results to the building owner. Team members must maintain an ongoing supervisory position on this project. One team member shall be provided by each of the parties listed below:
a. Program Manager/Owner (PrM)
b. Commissioning Agent (CxA)
c. Design Team (DT)
d. General Contractor (GC)
e. Mechanical Contractor (MC)
f. Controls Contractor (ATC)
g. Testing, Adjusting and Balancing Contractor (TAB)
h. Electrical Contractor (EC)

B. Design Intent Document
1. The Design Intent Document (DID) represents a composite of design drawings, project specifications, submittals, change orders and industry standards, prepared by the designer of record, that describe the systems of this facility. References to design intent will be taken from the DID. The DID is an evolving manuscript maintained by the design professional to track and incorporate design alterations that occur throughout the construction process. Any industry standards used for this project will be specifically noted when referenced.
2. The CxA will review the DID documents for commissioning provisions, functional performance, optimization of performance, accessibility, TAB provisions, and O&M considerations.

C. Commissioning Meetings
1. Commissioning meetings will be held in conjunction with progress meetings when possible and as necessary.
2. Commissioning meetings will be used to address any problems that alter the design intent or affect the commissioning process. These meetings provide an open forum for exchange of ideas between contractors, vendors, designers, users and owners.

D. Resolution Tracking Forms (RTF)
1. The use of Resolution Tracking Forms is a method employed by the CxA to monitor and record problems, their causes, and solutions. The use of these lists promotes communication between the installing contractors, design team, commissioning agent, and owner, in order to expedite their resolution in a timely manner.
2. The CxA will regularly submit RTF's to the CT in order to document and resolve deficiencies as quickly as possible. The frequency of RTF submission will be adjusted as project conditions dictate.

E. Certificate(s) of Installation/ Manufacturer's Checklists
1. Copies of the System Verification Checklists shall be provided to the CxA within 7 days of request.

2. Copies of the manufacturer's startup forms shall be provided to the CxA within 7 days of request.

F. Start-Up
1. The CxA will witness start-up of major systems when applicable. The systems to be witnessed will be identified and discussed during the Cx construction kickoff meeting. The appropriate contractors and/or manufacturer's representative will be required on site to perform start-up.
2. The installing contractor shall notify the CxA no later than 7 days prior to startup of equipment.

G. Functional Performance Tests (FPT)
1. The CxA will write FPT's based on the design intent document. These tests will be created for systems and subsystems.
2. Each major system will be tested. A random sample of each subsystem will be tested. This will be coordinated and witnessed by the CxA. A minimum of 30% of sub-systems will be tested. If more than a 10% failure rate occurs, all sub-systems will be tested.
3. No FPT's will be performed until the system and related subsystems have been started, the TAB report has been submitted and reviewed, and the completion of the control system has been documented through point-to-point checklists and other documentation.

H. Building Turn-Over / Owner Orientation / User Training
1. The CxA may review O&M manuals, to ensure specificity and completeness.
2. The CxA will review as-built drawings, to ensure specificity and completeness.
3. The installing contractor or manufacturer's representative will provide the training. This training should include both classroom training and hands-on operational training. The owner may choose to videotape this training for future use.
4. The CxA will assist in the coordination of off-season testing, calibrating, and servicing as specified in the contract documents.

I. Training of Owner's Operators
1. The Owner's facility staff shall be given comprehensive training in the understanding of the systems and the operation and maintenance of each major piece of equipment.
2. The GC will be responsible for scheduling the training which shall start with classroom sessions followed by hands on training on each piece of equipment. Hands on training shall include start-up, operation in all modes possible, shut-down and any emergency procedures.
3. The manufacturer's representative shall provide the instructions on each major piece of equipment. These sessions shall review safe and proper operating requirements and preventative maintenance.
4. Training will be included for all major pieces of equipment including pumps, chillers, boilers, hot water heaters, heat rejection equipment, air conditioning units, air handling units, fans, air terminals, controls and water treatment systems.
5. Each classroom training session shall be followed by an inspection, explanation and demonstration of the equipment. The start-up and shut-down modes of operation shall be demonstrated.
6. The GC shall attend all sessions and shall add to each session any special information relating to the details of installation of the equipment as it might impact the operation and maintenance.
7. The ATC shall conduct the training session on the controls system hardware and software.
8. The CxA shall conduct training of the project's systems manual.

K. Systems Manual
1. Systems manual shall be provided by the CxA
2. Training of the content of the systems manual shall be provided by the CxA.
3. Content of the Systems Manual shall be, at a minimum, as follows:
    a. Site Information
    b. Site Contact Information
    c. General Site Operating Procedures
    d. Major Systems Description
    e. Site Equipment Inventory and Maintenance
    f. Miscellaneous References and Documentation

N. Controls Description:
1. This will be included in each section covering controlled equipment. It will include the description from the approved temperature control submission, complete with schematic diagram showing piping arrangement and control location on 8-1/2" x 11" or 11" x 17" sheet. This data shall be provided by the ATC in a form suitable for insertion into the O&M Manuals.

O. Submittal Requirement:
1. The O&M manuals for each piece of equipment shall be submitted to the GC at the equipment placement completion stage, which shall be defined as that time in the project when the piece of equipment have been set in place ready for connection to piping and duct systems.

P. Warranty Review
1. The CxA will participate in the 10th month walk-through to observe the operation of the building systems. This will include a review meeting with the owner's personnel, a discussion of warranty issues, energy usage, maintenance practices, usage changes, and chronic problems, as well as other issues affecting the owner and the operation of the HVAC systems.

1.10 RESPONSIBILITIES OF INSTALLING CONTRACTORS

A. General Contractor (GC)
1. Include commissioning requirements in the mechanical, electrical, and controls contracts, as well as other subcontracts, to assure full cooperation of all parties in the commissioning process.
2. Assure acceptable representation, with the means and authority to prepare and coordinate execution of the commissioning program as described in the contract documents.
3. Assure that the CxA shall receive a copy of all construction documents, addenda, change orders and appropriate submittals and shop drawings for review and use in development of the commissioning plan and functional performance tests.
    a. The GC shall provide the CxA with the submittal log.
    b. The CxA will identify the equipment and/or systems the CxA needs to review and will return the marked up submittal log to the GC.
    c. The GC shall ensure all submittals for equipment/systems identified are delivered to the CxA for review.
    d. Comments and/or questions associated with each submittal will be directed to the design team for inclusion/exclusion of the design team's comments.
    e. Coordinate inclusion of commissioning activities in the construction schedule.
    f. Issue a statement that TAB work has been completed, and that the final TAB report has been submitted for review.
    g. Issue a statement that control systems have been completely installed and calibrated
    h. Coordinate Owner training activities with the Owner and each trade's respective contractor.
    i. Facilitate resolution of deficiencies identified by observation or performance testing.

B. Mechanical Contractor (MC)
1. Include cost for commissioning requirements in the contract price.
2. Include requirements for submittal data (including partial load data), O&M data, and training in each purchase order or sub-contract.
3. Assure participation of major equipment manufacturers in appropriate startup, training, and testing activities.
4. Attend commissioning meetings scheduled by the CxA.
5. Assist the CxA in system verification and performance testing.
6. Prepare preliminary schedule for HVAC system inspections, O & M manual submission, training sessions, pipe and duct system testing, flushing and cleaning, equipment start-up, system verification, performance testing, and system completion for use by the CxA. Update schedule as appropriate throughout the construction period and provide updated schedule to the commissioning team.
7. Complete System Verification Checklists and manufacturer's pre-startup checklists prior to scheduling startup of HVAC equipment.

a. Retain System Verification Checklists in a 3-ring binder in an organized fashion. Binder is to remain on the job site
b. Make System Verification Checklists available for CxA review upon request.
c. Retain calibration records for equipment provided with manufacturer calibrated sensors in the System Verification Checklists binder.
e. Monitor and respond to Resolution Tracking Forms distributed by the CxA in order to expedite corrective actions necessary to achieve design intent.
f. Notify the CxA a minimum of one week in advance of scheduled system start-up.
g. Update drawings to as-built condition and review with the CxA throughout the construction process.
h. Schedule vendor and subcontractor provided training sessions as required by project specifications.
i. Provide written notification to the GC and CxA that the following work has been completed in accordance with the project specifications, and that the equipment, systems and subsystems are operating in accordance with design intent.
    1) HVAC equipment including fans, air handling units, dehumidification units, ductwork, dampers, terminal devices, etc.
j. Participate in the Functional Performance Tests as required to achieve design intent.
k. Participate in the off-season mode testing as required to achieve design intent.
l. Participate in O&M Training as required by project specifications.
m. Provide a complete set of as-built drawings and O&M manuals of equipment installed by the MC to the GC for inclusion in the project documentation.

Part 2 – PRODUCTS (Not applicable)

Part 3 – EXECUTION (Not applicable)

END OF SECTION 23 08 01

SECTION 23 0802

INSTALLATION & ACCEPTANCE TESTING OF MECHANICAL SYSTEMS

PART 1 GENERAL

1.01 INTRODUCTION

A. Title 24 requires the completion of all applicable Certificates of Installation and Certificates of Acceptance for mechanical systems. This shall include all applicable mechanical systems as defined in the energy compliance sheets included with the contract documents.

1.02 RELATED DOCUMENTS

A. Contract drawings and specifications, general provisions of the contract, including general and supplementary conditions, mechanical provisions and Division-1 Specification sections apply to work of this section.

1.03 DESCRIPTION OF WORK

A. Complete all Title 24 required Certificate(s) of Installation (NRCI) and Certificate(s) of Acceptance (NRCA) to be completed per the contract documents.

1.04 RESPONSIBILITIES OF INSTALLING CONTRACTORS

A. General Contractor (GC)
   1. Ensure that all contractors identified as the contractor responsible for acceptance testing and completion of the Title 24 Certificate(s) of Acceptance are certified by the State of California or its designated body to conduct each respective test.

B. Mechanical Contractor (MC)
   1. Verify proper installation and performance of all mechanical services provided.
   2. Complete Title 24 Certificate(s) of Installation and manufacturer's pre-start checklists prior to scheduling startup/programming of mechanical control equipment.
      a. Retain Certificate(s) of Installation in a 3-ring binder in an organized fashion. Binder is to remain on the job site
      b. Make Certificate(s) of Installation available for building inspector's review.
      c. Retain calibration records for equipment provided with manufacturer calibrated sensors in the Certificate(s) of Installation binder.
      d. Correct labeling of all circuits with connected equipment.
   3. Complete the Certificate(s) of Acceptance per the contract documents.
      a. The company installing the mechanical systems must be an authorized Mechanical Controls Acceptance Test Employer certified by a Mechanical Controls Acceptance Test Technician Certification Provider or include in their bid the cost of retaining and overseeing a contractor who is an authorized Mechanical Controls Acceptance Test Employer to complete the acceptance testing.
      b. At the discretion of the GC, the Mechanical Controls Acceptance Testing may be completed by the Testing & Balancing (T&B) Contractor if the T&B contractor's company and personnel meet all requirements in this specification section.
      c. All required acceptance testing must be completed by a Mechanical Controls Acceptance Test Technician employed by the Mechanical Controls Acceptance Test Employer.
      d. Retain Certificate(s) of Acceptance in a 3-ring binder in an organized fashion. Binder is to remain on the job site
      e. Provide copies of all Certificate(s) of Acceptance to the GC for review by the building inspector
      f. Upload all Certificate(s) of Acceptance to the California Title 24 Certificates of Acceptance database, if, at the time of project completion, the database is available to the public.
   4. Successful completion of the required Acceptance Tests is the responsibility of the installing contractor. Any costs associated with modifications necessary to obtain compliance and re-testing of systems shall be included in the base bid of this project.

END OF SECTION

SECTION 23 2300

REFRIGERANT PIPING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Piping.

B. Refrigerant.

C. Moisture and liquid indicators.

D. Valves.

E. Filter-driers.

F. Solenoid valves.

G. Expansion valves.

1.02 REFERENCE STANDARDS

A. AHRI 710 - Performance Rating of Liquid-Line Driers; 2009.

B. AHRI 750 - Thermostatic Refrigerant Expansion Valves; 2007.

C. AHRI 760 - Performance Rating of Solenoid Valves for Use With Volatile Refrigerants; 2007.

D. ASHRAE Std 15 - Safety Standard for Refrigeration Systems; 2013.

E. ASME B16.22 - Wrought Copper and Copper Alloy Solder-Joint Pressure Fittings; 2013.

F. ASME B16.26 - Cast Copper Alloy Fittings for Flared Copper Tubes; 2013.

G. ASME B31.5 - Refrigeration Piping and Heat Transfer Components; 2013.

H. ASTM B88 - Standard Specification for Seamless Copper Water Tube; 2016.

I. ASTM B88M - Standard Specification for Seamless Copper Water Tube (Metric); 2016.

J. ASTM B280 - Standard Specification for Seamless Copper Tube for Air Conditioning and Refrigeration Field Service; 2016.

K. AWS A5.8M/A5.8 - Specification for Filler Metals for Brazing and Braze Welding; 2011-AMD 1.

L. UL 429 - Electrically Operated Valves; Current Edition, Including All Revisions.

1.03 SYSTEM DESCRIPTION

A. Where more than one piping system material is specified ensure system components are compatible and joined to ensure the integrity of the system is not jeopardized. Provide necessary joining fittings. Ensure flanges, union, and couplings for servicing are consistently provided.

B. Provide pipe hangers and supports in accordance with ASME B31.5 unless indicated otherwise.

C. Liquid Indicators:
   1. Use line size liquid indicators in main liquid line leaving condenser.
   2. If receiver is provided, install in liquid line leaving receiver.

D. Valves:
   1. Use service valves on suction and discharge of compressors.
   2. Use gage taps at compressor inlet and outlet.

E. Filter-Driers:
   1. Use a filter-drier immediately ahead of liquid-line controls, such as thermostatic expansion valves, solenoid valves, and moisture indicators.

F. Solenoid Valves:
   1. Use in liquid line of single or multiple evaporator systems.

1.04 SUBMITTALS

A. Product Data: Provide general assembly of specialties, including manufacturers catalogue information. Provide manufacturers catalog data including load capacity.

B. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
1. See Section 01 6000 - Product Requirements, for additional provisions.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Deliver and store piping and specialties in shipping containers with labeling in place.

B. Protect piping and specialties from entry of contaminating material by leaving end caps and plugs in place until installation.

C. Dehydrate and charge components such as piping and receivers, seal prior to shipment, until connected into system.

PART 2 PRODUCTS

2.01 PIPING

A. Copper Tube: ASTM B280, H58 hard drawn or O60 soft annealed.
1. Fittings: ASME B16.22 wrought copper.
2. Joints: Braze, AWS A5.8M/A5.8 BCuP silver/phosphorus/copper alloy.

B. Copper Tube to 7/8 inch (22 mm) OD: ASTM B88 (ASTM B88M), Type K (A), annealed.
1. Fittings: ASME B16.26 cast copper.
2. Joints: Flared.

C. Pipe Supports and Anchors:
1. Conform to ASME B31.5.
2. Hangers for Pipe Sizes 1/2 to 1-1/2 Inch (13 to 38 mm): Malleable iron adjustable swivel, split ring.

2.02 MOISTURE AND LIQUID INDICATORS

A. Indicators: Single port type, UL listed, with copper or brass body, flared or solder ends, sight glass, color coded paper moisture indicator with removable element cartridge and plastic cap; for maximum temperature of 200 degrees F (93 degrees C) and maximum working pressure of 500 psi (3450 kPa).

2.03 VALVES

A. Service Valves:
1. Forged brass body with copper stubs, brass caps, removable valve core, integral ball check valve, flared or solder ends, for maximum pressure of 500 psi (3450 kPa).

2.04 FILTER-DRIERS

A. Performance:
1. Flow Capacity - Liquid Line: per manufactures recommendation, minimum, rated in accordance with AHRI 710.
2. Pressure Drop: 2 psi (14 kPa), maximum, when operating at full connected evaporator capacity.
3. Design Working Pressure: per manufactures recommendation, minimum.

B. Cores: Molded or loose-fill molecular sieve desiccant compatible with refrigerant, activated alumina, activated charcoal, and filtration to 40 microns, with secondary filtration to 20 microns; of construction that will not pass into refrigerant lines.

C. Construction: UL listed.
1. Connections: As specified for applicable pipe type.

2.05 SOLENOID VALVES

A. Valve: AHRI 760 I-P, pilot operated, copper, brass or steel body and internal parts, synthetic seat, stainless steel stem and plunger assembly (permitting manual operation in case of coil failure), integral strainer, with flared, solder, or threaded ends; for maximum working pressure of 500 psi (3450 kPa).

B. Coil Assembly: UL 429, UL listed, replaceable with molded electromagnetic coil, moisture and fungus proof, with surge protector and color coded lead wires, integral junction box with pilot light.

PART 3 EXECUTION

3.01 PREPARATION

A. Ream pipe and tube ends. Remove burrs. Bevel plain end ferrous pipe.

B. Remove scale and dirt on inside and outside before assembly.

C. Prepare piping connections to equipment with flanges or unions.

3.02 INSTALLATION

A. Install refrigeration specialties in accordance with manufacturer's instructions.

B. Route piping in orderly manner, with plumbing parallel to building structure, and maintain gradient.

C. Install piping to conserve building space and avoid interference with use of space.

D. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment.

E. Pipe Hangers and Supports:
   1. Install in accordance with ASME B31.5.
   2. Support horizontal piping as indicated.
   3. Install hangers to provide minimum 1/2 inch (13 mm) space between finished covering and adjacent work.
   4. Place hangers within 12 inches (300 mm) of each horizontal elbow.

F. Arrange piping to return oil to compressor. Provide traps and loops in piping, and provide double risers as required. Slope horizontal piping 0.40 percent in direction of flow.

G. Provide clearance for installation of insulation and access to valves and fittings.

H. Provide access to concealed valves and fittings. Coordinate size and location of access doors with Section 08 3100.

I. Follow ASHRAE Std 15 procedures for charging and purging of systems and for disposal of refrigerant.

J. Refrigerant piping shall be provided with insulation. All exterior insulation shall be provided with an aluminum jacket and UV protection.

END OF SECTION

SECTION 23 31 00
HVAC DUCTS AND CASINGS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Metal ductwork.

1.2 SUBMITTALS

A. See Division 1 for submittal procedures.

1.3 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum three years of documented experience, and approved by manufacturer.

PART 2 PRODUCTS

2.1 DUCT ASSEMBLIES

A. Regulatory Requirements: Construct ductwork to comply with NFPA 90A standards.

2.2 MATERIALS

A. Galvanized Steel for Ducts: Hot-dipped galvanized steel sheet, ASTM A653/A653M FS Type B, with G60/Z180 coating.

2.3 DUCTWORK FABRICATION

A. Fabricate and support in accordance with SMACNA (DCS) and as indicated.

B. Provide duct material, gages, reinforcing, and sealing for operating pressures indicated.

C. Increase duct sizes gradually, not exceeding 15 degrees divergence wherever possible; maximum 30 degrees divergence upstream of equipment and 45 degrees convergence downstream.

D. Fabricate continuously welded round and oval duct fittings in accordance with SMACNA (DCS).

2.4 MANUFACTURED DUCTWORK AND FITTINGS

A. Round Ducts: Round lockseam duct with galvanized steel outer wall.
   1. Manufacture in accordance with SMACNA (DCS).

B. Flexible Ducts: UL 181, Class 1, aluminum laminate and polyester film with latex adhesive supported by helically wound spring steel wire.
   1. Pressure Rating: 10 inches WG positive and 2.0 inches WG negative.
   2. Maximum Velocity: 400 FPM.
   3. Temperature Range: Minus 20 degrees F to 210 degrees F.

2.5 DUCT ACCESSORIES

A. Provide 24″x24″ steel access panel with lockable key for servable components above ceilings or behind walls. Panel shall be factory painted to match existing conditions. Install with insulated access panel for areas exposed to outdoors or areas with high humidity where water can condense. Use 1 hour rated access panels for areas such as corridors or other fire rated areas. Field access panels to match existing surrounding areas if located in exposed areas.

PART 3 EXECUTION

3.1 INSTALLATION

A. Install, support, and seal ducts in accordance with SMACNA (DCS).

B. Duct sizes indicated are inside clear dimensions. For lined ducts, maintain sizes inside lining.

C. Locate ducts with sufficient space around equipment to allow normal operating and maintenance activities.

D. Install ductwork in accordance with SMACNA Guidelines for Seismic Restraints of Mechanical Systems.

3.2 CLEANING

A. Clean duct system with high powered vacuum machines. Protect equipment that could be harmed by excessive dirt with filters, or bypass during cleaning. Provide adequate access into duct for cleaning purposes.

B. Prior to operating the air moving units for the first time, install cheesecloth over each diffuser to trap duct and debris. After operation, remove cheesecloth and clean diffuser.

END OF SECTION

SECTION 23 33 00
DUCT ACCESSORIES

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Air turning devices/extractors
B. Backdraft dampers
C. Duct access panels.
D. Flexible Duct connections.
E. Volume Control Dampers

1.2 REFERENCE STANDARDS

A. NFPA 90A – Standard for the Installation of Air Conditioning and Venting Systems; 2015
B. NFPA 92 – Standard for Smoke Control Systems, 2015.
C. SMACNA (DCS) – HVAC Duct Construction Standards for Metal and Flexible; 2010.

1.3 SUBMITTALS

A. Product Data: Provide for shop fabrication assemblies including volume control dampers. Include electrical characteristics and connection requirements.

PART 2 PRODUCTS

2.1 AIR TURNING DEVICES/EXTRACTORS

A. Manufacturers:
   1. Aero/Dyne Company; Model H.E.P: www.aero-dyne.net.
   2. Krueger-HVAC, Division of Air System Components; www.krueger-hvac.com/#sle.
   3. Ruskin Company; www.ruskin.com/#sle.
   4. Titus HVAC, a brand of Johnson Controls; www.titus-hvac.com/#sle.
C. Turning vanes shall be a true airfoil design; smoothly-rounded entry nose with extended trailing edge. Generated sound power level shall not exceed 54 decibels in band 4 at 2,000 FPM, with a duct size of 24 x 24.
D. Assemblies shall be fabricated with side rails; vanes installed on design centers across the full diagonal dimension of the elbow.
E. Multi-blade device with blades aligned in short dimension; steel construction; with individually adjustable blades, mounting straps.
F. Multi-blade device with radius blades attached to pivoting frame and bracket, steel construction, with push-pull operator strap.

2.2 BACKDRAFT DAMPERS

A. Multi-Blade, Parallel action gravity balanced backdraft dampers: Extruded aluminum, with center pivot blades of maximum 6” width, with felt or flexible vinyl sealed edges, lined together with rattle free manner with 90 degrees stop, steel ball bearings, and plated steel pivot pin; adjustment device to permit settings for varying differential static pressure.

2.3 DUCT ACCESS DOORS

A. Fabrication: Rigid and close-fitting of galvanized steel with sealing gaskets and quick fastening locking devices. For insulated ducts, install minimum 1 inch thick insulation with sheet metal cover.
   1. Less than 12 inches square: secure with sash locks.
   2. Up to 18 inches square: provide two hinges and two sash locks.
B. Access doors with sheet metal screw fasteners are not acceptable.

2.4 FLEXIBLE DUCT CONNECTIONS

A. Fabricate in accordance with SMACNA HVAC Duct Construction Standards

B. Flexible Duct Connections: Fabric crimped into metal edge strip.

1. Metal: 3 inches wide, 24 gage, 0.0239 inches thick galvanized steel.

2.4 VOLUME CONTROL DAMPERS

A. Manufacturers:

1. Nailor Industries: www.nailor.com

2. Ruskin Company; www.ruskin.com

3. Greenheck; www.greenheck.com

B. Multi-Blade Damper: Fabricate of opposed blade pattern with maximum blade sizes of 8 by 72 inch. Assembly center and edge crimped blades in prime coated or galvanized channel frame with suitable hardware.

1. Blade: 18 gage, 0.0478 inch, minimum.

C. Quadrants:

1. Provide locking, indicating quadrant regulators on single and muli-blade dampers.

2. On insulated duct mounted quadrant regulators on stand-off mounting brackets, bases, or adapters.

3. Where rod lengths exceed 30 inches provide regulator at both ends.

PART 3 EXECUTION

3.1 PREPARATION

A. Verify that electric power is available and of the correct characteristics.

3.2 INSTALLATION

A. **Install accessories in accordance with manufacturer's instructions. Refer to 23 31 00 for duct construction and pressure class.**

B. **Provide backdraft dampers on exhaust fans or exhaust ducts nearest to outside and where indicated.**

C. **Provide balancing dampers on duct take-off to diffusers, grilles, and registers, regardless of whether dampers are specified as part of the diffuser, grille, or register assembly.**

END OF SECTION

SECTION 23 3423

HVAC POWER VENTILATORS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Roof exhausters.

B. Ceiling exhaust fans.

C. Inline centrifugal fans.

D. Utility vent set.

E. Laboratory and fume exhaust.

1.02 REFERENCE STANDARDS

A. AMCA 210 - Laboratory Methods of Testing Fans for Certified Aerodynamic Performance Rating; 2007.

B. AMCA 301 - Methods for Calculating Fan Sound Ratings from Laboratory Test Data; 2014.

C. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum); 2014.

D. UL 705 - Power Ventilators; Current Edition, Including All Revisions.

1.03 SUBMITTALS

A. Product Data: Provide data on fans and accessories including fan curves with specified operating point clearly plotted, power, RPM, sound power levels at rated capacity, and electrical characteristics and connection requirements.

B. Manufacturer's Instructions: Indicate installation instructions.

1.04 FIELD CONDITIONS

A. Permanent ventilators may not be used for ventilation during construction.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Greenheck Fan Corporation: www.greenheck.com.

B. Loren Cook Company: www.lorencook.com.

2.02 ROOF EXHAUSTERS

A. Fan Unit: V-belt or direct driven as indicated, with spun aluminum housing; resilient mounted motor; 1/2 inch (13 mm) mesh, 0.62 inch (1.6 mm) thick aluminum wire birdscreen; square base to suit roof curb with continuous curb gaskets.

B. Roof Curb: 8 inch (200 mm) high self-flashing of galvanized steel with continuously welded seams, built-in cant strips.

C. Disconnect Switch: Factory wired, non-fusible, in housing for thermal overload protected motor and wall mounted multiple speed switch.

D. Backdraft Damper: Gravity actuated, aluminum multiple blade construction, felt edged with offset hinge pin, nylon bearings, blades linked, and line voltage motor drive, power open, spring return.

E. Sheaves: Cast iron or steel, dynamically balanced, bored to fit shafts and keyed; variable and adjustable pitch motor sheave selected so required rpm is obtained with sheaves set at mid-position; fan shaft with self-aligning pre-lubricated ball bearings.

2.03 CEILING EXHAUST FANS

A. Centrifugal Fan Unit: V-belt or direct driven with galvanized steel housing lined with acoustic insulation, resilient mounted motor, gravity backdraft damper in discharge.

B. Grille: Molded white plastic.

C. Sheaves: Cast iron or steel, dynamically balanced, bored to fit shafts and keyed; variable and adjustable pitch motor sheaves selected so required rpm is obtained with sheaves set at mid-position; fan shaft with self-aligning pre-lubricated ball bearings.

2.04 INLINE CENTRIFUGAL FANS

A. Centrifugal Fan Unit: V-belt or direct driven with galvanized steel housing lined with acoustic insulation, resilient mounted motor, gravity backdraft damper in discharge.

B. Sheaves: Cast iron or steel, dynamically balanced, bored to fit shafts and keyed; variable and adjustable pitch motor sheaves selected so required rpm is obtained with sheaves set at mid-position; fan shaft with self-aligning pre-lubricated ball bearings.

2.05 UTILITY VENT SET

A. Direct Drive Fan:
   1. Fan Wheel:
      a. Type: Non-overloading, backward inclined centrifugal.
      b. Material: Aluminum.
   2. Statically and dynamically balanced.
   3. Motors:
      a. Open drip-proof (ODP).
      b. Heavy duty ball bearing type.
      c. Mount on vibration isolators or resilient cradle mounts, out of air stream.
      d. Fully accessible for maintenance.
   4. Housing:
      a. Construct of heavy gage aluminum including curb cap, windband, and motor compartment.
      b. Rigid internal support structure.
      c. One-piece fabricated or fully welded curb-cap base to windband for leak proof construction.
      d. Construct drive frame assembly of heavy gage steel, mounted on vibration isolators.
      e. Provide breather tube for fresh air motor cooling and wiring.

B. Shafts and Bearings:
   1. Fan Shaft:
      a. Ground and polished steel with anti-corrosive coating.
      b. First critical speed at least 25 percent over maximum cataloged operating speed.
   2. Bearings:
      a. Permanently sealed or pillow block type.
      b. Minimum L10 life in excess of 100,000 hours (equivalent to L50 average life of 500,000 hours), at maximum cataloged operating speed.
      c. 100 percent factory tested.

C. Drive Assembly:
   1. Belts, pulleys, and keys oversized for a minimum of 150 percent of driven horsepower.
   2. Belts: Static free and oil resistant.
   3. Fully machined cast iron type, keyed and securely attached to the wheel and motor shafts.
   4. Motor pulley adjustable for final system balancing.
   5. Readily accessible for maintenance.

D. Disconnect Switches:
   1. Factory mounted and wired.
   2. Environment Type per NEMA 250: Unless otherwise indicated, as specified for the following installation locations:
      a. Outdoor Locations: Type 3R.
   3. Finish for Painted Steel Enclosures: Provide manufacturer's standard, factory applied gray, or _____ unless otherwise indicated.
   4. Positive electrical shutoff.
   5. Wired from fan motor to junction box installed within motor compartment.

E. Drain Trough: Allows for single-point drainage of water, grease, and other residues.

2.06 LABORATORY AND FUME EXHAUST

A. Belt Drive Fan:
1. Fan Wheel:
a. Type: Non-overloading, backward inclined centrifugal.
b. Material: Aluminum.
2. Statically and dynamically balanced.
3. Motors:
a. Open drip-proof (ODP).
b. Heavy duty ball bearing type.
c. Mount on vibration isolators or resilient cradle mounts, out of air stream.
d. Fully accessible for maintenance.
4. Housing:
a. Construct of heavy gage aluminum including curb cap, windband, and motor compartment.
b. Rigid internal support structure.
c. One-piece fabricated or fully welded curb-cap base to windband for leak proof construction.
d. Construct drive frame assembly of heavy gage steel, mounted on vibration isolators.
e. Provide breather tube for fresh air motor cooling and wiring.

B. Shafts and Bearings:
1. Fan Shaft:
a. Ground and polished steel with anti-corrosive coating.
b. First critical speed at least 25 percent over maximum cataloged operating speed.
2. Bearings:
a. Permanently sealed or pillow block type.
b. Minimum L10 life in excess of 100,000 hours (equivalent to L50 average life of 500,000 hours), at maximum cataloged operating speed.
c. 100 percent factory tested.

C. Drive Assembly:
1. Belts, pulleys, and keys oversized for a minimum of 150 percent of driven horsepower.
2. Belts: Static free and oil resistant.
3. Fully machined cast iron type, keyed and securely attached to the wheel and motor shafts.
4. Motor pulley adjustable for final system balancing.
5. Readily accessible for maintenance.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Secure roof exhausters with cadmium plated steel lag screws to roof curb.

C. Extend ducts to roof exhausters into roof curb. Counterflash duct to roof opening.

D. Hung Cabinet Fans:
1. Install flexible connections specified in Section 23 3300 between fan and ductwork. Ensure metal bands of connectors are parallel with minimum one inch (25 mm) flex between ductwork and fan while running.

E. Provide sheaves required for final air balance.

F. Install backdraft dampers on inlet to roof and wall exhausters.

G. Provide backdraft dampers on outlet from cabinet and ceiling exhauster fans and as indicated.

END OF SECTION

SECTION 23 3700

AIR OUTLETS AND INLETS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Diffusers.

B. Registers/grilles.

C. Door grilles.

D. Louvers.

E. Goosenecks.

1.02 REFERENCE STANDARDS

A. AMCA 500-L - Laboratory Methods of Testing Louvers for Rating; 2012.

B. ARI 890 - Standard for Air Diffusers and Air Diffuser Assemblies; Air-Conditioning and Refrigeration Institute; 2008.

C. ASHRAE Std 70 - Method of Testing the Performance of Air Outlets and Inlets; 2006 (R2011).

D. SMACNA (DCS) - HVAC Duct Construction Standards Metal and Flexible; 2005 (Rev. 2009).

1.03 SUBMITTALS

A. Product Data: Provide data for equipment required for this project. Review outlets and inlets as to size, finish, and type of mounting prior to submission. Submit schedule of outlets and inlets showing type, size, location, application, and noise level.

1.04 QUALITY ASSURANCE

A. Test and rate air outlet and inlet performance in accordance with ASHRAE Std 70.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Krueger: www.krueger-hvac.com.

B. Price Industries: www.price-hvac.com.

C. Titus: www.titus-hvac.com.

2.02 RECTANGULAR CEILING DIFFUSERS

A. Type: Provide square, adjustable pattern, stamped, multi-core diffuser to discharge air in four way pattern with sectorizing baffles where indicated.

B. Frame: Surface mount type. In plaster ceilings, provide plaster frame and ceiling frame.

C. Fabrication: Aluminum with baked enamel off-white finish.

2.03 CEILING SUPPLY REGISTERS/GRILLES

A. Type: Streamlined and individually adjustable curved blades to discharge air along face of grille, two-way deflection.

B. Frame: 1-1/4 inch (32 mm) margin with countersunk screw mounting and gasket.

C. Fabrication: Aluminum extrusions with factory off-white enamel finish.

D. Damper: Integral, gang-operated, opposed blade type with removable key operator, operable from face.

2.04 CEILING EXHAUST AND RETURN REGISTERS/GRILLES

A. Type: Streamlined blades, 3/4 inch (19 mm) minimum depth, 3/4 inch (19 mm) maximum spacing, with blades set at 45 degrees, vertical face.

B. Frame: 1-1/4 inch (32 mm) margin with countersunk screw mounting.

C. Damper: Integral, gang-operated, opposed blade type with removable key operator, operable from face where not individually connected to exhaust fans.

2.05 DOOR GRILLES

A. Type: V-shaped louvers of 20 gage, 0.0359 inch (0.91 mm) thick steel, 1 inch (25 mm) deep on 1/2 inch (13 mm) centers.

B. Frame: 20 gage, 0.0359 inch (0.91 mm) steel with auxiliary frame to give finished appearance on both sides of door, with factory prime coat finish.

2.06 LOUVERS

A. Type: 4 inch (100 mm) deep with blades on 45 degree slope with center baffle and return bend, heavy channel frame, 1/2 inch (13 mm) square mesh screen over exhaust and 1/2 inch (13 mm) square mesh screen over intake.

B. Fabrication: 12 gage (2.50 mm) thick extruded aluminum, welded assembly, with factory prime coat finish color to be selected.

C. Mounting: Furnish with interior flat flange for installation.

2.07 GOOSENECKS

A. Fabricate in accordance with SMACNA (DCS) of minimum 18 gage, 0.0598 inch (1.21 mm) galvanized steel.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Check location of outlets and inlets and make necessary adjustments in position to conform with architectural features, symmetry, and lighting arrangement.

C. Install diffusers to ductwork with air tight connection.

D. Provide balancing dampers on duct take-off to diffusers, and grilles and registers, despite whether dampers are specified as part of the diffuser, or grille and register assembly.

3.02 SCHEDULES SHOWN ON SHEET M-0.1

END OF SECTION

SECTION 23 74 00
SPLIT DX HVAC EQUIPMENT

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Split DX Equipment.

B. Unit controls.

C. Ground Mounting curb and base.

1.02 REFERENCES

A. NFPA 90 A & B - Standard for the Installation of Air Conditioning and Ventilation Systems and Installation of Warm Air Heating; National Fire Protection Association; 2002.

B. ANSI/ASHRAE 15 - Safety Code for Mechanical Refrigeration.

1.03 SUBMITTALS

A. See Division 1 for submittal procedures.

B. Product Data: Provide capacity and dimensions of manufactured products and assemblies required for this project. Indicate electrical service with electrical characteristics and connection requirements, and duct connections.

C. Manufacturer's Instructions: Indicate assembly, support details, connection requirements, and include start-up instructions.

D. Submit unit performance data including: capacity, nominal and operating performance.

E. Operation and Maintenance Data: Include manufacturer's descriptive literature, operating instructions, installation instructions, maintenance and repair data, and parts listing.

F. Warranty: Submit manufacturer's warranty and ensure forms have been filled out in Owner's name and registered with manufacturer.

G. Substitutions for equipment can only be made if contractor demonstrates to engineer and owner that substituted equipment has same performance characteristics, efficiency (IEER and EER), controls integration, and weights. Contractor to provide signed letter assuring engineer and owner that contractor shall cover all changes and costs associated with substituted equipment.

1.04 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum three years of documented experience.

B. Products Requiring Electrical Connection: Listed and classified by Underwriters' Laboratories, Inc. as suitable for the purpose specified and indicated.

1.05 DELIVERY, STORAGE, AND PROTECTION

A. Protect units from physical damage by storing off site until roof mounting curbs are in place, ready for immediate installation of units.

1.06 WARRANTY

A. See Division 1 - Closeout Submittals, for additional warranty requirements.

B. Provide a five year warranty to include coverage for compressors and heat exchangers. In addition, the entire unit, excluding refrigerant, will have a 12-month parts warranty form date of shipment not to exceed 18 months from date of shipment.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Trane; Model as Scheduled: www.trane.com

B. Or Approved Equal

2.02 AIR CONDITIONING UNITS

A. Description: Self-contained, packaged, factory assembled and prewired, consisting of cabinet and frame, supply fan, controls, air filters, refrigerant cooling coil and compressor, condenser coil and condenser fan.

2.03 GENERAL UNIT DESCRIPTION

A. Unit(s) furnished and installed shall be combination two-stage cooling packaged Computer Room Air Conditioning (CRAC) unit as scheduled on contract documents and these specifications. Units shall have two compressors, a variable speed supply fan and two-speed condenser fan. They shall be factory-assembled, piped, wired and fully charged with refrigerant. Cooling capacity ratings shall be based on ARI Standard 210/240. Unit(s) shall consist of an insulated, weather-tight casing with compressor(s), air-cooled condenser coil, condenser fans, evaporator coil, return-air filters, supply motors, unit controls and gas-fired heating section.

B. HVAC unit shall be BACnet compatible and shall integrate into existing campus wide web based central management system. Units shall come with integrated display on front for monitoring of equipment status and changing of setpoints.

2.04 FABRICATION

A. Cabinet: Steel with baked enamel finish, including access panels with screwdriver operated flush cam type fasteners and base pan. Structural members shall be minimum 14 gage, with access doors or panels of minimum 18 gage. All panels shall be hinged access. Exterior surfaces shall be phosphate and zinc-coated steel with baked enamel powder paint finish. Double Walled construction.

B. Insulation: One inch thick foil-faced neoprene coated glass fiber with edges protected from erosion in the heat exchanger and evaporator sections to provide a non-porous, cleanable surface.

C. External cabinet surface shall be tested 1000 hours in salt spray test in compliance with ASTM B117.

D. Access Panels: Water and air-tight panels shall provide access to filters, return air fan section, supply air fan section, evaporator coil section, and unit control section.

E. Provide openings in unit cabinet for power, control, condensate, water for humidifier connections.

F. Supply Fan: Single inlet plenum fan with backward inclined blades. Direct Drive motor with variable speed capacity. Integrated VFD into unit with speed control at display. The fan shall be an electronically commutated (EC) synchronous DC motor, having soft start capability and shallb e controlled through the unit. Each fan shall have fault monitoring circuitr.

G. Air Filters: 4 inch thick glass fiber disposable media in metal frames.

H. Unit shall be provided with through the curb access for power, control, and humidifier connections. .

2.05 FANS AND MOTORS

A. Outdoor condenser fans shall be two-speed, direct drive, statically and dynamically balanced and be configured in a draw-through arrangement.

2.06 EVAPORATOR COIL

A. Provide seamless copper tube and aluminum fin coil assembly with galvanized drain pan and connection. Factory pressure and leak tested at 400 psig.

B. Provide capillary tubes or thermostatic expansion valves for units of 6 tons capacity and less, and thermostatic expansion valves and alternate row circuiting for units 7.5 tons cooling capacity and larger.

C. Drain pan under evaporator coil shall be manufactured of a non-corrosive material - either polymer or stainless steel - galvanized steel is not acceptable. It shall be sloped toward the drain to allow total drainage of condensate at all unit operating conditions.

2.07 COMPRESSOR

A. Provide hermetic compressors, 3600 rpm maximum, resiliently mounted with positive lubrication, crankcase heater, high and low pressure safety controls, motor overload protection, suction and discharge service valves and gage ports, and filter drier.

B. Compressor shall have complete overload protection on all three power lines, internal thermostats, rotolock service valve, crankcase heater and low pressure override timer for positive starting at low temperatures.

2.10 CONDENSER COIL

A. Provide copper tube aluminum fin coil assembly with subcooling rows and coil guard. Factory pressure and leak tested at 400psig.

B. Provide direct drive propeller fans, resiliently mounted with fan guard, motor overload protection, wired to operate with compressor. Provide high efficiency fan motors.

2.11 REFRIGERATION SYSTEM

A. Unit shall be equipped to provide mechanical cooling for low ambient operation from zero (0) to 115 degrees Fahrenheit.

B. Refrigerant system shall have two independent refrigeration circuits.

2.12 CONDENSATE PUMP

A. Unit shall be equipped with dual float condensate pump. If condensate pump fails control panel shall enunciate an alarm and display. Pumps shall be factory mounted/wired and shall include sump, motor, and automatic control. A factory installed high condensate water level alarm switch will disable the unit prior to condensate pan overflow should the drain become plugged with debris.

2.13 CONTROL SYSTEM

A. Unit shall come with a fully operational control system that integrates into the building BMS.

B. The control circuit voltage shall be 24V AC.

PART 3 EXECUTION

3.01 EXAMINATION

A. Contractor shall verify that roof is ready to receive work and opening dimensions are as illustrated by the manufacturer.

B. Contractor shall verify that proper power supply is available.

3.02 INSTALLATION

A. Contractor shall Install in accordance with manufacturer's instructions.

B. Install in accordance with NFPA 90A.

C. Install with flex connections between equipment and ductwork. Install flex connections on piping connections if system uses spring isolators.

D. Mount units on factory built curb providing watertight enclosure to protect ductwork and utility services. Install equipment level.

E. Install all piping per manufacturer’s requirements with necessary filters, traps, valves and other equipment for a full operating system.

F. Factory authorized startup and certification are required to inspect, assist in testing, and adjust components, assemblies, and connections.

END OF SECTION

SECTION 23 75 14

ROOF TOP AIR CONDITIONING UNITS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Packaged roof top unit.

B. Unit controls.

C. Roof mounting curb and base.

1.02 REFERENCES

A. NFPA 90 A & B - Standard for the Installation of Air Conditioning and Ventilation Systems and Installation of Warm Air Heating; National Fire Protection Association; 2002.

B. ANSI/ASHRAE 15 - Safety Code for Mechanical Refrigeration.

1.03 SUBMITTALS

A. See Division 1 for submittal procedures.

B. Product Data: Provide capacity and dimensions of manufactured products and assemblies required for this project. Indicate electrical service with electrical characteristics and connection requirements, and duct connections.

C. Manufacturer's Instructions: Indicate assembly, support details, connection requirements, and include start-up instructions.

D. Submit unit performance data including: capacity, nominal and operating performance.

E. Operation and Maintenance Data: Include manufacturer's descriptive literature, operating instructions, installation instructions, maintenance and repair data, and parts listing.

F. Warranty: Submit manufacturer's warranty and ensure forms have been filled out in Owner's name and registered with manufacturer.

G. Substitutions for equipment can only be made if contractor demonstrates to engineer and owner that substituted equipment has same performance characteristics, efficiency (IEER and EER), controls integration, and weights. Contractor to provide signed letter assuring engineer and owner that contractor shall cover all changes and costs associated with substituted equipment.

1.04 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum three years of documented experience.

B. Products Requiring Electrical Connection: Listed and classified by Underwriters' Laboratories, Inc. as suitable for the purpose specified and indicated.

1.05 DELIVERY, STORAGE, AND PROTECTION

A. Protect units from physical damage by storing off site until roof mounting curbs are in place, ready for immediate installation of units.

1.06 WARRANTY

A. See Division 1 - Closeout Submittals, for additional warranty requirements.

B. Provide a five year warranty to include coverage for compressors and heat exchangers. In addition, the entire unit, excluding refrigerant, will have a 12-month parts warranty form date of shipment not to exceed 18 months from date of shipment.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Trane Corporation; Model as Scheduled: www.trane.com.

2.02 AIR CONDITIONING UNITS

A. Description: Self-contained, packaged, factory assembled and prewired, consisting of cabinet and frame, supply fan, heat exchanger and burner, controls, air filters, refrigerant cooling coil and compressor, condenser coil and condenser fan.

2.03 GENERAL UNIT DESCRIPTION

A. Unit(s) furnished and installed shall be combination single-stage heat pump and single-stage cooling packaged rooftop(s) as scheduled on contract documents and these specifications. Units shall have one compressor, a variable speed supply fan and one-speed condenser fan. They shall be factory-assembled, piped, wired and fully charged with refrigerant. Cooling capacity ratings shall be based on ARI Standard 210/240. Unit(s) shall consist of an insulated, weather-tight casing with compressor(s), air-cooled condenser coil, condenser fans, evaporator coil, return-air filters, supply motors, unit controls and heating section controls.

B. Rooftop packaged unit shall be Bacnet compatible and shall integrate into existing campus wide web based central management system.

2.04 FABRICATION

A. Cabinet: Steel with baked enamel finish, including access panels with screwdriver operated flush cam type fasteners and base pan. Structural members shall be minimum 18 gage, with access doors or panels of minimum 20 gage. Exterior surfaces shall be phosphate and
zinc-coated steel with baked enamel powder paint finish.

B. Insulation: one inch thick foil-faced neoprene coated glass fiber with edges protected from erosion in the heat exchanger and evaporator sections to provide a non-porous, cleanable surface.

C. External cabinet surface shall be tested 1000 hours in salt spray test in compliance with ASTM B117.

D. Access Panels: Water and air-tight panels shall provide access to filters, heating section, return air fan section, supply air fan section, evaporator coil section, and unit control section

E. Provide openings in unit cabinet for power, control, and condensate.

F. Supply Fan: Forward curved centrifugal type, resiliently mounted with direct drive or V-belt drive, adjustable variable pitch motor pulley, and rubber isolated hinge mounted high efficiency motor or direct drive as indicated. Isolate complete fan assembly. Refer to Section 15072.

G. Air Filters: 1 inch thick glass fiber disposable media in metal frames. Refer to Section 15860.

H. Unit shall be provided with through the curb access for power, control, and gas connections.

2.05 FANS AND MOTORS

A. Evaporator fan shall be forward curved and have multispeed, belt or direct drive motors.

B. Outdoor condenser fans shall be two-speed, direct drive, statically and dynamically balanced and be configured in a draw-through arrangement.

2.06 EVAPORATOR COIL

A. Provide seamless copper tube aluminum fin coil assembly with galvanized drain pan and connection. Factory pressure and leak tested at 400 psig.

B. Provide capillary tubes or thermostatic expansion valves for units of 6 tons capacity and less, and thermostatic expansion valves and alternate row circuiting for units 7.5 tons cooling capacity and larger.

C. Drain pan under evaporator coil shall be manufactured of a non-corrosive material - either polymer or stainless steel - galvanized steel is not acceptable. It shall be sloped toward the drain to allow total drainage of condensate at all unit operating conditions.

2.07 COMPRESSOR

A. Provide hermetic compressors, 3600 rpm maximum, resiliently mounted with positive lubrication, crankcase heater, high and low pressure safety controls, motor overload protection, suction and discharge service valves and gage ports, and filter drier.

2.10 CONDENSER COIL

A. Provide copper tube aluminum fin coil assembly with subcooling rows and coil guard. Factory pressure and leak tested at 400psig.

B. Provide direct drive propeller fans, resiliently mounted with fan guard, motor overload protection, wired to operate with compressor. Provide high efficiency fan motors.

2.11 REFRIGERATION SYSTEM

A. Unit shall be equipped to provide mechanical cooling for low ambient operation from zero (0) to 115 degrees Fahrenheit.

2.12 OUTDOOR AIR SECTION

A. Provide a fully integrated, field-installed 0-100% modulating outside air economizer including damper actuator, fixed dry bulb economizer control.

1. Provide fully integrated, field-installed variable minimum position control for the economizer. The economizer shall reset its minimum position as indoor fan speed varies.
    a. When the unit is off the damper shall be shut.
    b. When the unit is operating at 100% fan capacity (two stages of heating or cooling) the damper shall modulate to a minimum position set by the TAB contractor to provide the specified outside airflow.
    c. When the unit is operating at 50% fan capacity (occupied with fan running or one stage of heating or cooling) the damper minimum position shall reset as determined by the TAB contractor to provide the specified outside air flow at part load operation. (This will be open greater than the 100% fan capacity setting to compensate for lower unit airflow.)

B. Provide spring return for outside air damper closure during unit shutdown or power interruption.

PART 3 EXECUTION

3.01 EXAMINATION

A. Contractor shall verify that roof is ready to receive work and opening dimensions are as illustrated by the manufacturer.

B. Contractor shall verify that proper power supply is available.

3.02 INSTALLATION

A. Contractor shall Install in accordance with manufacturer's instructions.

B. Install in accordance with NFPA 90A.

C. Mount units on factory built roof mounting curb providing watertight enclosure to protect ductwork and utility services. Install roof mounting curb level.

D. Install with flex connections for supply and return duct with galvanized sheet metal weather shield if exposed to weather.

END OF SECTION

SECTION 26 00 10
BASIC ELECTRICAL REQUIREMENTS

PART 1 - GENERAL

1.01 SCOPE

A. This section supplements all sections of this division and shall apply to all phases of work hereinafter specified, shown on the drawings, or required to provide a complete installation of electrical systems for the Project. The work required under this division is not limited to the electrical specifications and drawings. Refer to all bid documents including Civil, Architectural, Structural, and Mechanical documents which may designate Work to be accomplished. The intent of the Specifications is to provide a complete and operable electrical system, which shall include all documents that are a part of the entire Project Contract.

1. Work included: Furnish all labor, material, tools, equipment, facilities, transportation, skilled supervision necessary for, and incidental to, performing operations in connection with furnishing, delivery, and installation of the work in this division complete as shown or noted on the Drawings and specified herein.

B. Related Work Specified Elsewhere:

1. Refer to all sections in the general contract conditions, Contract Requirements and Division 1, General Requirements.

C. Work Installed but Furnished by Others:

1. The electrical work includes the installation or connection of certain materials and equipment furnished by others. Verify installation details. Foundations for apparatus and equipment will be furnished by others unless otherwise noted or detailed.

1.02 GENERAL REQUIREMENTS

A. Guarantee See General Conditions:

1. Except as may be specified under other Sections in the specification, guarantee equipment furnished under the specifications for a period of one year, except for equipment required to have a longer guarantee period, from date of final completion. Guarantee all work against defective workmanship, material, and improper installation. Upon notification of failure, correct deficiency immediately and without additional cost to the Owner.

2. Standard warranty of manufacturer shall apply for replacement of parts after expiration of the above period. Manufacturer shall furnish replacement parts to the Owner or his service agency as approved. Furnish to the Owner, through the Architect, printed manufacturer's warranties complete with material included and expiration dates, upon completion of project. Conform to Division 01.

B. Equipment Safety: All electrical materials and equipment shall be new and shall be listed by Underwriter's Laboratories and bear their label, or listed and certified by a nationally recognized testing authority where UL does not have an approval. Custom made equipment must have complete test data submitted by the manufacturer attesting to its safety.

C. Codes and Regulations:

1. Design, manufacturer, testing and method of installation of all apparatus and materials furnished under the requirements of these specifications shall conform to the latest publications or standard rules of the following:

    a. Institute of Electrical and Electronic Engineers - IEEE

    b. National Electrical Manufacturers' Association - NEMA

    c. Underwriters' Laboratories, Inc. - UL

    d. National Fire Protection Association - NFPA

    e. American Society for Testing and Materials - ASTM

    f. American National Standards Institute - ANSI

    g. California Electrical Code - CEC, Title 24, Part 3

    h. California Code of Regulations, Title 8, Subchapter 5

    i. California Building Code-CBC, Title 24 Parts 1 &2

    j. State & Municipal Codes in Force in the Specific Project Area

    k. Occupational Safety & Health Administration - OSHA

    l. California State Fire Marshal

    m. California Fire Code- CFC, Title 24 Part 9

    n. National Electrical Testing Association - NETA

2. The term "Code", when used within the specifications, shall refer to the Publications, Standards, ordinances and codes, listed above. In the case where the codes have different levels of requirements the most stringent rules shall apply.

D. Requirements of Regulatory Agencies:

1. Codes, Permits, and Fees: Where the Contract Documents exceed minimum requirements, the Contract Documents take precedence. Where code conflicts occur, the most stringent shall apply. The most stringent condition shall be as interpreted by the Engineer.

    a. Comply with all requirements for permits, licenses, fees and Code. Permits, licenses, fees, inspections and arrangements required for the Contractor at his expense shall obtain the Work, unless otherwise specified.

    b. Comply with the requirements of the applicable utility companies serving the Project. Make all arrangements with the utility companies for proper coordination of the Work.

E. Shop Drawings:

1. See Division 01 for additional requirements.

2. Time Schedules for Submission and Ordering: The Contractor shall prepare, review and coordinate his schedule of submissions carefully, determining the necessary lead time for preparing, submitting, checking, ordering and delivery of materials and equipment for timely arrival. The Contractor shall be responsible for conformance with the overall construction schedule.

3. Submittals will be checked for general compliance with specifications only. The Contractor shall be responsible for deviations from the drawings or specifications and for errors or omissions of any sort in submittals.

4. Submit a complete list of materials and equipment proposed for the job, including manufacturers names and catalog numbers.

5. Shop drawings shall be submitted in completed groups of materials (i.e., lighting fixtures or switchgear). The Contractor shall add and sign the following paragraph on equipment and materials submitted for review. "It is hereby certified that the (equipment) (material) shown and marked in this submittal is that proposed to be incorporated into the project; is in compliance with the Contract Drawings and specifications and can be installed in the allocated spaces". Failure to add the above written statement for compliance will result in return of submittals without review.

   a. Bind catalog cuts, plate numbers, descriptive bulletins and drawings, 11" x 17" (275 mm x 435 mm) or smaller, in sets with covers neatly showing titles.

   b. The Contractor shall verify dimensions of equipment and be satisfied as to Code compliance for fit prior to submitting shop drawings for approval.

   c. Where current limiting devices are specified, submit technical data to substantiate adequate protection of equipment cascaded downstream. Submittals shall not be reviewed unless supporting calculations and data are submitted therewith.

   d. Include complete catalog information such as construction, ratings, insulation systems, as applicable.

   e. For any material specified to meet UL or trade standards, furnish the manufacturers or vendor's certification that the material furnished for the work does in fact equal or exceed such specifications.

   f. Reference listings to the specifications' Sections and Article to which each is applicable.

   g. Equipment Floor Plans: After approval of material is secured prepare a floor plan of each electrical and communication equipment space, room or yard, drawn to scale at 1/2 inch equals 1 foot and submit for approval in the same manner as for shop drawings. The layout drawings shall be exact scale.

6. Contractor shall prepare coordinated drawings when required by Division 01 or where noted otherwise.

F. Interpretations: The Contractor through the Architect must make Requests for interpretations of drawings and specifications. Any such requests made by equipment manufacturers or suppliers will be referred to the Contractor.

G. Standard of Quality

1. The contract Drawings and Specifications establish the “MINIMUM STANDARD OF QUALITY” each product and/or system must meet to be considered acceptable. Products of other manufactures will be considered if the product and/or system meet or exceed the “MINIMUM STANDARD OF QUALITY” established by this Contract Document.

2. Items for similar application shall be of the same manufacturer.

3. The label of listing by UL shall appear on all materials and equipment for which standards have been established by the agency.

4. Where codes as listed in Section General Requirement Section of the Specifications that establish label or approved requirements, furnish all materials and equipment with either the required labels affixed or the necessary written approval.

5. Provide the type and quantity of electrical materials and equipment necessary to complete Work and all systems in operation, tested and ready for use.

6. Provide and install all incidental items that belong to the Work described and which are required for complete systems.

7. All switchboards, distribution boards, panel boards and circuit breakers shall be of the same manufacturer.

8. All wiring devices such as switches and receptacles shall be of the same manufacturer.

H. Substitutions: Refer to Division 01

I. Submit comprehensive material list, shop drawings and complete technical data for the following equipment and materials:

1. General Requirements:

a. Main service and distribution switchboards.

b. Panelboards.

c. Conduits

d. Conductors, include all selected insulation types.

e. Fuses

f. Disconnect switches and Starters.

g. Pullboxes, manholes and handholes.

h. Standard lighting fixtures, specially fabricated fixtures, ballasts and lamps, with samples and sample of standard finish available (where requested).

i. Control devices, standard and special receptacles, switches, outlets and finish device plates.

j. Cabinets for signal and telephone system, special terminals and cabinets. Include all cabinet dimensions.

k. Fire alarm system.

l. Transformers

J. Record Drawings: Refer to Division 01, Contract Closeout.

K. Work Responsibilities:

1. The drawings indicate diagrammatically the desired locations or arrangement of conduit runs, outlets, junction boxes and equipment and are to be followed. Execute the work so as to secure the best possible installation in the available space and to overcome local difficulties due to space limitations. The Contractor is responsible for the correct placing of his work. Where conflicts occur in plans and/or specifications, the most stringent application shall apply and shall be part of the base bid.

2. Locations shown on architectural plan or on wall elevations shall take precedence over electrical plan locations, but where a major conflict is evident, notify the Architect.

3. In the event minor changes in the indicated locations or arrangement are necessary due to developed conditions in the building construction or rearrangement of furnishings or equipment or due to interference with other trades, such changes shall be made without extra cost.

4. Verify dimensions and the correct location of Owner-Furnished equipment before proceeding with the roughing-in of connections.

5. All scaled and figured dimensions are approximate of typical equipment of the class indicated. Before proceeding with work carefully check and verify dimensions and sizes with the drawings to see that the furnished equipment will fit into the spaces provided without violation of applicable Codes.

6. Should any changes to the work indicated on the drawings or described in the specifications be necessary in order to comply with the above requirements, notify the Architect.

7. Contractor shall be responsible for coordination of coordinated drawings when required by the Architect.

8. Replace or repair, without additional compensation any work which does not comply with or which is installed in violation of any of these requirements.

L. Installation General: For special requirements, refer to specific equipment under these requirements.

1. Unless otherwise specified elsewhere in the specifications, do all excavating necessary for the proper installation of the electrical work.

2. Locations of Openings: Locate chases, shafts and openings required for the installation of the electrical work during framing of the structure. Do any additional cutting and patching required. Cutting or drilling in any structural member is prohibited without approval of the Architect. Furnish all access panels to make all boxes, connections and devices accessible as required by CEC.

3. Location of Sleeves: Where conduits pass through concrete walls, suspended slabs or metal deck floors, install sleeves of adequate size to permit installation of conduit. Sleeves shall be installed

prior to pouring of concrete and shall have ends flush with the wall or extend 2 inches above floor surfaces. Verify locations.

4. Wherever conduit extends through roof, install flashings in accordance with drawings and details.

5. Contractor shall be responsible for cutting and patching which may be required for the proper installation of the electrical work.

6. Protect work, materials and equipment and provide adequate and proper storage facilities during the progress of the work. Storage outdoors shall be weather protected and shall include space heaters to prevent condensation. Provide for the safety and good condition of all work until final acceptance of the work. Replace all damaged or defective work, materials and equipment before requesting final acceptance.

7. Conduit and Equipment to be Installed: Clean thoroughly to remove plaster, spattered paint, cement and dirt on both exterior and interior. All underground conduits shall be mandrelled prior to pulling wire.

8. Conduit and Equipment to be Painted: Clean conduit exposed to view in completed structure by removing plaster and dirt. Remove grease, oil and similar material from conduit and equipment by wiping with clean rags and suitable solvents in preparation for paint.

9. Items with Factory Finish: Remove cement, plaster, grease and oil, and leave surfaces, including cracks and corners, clean and polished. Touch up scratched or bare spots to match finish.

10. Site Cleaning: Remove from site all packing cartons, scrap materials and other rubbish on a weekly basis. Vacuum out all cabinets, switchgear and panels and junction boxes prior to pulling any conductors.

11. Electrical equipment and materials exposed to public and in finished areas shall be finish-painted after installation in accordance with the Painting Section. All exposed screw-type fasteners, exterior, or interior in restrooms, shall be vandal-resistant spanner type; include tool.

M. Excavation, Cutting and Patching:

1. Excavating, trenching and backfilling required for the work of this Division in accordance with the applicable requirements of Division 2. Excavating and backfilling connected with electrical work, repaving cuts and providing and maintaining protective measures for the electrical work excavation required by the governing authorities having jurisdiction shall be performed as a part of the work of this Division.

2. Verify openings indicated on the drawings. Provide all cutting, patching and reinforcement of the construction of the building as required to install electrical work.

N. Tests

1. Equipment and systems for which the National Electrical Testing Association (NETA) has an approved or recommended procedure, shall be tested in accordance with that procedure. Test values shall equal values recommended by NETA. Copies of test reports shall be submitted as required under shop drawing submittals.

2. Resistance to ground tests shall be accomplished by a qualified independent testing firm to measure resistance to ground at grounding electrodes. Make tests before slabs or affected areas are poured in order that corrective measures, if required, may be taken. Submit a report showing the results of these measurements. If the resistances exceed values specified elsewhere or NETA test procedure recommendations, perform corrective measures required to reduce resistance to acceptable values.

3. Prior to energizing any motor, measure the service voltage for phase balance and report if unbalance exceeds 1% from mean.

4. Measure the three-phase voltage at no load and at maximum load conditions and submit to the engineer a report showing the results of these measurements.

5. Upon completion of the work and adjustment of all equipment, conduct an operating test. Conduct the test in the presence of an authorized representative of the Owner's Representative. Demonstrate system and equipment to operate in accordance with requirements of the Contract Documents and to be free from electrical and mechanical defects. Provide systems free from short circuits and grounds and show an insulation resistance between phase conductors and ground not less than the requirements of the governing electric code. Test circuits for proper neutral connection.

6. Complete tests prior to final inspection of project, including corrective work based on the results of the tests.

7. Perform special tests on systems and equipment as specified herein using personnel qualified to perform such tests.

O. Protection: Protect finish parts of the materials and equipment against damage during the progress of the work and until final completion and acceptance. Cover materials and equipment in storage and during construction in such a manner that no finished surfaces will be damaged or marred. Keep moving parts clean, dry and lubricated.

P. Cleaning Up:

1. Upon completion of the work and at various time during the progress of the work, remove from the building all surplus materials, rubbish and debris resulting from the work of this Division.

2. Thoroughly clean switchgear including busses, apparatus, exposed conduit, metal work including the exterior and interior, and accessories for the work of this Division, of cement, plaster and other deleterious materials; remove grease and oil spots with cleaning solvent; carefully wipe surfaces and scrape cracks and corners clean.

3. Thoroughly polish chromium or plated work. Remove dirt and stains from lighting fixtures.

4. Leave the entire installation in a clean condition.

Q. Completion:

1. The work will not be reviewed for final acceptance until operating and maintenance data, manufacturer's literature, panel directories and nameplates specified herein have been approved and properly posted or installed and final cleaning of equipment and premises has been completed.

2. When the installation is complete and adjustments have been made, operate the system for a period of one week, during which time demonstrate that systems are completed and operating in conformance with the specifications.

R. Operating and Maintenance Data: Submit complete and at one time, prior to acceptance of the installation, 4 copies of manufacturer's instructions for operation and maintenance of electrical equipment, including replacement parts lists. As specified in Division 01

S. Inspection and Acceptance Procedures: The Architect will submit observation reports periodically during the construction phase detailing Contract deficiencies. The Contractor is responsible for making corrections immediately. Notice of Completion of the project will not be made until all items have been corrected.

T. Final Completion of Electrical Systems:

1. Prior to Final Completion of operating electrical systems, the Contractor shall:

a. Provide materials of the type and quality specified and as necessary for proper operation, tested and ready for use.

b. Furnish the required Operating and Maintenance Data/Manuals.

c. Clean up of the project pertaining to this Division of the work.

d. After installation has been completed and adjustments made, operate the system for a period of one week, during which time, demonstrate to the Architect that systems are complete and operating in conformance with Contract Documents.

e. Conduct tests required and as specified in this Division and submit test reports and corrective actions taken.

f. Submission of warranties and guarantees.

2. Final Completion of Work Shall be Contingent On:

a. Contractor replacing defective materials and workmanship.

b. Upon completion of work and adjustments made, Contractor shall conduct an operating test for each system for approval at such time as Architect directs. Conduct test in presence of authorized representative of Architect and demonstrate that systems and equipment do operate in accordance with requirements of the Contract Documents and are free from electrical and mechanical defects.

c. Contractor shall provide the necessary training programs and instructions to the Owner's representative. Number of hours shall be a minimum of four (4) hours for each system or days as required under separate Sections of these Specifications. Complete operation and maintenance manuals shall be provided at least two (2) weeks prior to training.

d. Submit copies of manufacturer's instructions and maintenance of electrical equipment including replacement parts lists. Each set shall include one set of shop drawings of equipment installed.

U. Submittals for Change Orders: When changes are made during the construction phase, deletions and additions shall be presented in a manner that will indicate the cost of each item of material and corresponding labor.

Markup shall be then added in accordance with the requirements of the General Conditions as modified by the Supplementary Conditions.

V. The Contractor at a time convenient to the Owner shall provide instruction to the Owner's operating personnel in the proper operation and maintenance of all equipment and systems. The instructors shall have received factory training and shall be thoroughly familiar with the equipment installed. The operating personnel shall receive the number of days instruction as indicated in other sections.

1.03 PROJECT RECORD DOCUMENTS

A. Record Drawings: CAD: Use a computer aided drafting (CAD) system in the preparation of record drawings for this Project. Acceptable CAD systems shall be capable of producing files in AutoCAD Version 2004 compatible DWG or DXF format. Owner's consultant will furnish CAD backgrounds for use by the Contractor after construction is 85% complete except where prohibited by Contract.

B. Record Set During the Work: At site, maintain at least one set of Drawings as a Field Record Set. Also maintain at least one copy of all Addenda, Modifications, approved submittals, correspondence, and transmittals at site. Keep Drawings and data in good order and readily available to Architect and Owner.

C. Changes: Clearly and correctly mark Record Drawings to show changes made during the construction process at the time the changed work is installed. No such changes shall be made in the work unless authorized by the Architect.

D. Final Record Drawings: Conform to Division 01 requirements.

E. Preparation of Final Record Drawings: Contractor shall transfer recorded changes in the work indicated on the Field Record Set to the record set. Changes shall be neatly and clearly drawn and noted by skilled draftsmen, and shown technically correct.

F. Approval: Prior to Architect's inspection for Substantial Completion, submit the Final Record Drawings to the Architect for review, and make such revisions as may be necessary for Final Record Drawings to be a true, complete, and accurate record of the work.

G. Manuals: Obtain data from the various manufacturers and submit instruction, operation, and maintenance manuals as required and to the extent required under other Sections.

H. At all times when the work is in progress, maintain at the workplace, fabrication shop or Project Site as applies, a complete separate, clean, undamaged set of the latest stamped, actioned submittals. As work progresses, maintain records of "as installed" conditions on this set in suitable ink or chemical fluid. Update the set daily. After successful completion of Project Site testing specified herein, and after completion of Punch List corrections, copy all records of "as installed" conditions on to originals.

I. Quantity:

1. Review sets:As for Shop and Field Drawings.

2. Record set:Refer to Division 01.

J. Content: All drawings required under "Field and Shop Drawings". Show "as installed" condition. Where room designations according to Project permanent signage differ from construction designations in the Contract Documents, show both designations.

K. Warranty Certificates: Comply with Division 01.

A. END OF SECTION

SECTION 26 0510
ELECTRICAL GENERAL PROVISIONS

PART 1 – GENERAL

1.1 SECTION INCLUDES

A. Furnish all labor, materials, apparatus, tools, equipment, transportation, temporary construction and special or occasional services as required to make a complete working electrical installation, as shown on the drawings or described in these specifications.

1.2 REFERENCES

A. Reference to codes, standards, specifications and recommendations of technical societies, trade organizations and governmental agencies shall mean the latest edition of such publications adopted and published prior to submittal of the bid proposed. Such codes or standards shall be considered a part of this specification as though fully repeated herein.

B. When codes, standards, regulations, etc., allow work of lesser quality or extent than is specified under this Division, nothing in said codes shall be construed or inferred as reducing the quality, requirements or extent of the drawings and specifications.

C. California Code of Regulations (CCR) Title 24, Part 3, Basic Electrical Requirements, State Building Standards Electrical Code

D. National Fire Protection Association (NFPA).

E. Equipment and materials specified under this Division shall conform to the following standards where applicable:

1. UL Underwriters' Laboratories
2. ASTM American Society for Testing Materials
3. CMB Certified Ballast Manufacturers
4. IPCEA Insulated Power Cable Engineer Assoc.
5. NEMA National Electrical Manufacturer's Assn.
6. ANSI American National Standards Institute
7. ETL Electrical Testing Laboratories

F. All base material shall be ASTM and/or ANSI standards.

G. All electrical apparatus furnished under this Section shall conform to National Electrical Manufacturers Association (NEMA) standards and the NEC and bear the Underwriters' Laboratories (UL) label where such label is applicable.

1.3 SUBMITTALS

A. See Division 1 for submittal procedures.

B. Where items are noted as "or equal" a product of equal design, construction and performance will be considered. Contractor must submit all pertinent test data, catalog cuts and product information required to substantiate that the product is in fact equal. Refer to Division 1, General Requirement for additional requirements. Only one substitution will be considered for each product specified.

C. Submittals shall consist of detailed shop drawings, specifications, "catalog cuts" and data sheets containing physical and dimensioned information, performance data, electrical characteristics, material used in fabrication , material finish and shall clearly indicate those optional accessories which are included and those which are excluded. Furnish one reproducible and 4 prints of each shop drawing.

1.4 CUTTING, PAINTING AND PATCHING

A. Structural members shall in no case be drilled, bored or notched in such a manner that will impair their structural value. Cutting of holes, if required, shall be done with core drill and only with the approval of University Representative.

B. Cutting and digging shall be under the direct supervision of the General Contractor. Include as necessary for the work in this section.

C. The contractor shall be responsible for returning any surface from which he has removed equipment or devices to the condition and finish of the adjacent surfaces.

1.5 SUPERVISION

A. Contractor shall personally or through an authorized and competent representative constantly supervise the work from beginning to completion and, within reason, keep the same workmen and foreman on the project throughout the project duration.

1.6 PROTECTION

A. Keep conduits, junction boxes, and outlet boxes, and other openings closed to prevent entry of foreign matter: cover fixtures, equipment, and apparatus and protect against dirt, paint, water, chemical, or mechanical damage, before and during construction period. Restore to original condition any fixture, apparatus, or equipment damaged prior to final acceptance, including restoration of damaged shop coats of paint, before final acceptance. Protect bright finished surfaces and similar items until in service. No rust or damage will be permitted.

1.7 EXAMINATION OF SITE

A. The Contractor shall visit the site and determine the locale, working conditions, conflicting utilities, and the conditions in which the electrical work will take place. No allowances will be made subsequently for any costs which may be incurred because of any error or omission due to failure to examine the site and to notify the Engineer of any discrepancies between drawings and specifications and actual site conditions. Schedule visits at least 1 week in advance with University Maintenance staff.

1.8 ENVIRONMENTAL REQUIREMENTS

A. After other work such as sanding, painting etc. has been completed, clean lighting fixtures, panelboards, switchboards, and other electrical equipment to remove dust, dirt, and grease, or other marks, and leave work in clean condition.

1.9 VOLTAGE CHECK

A. At completion of job, check voltage at several points of utilization on the system which has been installed under this contract. During test, energize all loads installed. Measure 3-Phase voltages and note percentage differences. Submit report to Engineer. Include copy in O&M Manual.

1.10 TESTS

A. Perform tests as specified to prove installation is in accordance with contract requirements. Perform tests in the presence of the Engineer and furnish test equipment, facilities, and technical personnel required to perform tests. Tests shall be conducted during the construction period and at completion to determine conformity with applicable codes and with these Specifications. Tests, in addition to specific system test described elsewhere, shall include:

1. Insulation Resistance: All 600 volt insulation shall be tested at 1,000 volts D.C for one minute on all feeder and branch circuit conductors including the neutral, and make a typed record of all readings to be included in the maintenance instructions. The direct current amperes shall be recorded at start and at one minute. The value shall be declining and not more than one microampere.
2. Circuit Continuity: Test all feeder and branch circuits for continuity. Test all neutrals for improper ground.

B. Equipment Operations: Test motors for correct operation and rotation.

C. Product Failure: Any products which fail during the tests or are ruled unsatisfactory by the Engineer shall be replaced, repaired, or corrected as prescribed by the Engineer at the expense of the Contractor. Tests shall be performed after repairs, replacements, or corrections until satisfactory performance is demonstrated.

D. Miscellaneous: Include all test results in the maintenance manual. Cost, if any, for all tests shall be paid by the Contractor.

1.11 DRAWINGS

A. Layout: General layout shown on the drawing shall be followed except where other work may conflict with the drawings.

B. Accuracy:
1. Drawings for the work under this section are diagrammatic.
2. Contractor shall verify lines, levels, and dimensions shown on the drawings and shall be responsible for the accuracy of the setting out of work and for its strict conformance with existing conditions at the site.

3. Contractor shall insure reconnection of existing equipment and circuits affected by contract demolition whether or not reconnection is specifically shown on the contract documents.

1.12 PROJECT RECORD DRAWINGS

A. Refer to General Conditions for contractual requirements. Provide project record drawings as required by the General Provisions of the specifications and as required herein. Such drawings shall fully represent installed conditions including actual locations of outlets, true panelboard connections following phase balancing routines, correct conduit and wire sizing as well as routing, revised fixture schedule listing the manufacturer and products actually installed and revised panel schedule. All changes to drawings shall be made by qualified draftspersons to match existing linework and lettering as close as possible. When all the changes have been made to the trade drawings, contractor shall produce one (1) full size (E-Size) updated set of trade drawing(s) utilizing AutoCad 2008 or newer and supply one (1) set of Compact Discs (CD's) reflecting same.

1.13 MAINTENANCE AND OPERATING INSTRUCTIONS

A. Furnish to the Engineer four (4) hard back 3-ring binders containing all bulletins, operating and maintenance instructions and part lists and other pertinent information for each and every piece of equipment furnished under this specification. Include service telephone numbers. Each binder shall be indexed into sections and labeled for easy reference. Bulletins containing more information than the equipment concerned shall be properly stripped and assembled.

B. At the time of completion, a period of not less than eight hours shall be allotted by the Contractor for instruction of building operating and maintenance personnel in the use of all systems. All personnel shall be instructed at one time, the Contractor making all necessary arrangements with manufacturer's representative. The equipment manufacturer shall be requested to provide product literature and application guides for the user's reference. Costs, if any for the above services shall be paid by the Contractor.

1.14 WARRANTIES

A. Furnish to the Engineer four (4) hard back 3-ring binders containing all warranties of every piece of equipment furnished under this specification. Include terms and limitations of warranties, contact names, addresses, and telephone numbers of manufacturer. Each binder shall be indexed into sections and labeled for easy reference for each equipment warranty.

1.15 EXTRA MATERIALS

A. See Division 1 - Product Requirements, for additional provisions.

B. All special tools for proper operation and maintenance of the equipment provided under this Section shall be delivered to the District's representative

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

3.01 WORKMANSHIP

A. Preparation, handling, and installation shall be in accordance with manufacturer's written instructions and technical data particular to the product specified and/or accepted equal except as otherwise specified. Coordinate work and cooperate with others in furnishing and placing this work. Work to reviewed shop drawings for work done by others and to field measurements as necessary to properly fit the work.

B. Conform to the National Electrical Contractor's Association "Standard of Installation" for general installation practice.

3.02 INSTALLATION

A. Install in accordance with manufacturer's instructions.

END OF SECTION

SECTION 26 0512
BASIC MATERIAL AND METHODS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Conduit, raceways and fittings.

B. Wires and Cables for 600 Volts and less.

C. Wire connections.

D. Wire devices.

E. Outlet boxes.

F. Pull and junction boxes.

G. Disconnect Switches.

H. Fuses.

I. Supporting Devices.

J. Identifying Devices.

K. Grounding and Bonding

1.2 SUBMITTALS

A. Submit in accordance with the requirements of Division 1 the following items:

1. A list of conduit types indicating where each type of conduit will be used. Indicate conduit manufacturers and fittings to be used.

2. Wires and Cables.

3. Wiring Devices and Plates

4. Nameplates, including engraving schedules where engraved plates are specified.

5. Fused disconnect switches.

1.3 QUALITY ASSURANCE

A. Conform to requirements of NFPA 70.

B. Products: Listed and classified by Underwriters Laboratories, Inc. as suitable for the purpose specified and indicated.

1.4 REFERENCES

A. ANSI C80.1 - Rigid Steel Conduit, Zinc Coated - latest edition.

B. ANSI C80.3 - Electrical Metallic Tubing, Zinc Coated - latest edition.

C. ANSI C80.5 - Rigid Aluminum Conduit - latest edition.

D. NECA (INST) - Standard of Installation; National Electrical Contractors Association - latest edition.

E. NEMA FB 1 - Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit and Cable Assemblies; latest edition.

F. NEMA RN 1 - Polyvinyl Chloride (PVC) Externally Coated Galvanized Rigid Steel Conduit and Intermediate Metal Conduit - latest edition.

G. NEMA TC 2 - Electrical Plastic Tubing (EPT) and Conduit (EPC-40 and EPC-80) - latest edition.

H. NEMA TC 3 - PVC Fittings for Use with Rigid PVC Conduit and Tubing - latest edition.

I. NFPA 70 - National Electrical Code - latest edition.

PART 2 PRODUCTS

2.1 CONDUIT, RACEWAYS AND FITTINGS

A. Rigid Steel Conduit

1. Rigid steel conduit shall be full weight, pipe size, finished inside and out by hot-dip galvanizing after fabrication, and shall conform with ANSI C80.1 and UL.

2. Couplings shall be electroplated steel.

3. Insulating Bushings: Threaded polypropylene or thermo-setting phenolic rated 150°C minimum.

4. Insulated grounding Bushings: Threaded cast malleable iron body with insulated throat and steel "lay-in" ground lug with compression screw.

5. Insulated Metallic Bushings: Threaded cast malleable iron body with plastic insulated throat rated 150°C.

6. Running threads are not acceptable.

7. Electrical Metallic Tubing (EMT):

a. Conduit: Conduit shall be formed of cold rolled strip steel, and shall comply with ANSI C80.3 and UL requirements.

b. Couplings: Electroplated steel, UL listed rain and concrete tight through 1-1/4" trade size. All EMT fittings shall be compression type.

c. Connectors: Steel, gland compression type with insulated plastic throat, 150°C temperature rated. All EMT fittings shall be compression type.

8. Liquid Tight Flexible Metal Conduit:

a. Conduit: Conduit shall be fabricated in continuous lengths from galvanized steel strip, spirally wound. Flexible conduit, except where installed in concealed dry locations, shall be liquid tight with plastic jacket extruded over the outer zinc coating. No aluminum substitute will be accepted.

b. Fittings: Connectors shall be the screw clamp on screw-in (Jake) variety with cast malleable iron bodies and threaded male hubs with insulated throat or insulated bushings. Set screw type connectors are not acceptable. Liquid tight fittings shall be of cadmium plated cast malleable iron, with insulated throat.

9. Rigid Non-Metallic Conduit:

a. Conduit and fittings shall be homogeneous plastic material free from visible cracks, holes or foreign inclusions. The conduit bore shall be smooth and free of blisters, nicks or other imperfections which could damage conductors or cables.

b. Materials: Polyvinyl Chloride (PVC) schedule 40. Material shall comply with NEMA TC-2 for conduit and NEMA TC-3 for fittings.

2.2 WIRING AND CABLES

A. Acceptable manufacturers: Southwire, or approved equal.

B. Conductor material: All wire and cable shall be insulated, stranded copper conductors. Soft drawn annealed copper wire 98% conductivity, bearing the UL label.

C. Minimum conductor size: AWG No. 12 for all power and lighting branch circuits. AWG No. 14 for all signal and control circuits.

D. Color Coding: System conductors shall be identified as to voltage and phase connections by means of color impregnated insulation or approved colored marking tape as follows:

E. For 120/240 volt, single phase, 3 wire system.

1. Phase A - Black
2. Phase B - Red
3. Phase C - Orange for High Leg (208v to neutral)
4. Neutral - White
5. Ground - Green

F. For 120/208 volt, 3 phase, 4 wire systems.

1. Phase A - Black
2. Phase B - Red
3. Phase C - Blue
4. Neutral - White
5. Ground - Green

G. for 277/480 Volt, 3 phase, 4 wire system

1. Phase A - Brown
2. Phase B - Orange
3. Phase C - Yellow
4. Neutral - Grey
5. Ground - Green

H. Secondary Wire and Cable, 0 to 600 Volts;

1. NEC Type THWN, or Type XHHW for feeders and branch circuits in wet or dry locations. NEC type THHN for branch circuits in dry locations.

2.3 WIRE CONNECTION

A. Wire Joints: Wires in sizes from #18 to #8 AWG, stranded conductor, with insulation rated 105 degrees C. or less shall be joined with electrical spring connectors of three part construction incorporating a non-restricted, zinc coated steel spring enclosed in a steel shell with an outer jacket of vinyl plastic with a flexible insulating skirt.

B. Mechanical Compression Connectors and Taps: Stranded conductors from #6 AWG to 750 Kcmil shall be joined or tapped using bolted pressure connectors having cast bronze compression bolts. Fittings shall be wide range-taking

and designed to facilitate the making of parallel taps, tees, crosses or end-to-end connections. Split-bolt connectors will not be acceptable.

C. Fixture Connections: Splice fixture wire to circuit wiring with solderless connectors as specified above in paragraph A.

D. Terminating Lugs: Conductors from size No. 6 AWG to 750 Kcmil, copper, shall be terminated using tin plated hydraulically operated crimping tools and dies as stipulated by the lug manufacturer. Lugs shall be 3M "Scotchlok" series 30000, Burndy Type Ya-L series, or equal.

E. Splicing and Insulating Tape (600 volts and below): General purpose electrical tape shall be suitable for temperatures from minus 18 degrees C to 105 degrees C, shall be black, ultraviolet proof, self-extinguishing, 7 mil thick vinyl with a dielectric strength of 10,000 volts. Apply 4 layers half-lap with 2” over-lay on each conductor.

F. Insulating Putty (600 volts and below): Pads or rolls of non-corrosive, self-fusing, one-eight inch thick rubber putty with PVC backing sheet. Putty shall be suitable for temperatures from minus 17.8 degrees C to 37.8 degrees C and shall have a dielectric strength of 570 volts/mil minimum.

G. Insulating Resin: Two Part liquid epoxy resin with resin and catalyst in pre measured, sealed mixing pouch. Resin shall have a set up time of approximately 30 minutes at 21.1 degrees C, and shall have thermal and dielectric properties equal to the insulation properties of the cables immersed in the resin.

H. Terminal Strip Connectors: Terminate wire in locking tongue style, pressure type, solderless lug where applicable.

I. WIRING DEVICES

1. Switches: Specification grade, flush mounting, quiet operating AC type, with toggle operator, heat resistant plastic housing and self grounding metal strap. Silver or silver alloy contact. Rated 20A at 120-277V and capable of full

    a. capacity on tungsten or fluorescent lamp load. Design for up to #10 wire. Use single pole, double pole, three-way, four-way, lighted, pilot, or keyed type, as indicated on drawings or required. Provide white color unless otherwise noted. Manufacturer: Leviton, Arrow Hart, or Hubbell.

2. Receptacles: Specification grade, flush mounting receptacles with nylon face. High grade brass allow triple wipe contacts. Provide 2 pole, 3 wire grounding type with a green colored brass hexagonal equipment grounding screw. Grounding shall be rivetless, single piece brass with no mechanical connections in the primary path between point of ground wire termination and ground blades. Use 20A rated receptacles, white in color, unless otherwise noted. Manufacturer: Leviton, Arrow Hart, or Hubbell.

    a. Isolated Ground - Provide separate path to ground, with orange faceplate or triangle to indicated isolated ground

    b. GFCI - Equipped with diagnostic indicator for miswiring.

    c. Weatherproof - GFCI type, outdoor rated, with metal lockable while in use cover

J. Faceplates: Provide nylon cover faceplates for wall receptacles, outlets, and switches. Include thermal mounting screws that match plate and device color. Manufacturer: Leviton, Arrow Hart, or Hubbell.

2.4 OUTLET BOXES

A. Standard outlet boxes: Galvanized, die formed or drawn steel, knock-out type of size and configuration best suited to the application indicated on the plans. Minimum box size, 4 inch square by 1-1/2 inch deep, indoor use. FS cast boxes are required for outdoor use.

B. Cast Metal Outlet Boxes: FS/FD cast boxes are required for outdoor use. Malleable iron alloy with threaded hubs and mounting lugs as required. Boxes shall be furnished with cast cover plates of the same material as the box and neoprene cover gaskets. Thomas and Betts, Crouse-Hinds, Appleton or equal.

C. Conduit Outlet Bodies: Cadmium plated, cast iron alloy. Obround conduit outlet bodies with threaded conduit hubs and neoprene gasketed, cast iron covers. Outlet bodies shall be used to facilitate pulling of conductors or to make changes in conduit direction only. Splices are not permitted in conduit outlet bodies. Thomas and Betts, Crouse Hinds Form 8 Condulets, Appleton form 35 Unilets, or equal.

2.5 PULL AND JUNCTION

A. Sheet Metal Boxes: Use standard outlet or concrete ring boxes wherever possible; otherwise use minimum 15 gauge get metal, NEMA 1 boxes, sized to code requirements with covers secured by cadmium plated machine screws located 6 inches on centers. Circle AW Products, Hoffman Engineering Co., or equal.

B. Cast Metal Boxes: Use standard cast malleable iron outlet or device boxes wherever possible; otherwise use cadmium plated, cast malleable iron junction boxes with bolt-on, interchangeable conduit hub plates with neoprene gaskets. Appleton FS/FD series; Crouse Hinds FS/FD series, or equal.

2.6 DISCONNECT SWITCHES

A. All disconnect switches shall be heavy-duty type and have the number of poles, voltage rating, and horsepower rating as required by the motor or equipment. Disconnect switches shall be in enclosures to suit conditions, NEMA 3R for outdoor and NEMA 1 for indoor. Disconnect switches shall be fused unless otherwise noted on the drawings. As manufactured by: Square D - Class 3110, ITE Seimens, or equal.

2.7 FUSES

A. Dual Element, Time Delay, UL Class RK5. Rejection type. Size and Voltage as indicated on equipment. Bussman, Little Fuse, or approved equal.

2.8 ELECTRICAL SUPPORTING DEVICES

A. Concrete Fasteners: Hilti Kwik Bolt TZ or equal, self-drilling expansion type concrete anchor.

B. Conduit Straps: Hot-dip galvanized, cast malleable iron, two holes type strap with cast clamp-backs and spacers as required. OZ/Gedney, Thomas & Betts, or equal.

C. Construction Channel: 1-1/2 inch by 1-1/2 inch 12 gauge galvanized steel channel with 17/32 inch diameter bolt holes, 1-1/2 inch on center, in the base of the channel. Kindorf 905 series, Unistrut P-1000-HS or equal.

D. Cable Ties and Clamps: Thomas and Betts Co. "Ty-Raps" Panduit "Pan-Ty" or equal one piece, nylon, reusable type lashing ties.

E. Fasteners (General) : Wood screws for fastening to wood. Machine screws for fastening to steel. Toggle bolts for fastening to hollow concrete block, gypsum board, or plaster walls. Expansion anchors for attachments to pre-poured concrete.

2.9 IDENTIFYING DEVICES

A. Nameplates: Type NP: Engraved black bakelite, 1 inch by 3-1/2 inch, 1/8 inch high white letters, machine screw retained. For permanent identification of all switchboards, panelboards, circuit breakers in separate enclosures, motor starters, relays, time switches, disconnect switches and other cabinet-enclosed apparatus including terminal cabinets or match existing as closely as possible.

B. Legend Plates: Type LP: Die-stamped metal legend plate with mounting hole and positioning key for attachment to panel mounted operators' devices. Engraved paint-filled characters as specified.

C. Wire & Terminal Markers: Self-adhering, pre-printed vinyl with self-laminating wrap around strip. Markers shall be legible after termination. Brady B191 series, Thomas & Betts WSL series or equal.

D. Conductor Phase Markers: Thomas & Betts WCPHAS series or similar in addition to colored marking as specified under this section of the specifications.

2.10 GROUNDING AND BONDING

A. Ground Rods

1. Manufacturer: Blackburn, Erico, or approved Equal

2. Size: 3/4" x 10' Ground Rods

B. Grounding Electrode Conductor, 2/0 for foundation foots, and per NEC.

C. Grounding Well - Christy Box, G5 Traffic Valve Box.

PART 3 EXECUTION

3.1 CONDUIT AND RACEWAY APPLICATIONS

A. Rigid Steel Conduit: Use rigid steel conduit for the following locations or conditions:

1. All exterior applications

2. All conduits larger than 2” trade diameter.

3. All conduits indoor below eight (8) feet above finished floor.

4. Electrical Metallic Tubing (EMT): EMT is allowed for the following conditions:

a. Interior only and above eight (8) feet from finished floor.

b. Interior only and when entering a panel from above.

5. Liquidtight Flexible Metallic Conduit: Use Liquidtight for the following conditions:

a. In damp and wet locations for connections to motors, transformers, vibrating equipment and machinery.

b. Connections to all pump motors, flow switches, and similar devices.

6. Rigid Non-Metallic Conduit, Polyvinyl Chloride (PVC) Schedule 40:

a. Underground installation.

3.2 CONDUIT INSTALLATION

A. General

1. All conduit runs shown on the plans are sized based on the use of rigid steel conduit and THWN copper conductors. If conductor type is changed the contractor shall be responsible for resizing conduits to meet code. In no case is conduit to be sized smaller than 3/4" trade diameter.

2. Low voltage wiring shall be installed in conduit, minimum 3/4" trade diameter.

3. Conduits shall be tightly covered and well protected during construction using metallic bushings and bushing "pennies" to seal open ends.

4. In making joints in rigid steel conduit, ream conduit smooth after cutting and threading.

5. Clean any conduit in which moisture or any foreign matter has collected before pulling in conductors. Paint all field threaded joints to prevent corrosion.

6. In all empty conduits or ducts, install an 1100 pound tensile strength polyethylene pulling rope.

7. Conduit systems shall be electrically continuous throughout. Install code size, uninsulated, copper grounding conductors in all conduit runs, grounding conductor shall be bonded to conduit, equipment frames and properly grounded.

B. Layout:

1. All new conduits shall be concealed. Any field conditions that does not allow concealment of conduits shall be reviewed with the Engineer prior to rough-in.

2. Locations of conduit runs shall be planned in advance of the installation and coordinated with concrete work, plumbing and framing.

3. Where practical install conduits in groups in parallel vertical or horizontal runs and at elevations that avoid unnecessary off-sets.

4. Low voltage conduit shall be grouped separately and labelled every 10 ft interval as to system (i.e. fire, control, etc)

5. Exposed conduit shall be run parallel or at right angles to the centerlines of the columns and beams.

6. Conduits shall not be placed closer than 12 inches from a parallel hot water or steam line or three inches from such lines crossing perpendicular to the runs.

7. In long runs of conduit, provide sufficient pull boxes per NEC inside buildings to facilitate pulling wires and cables. Support pull boxes from structure independent of conduit supports. These pull boxes are not shown on the plans.

C. Supports:

1. All raceway systems shall be secured to building structures using specified fasteners, clamps and hangers spaced according to Code.

2. Support single runs of conduit using two holes pipe straps. Where run horizontally on walls in damp or wet locations, install "clamp blocks" to space conduit off the surface.

3. Multiple conduit runs shall be supported using "trapeze" hangers fabricated from 3/8 inch diameter, threaded steel rods secured to building structures. Fasten conduit to construction channel with standard two holes pipe clamps. Provide lateral seismic bracing for hangers.

4. Installation

a. Locate and install anchors, fasteners, and supports in accordance with NECA "Standard of Installation".

1) Do not fasten supports to pipes, ducts, mechanical equipment, or conduit.

2) Do not drill or cut structural members.

b. Rigidly weld support members or use hexagon-head bolts to present neat appearance with adequate strength and rigidity. Use spring lock washers under all nuts.

c. Install surface-mounted cabinets and panelboards with minimum of four anchors.

d. In wet and damp locations use steel channel supports to stand cabinets and panelboards 1 inch off wall.

e. Use sheet metal channel to bridge studs above and below cabinets and panelboards recessed in hollow partitions.

D. Terminations and Joints:

1. Raceways shall be joined using specified couplings or transition couplings where dissimilar raceway systems are joined.

2. Rigid conduit connection to enclosures shall be made by Myers type grounding hubs only. EMT connections to enclosures shall be made with compression connector with grounding lock-nuts or bushings.

3. Conduit terminations exposed at weatherproof enclosures and cast outlet boxes shall be made watertight using appropriate connectors and hubs.

4. Install expansion couplings where any conduit crosses a building separation or expansion joint.

5. Install cable sealing bushings on all conduits originating outside the building walls and terminating in switchgear, cabinets or gutters inside the building. Install cable sealing bushings or caulk conduit terminations in all grade level or below grade exterior pull, junction or outlet boxes.

E. Penetrations:

1. Furnish and install metal sleeves for all exposed interior conduit runs passing through concrete floors or walls. Following conduit installation, seal all penetrations using non-iron bearing, chloride free, non-shrinking, dry-pack, grouting compound.

2. Install specified watertight conduit entrance seals and membrane clamps at all below grade wall and floor penetrations. Conduits penetrating exterior building walls and building floor slab shall be insulated rigid steel.

3. Conduits penetrating rated walls, floors, etc. shall be fireproofed.

3.3 CABLE AND WIRE INSTALLATION

A. Examination

1. Verify that interior of building has been protected from weather.

2. Verify that mechanical work likely to damage wire and cable has been completed.

3. Verify that raceway installation is complete and supported.

4. Verify that field measurements are as indicated.

B. Preparation

1. In existing conduits that will be reused, pull out existing conductors.

2. Completely and thoroughly swab raceway before installing wire.

3. Use 50/50 solution of Simple Green. Use CO2 to blow water and soap into conduit - let soak to break up dried out pulling compounds, then pull conductors. Pull one conductor at a time if will not pull all out together.

C. General:

1. Conductors shall not be in conduit until all work of any nature that may cause injury is completed. Care should be taken in pulling conductors that insulation is not damaged. U.L. approved non-petroleum base and insulating type pulling compound shall be used as needed.

2. All cables shall be installed and tested in accordance with manufacturer's requirements and warranty.

3. Block and tackle, power driven winch or other mechanical means shall not be used in pulling conductors of size smaller than AWG # 1.

D. Splicing and Terminating:

1. All aspects of splicing and terminating shall be in accordance with cable manufacturer's published procedures.

2. Make up all splices in outlet boxes with connectors as specified herein with separate tails of correct color to be made up to splice. Provide at least six (6) inches of tails packed in box after splice is made up.

3. All wire and cable in panels, control centers and equipment enclosures shall be bundled and clamped.

4. Encapsulate splices in exterior outlet, junction and pull boxes using insulating resin kits. All splices for exterior equipment in pump rooms shall be made up watertight.

5. Insulate mechanical compression taps AWG #1/0 and larger using pre-molded heat shrink tubing ITCSN Heaving Wall rated to 600V. Heating process should start from the middle of the heat shrink tubing and move to its ends.

E. Identification:

1. Securely tag all branch circuits, noting the purpose of each. Mark conductors with vinyl wrap-around markers. Where more than two conductors run through a single outlet, mark each circuit with the corresponding circuit number at the panelboard.

2. Color code conductors size #6 and larger using specified phase color markers and identification tags.

3. All terminal strips are to have each individual terminal identified with specified vinyl markers.

4. All identification shall be legible and readable after completion of installation.

5. Provide labeling for all switches and receptacle outlets. Self-adhering machine clear tape with black letters.

3.4 INSTALLATION:

A. Route wire and cable as required to meet project conditions.

1. Wire and cable routing indicated is approximate unless dimensioned.

2. Where wire and cable destination is indicated and routing is not shown, determine exact routing and lengths required.

3. Include wire and cable of lengths required to install connected devices within 10 ft of location shown.

B. Install wire and cable in accordance with the NECA "Standard of Installation."

C. Use wiring methods indicated.

D. Pull all conductors into raceway at same time.

E. Use suitable wire pulling lubricant for building wire 4 AWG and larger.

F. Protect exposed cable from damage.

G. Support cables above accessible ceiling, using spring metal clips or metal cable ties to support cables from structure or ceiling suspension system. Do not rest cable on ceiling panels.

H. Use suitable cable fittings and connectors.

I. Neatly train and lace wiring inside boxes, equipment, and panelboards.

J. Clean conductor surfaces before installing lugs and connectors.

K. Make splices, taps, and terminations to carry full ampacity of conductors with no perceptible temperature rise.

L. Terminate aluminum conductors with tin-plated aluminum-bodied compression connectors only. Fill with anti- oxidant compound before installing conductor.

M. Use suitable reducing connectors or mechanical connector adaptors for connecting aluminum conductors to copper conductors.

N. Use split bolt connectors for copper conductor splices and taps, 6 AWG and larger. Tape uninsulated conductors and connector with electrical tape to 150 percent of insulation rating of conductor.

O. Use solderless pressure connectors with insulating covers for copper conductor splices and taps, 8 AWG and smaller.

P. Use insulated spring wire connectors with plastic caps for copper conductor splices and taps, 10 AWG and smaller.

Q. Trench and backfill for direct burial cable installation as specified in Underground Structure Section. Install warning tape along entire length of direct burial cable.

3.5 Identify and color code wire and cable. Identify each conductor with its circuit number or other designation indicated.

A. ELECTRICAL CONNECTIONS

1. Make electrical connections in accordance with equipment manufacturer's instructions.

2. Make conduit connections to equipment using flexible conduit. Use liquid-tight flexible conduit with watertight connectors in damp or wet locations.

3. Connect heat producing equipment using wire and cable with insulation suitable for temperatures encountered.

4. Provide receptacle outlet to accommodate connection with attachment plug.

5. Provide cord and cap where field-supplied attachment plug is required.

6. Install suitable strain-relief clamps and fittings for cord connections at outlet boxes and equipment connection boxes.

7. Install disconnect switches, controllers, control stations, and control devices to complete equipment wiring requirements.

8. Install terminal block jumpers to complete equipment wiring requirements.

9. Install interconnecting conduit and wiring between devices and equipment to complete equipment wiring requirements.

3.6 INSTALLATION OF BOXES

A. General:

1. Leave no un-used openings in any box. Install close-up plugs as required to seal openings.

2. Exposed outlet boxes and boxes in damp or wet locations shall be cast metal with gasketed cast metal cover plates.

B. Box Layout:

1. Outlet boxes shall be installed at the locations and elevations shown on the drawings or specified herein. Make adjustments to locations as required by structural conditions and to suit coordination requirements of other trades.

2. Install junction or pullboxes where required to limit bends in conduit runs to not more than 360 degrees or where pulling tension achieved would exceed the maximum allowable for the cable to be installed. Consult wire and cable manufacturer.

3.7 INSTALLATION OF WIRING DEVICES

A. General

B. Install all devices flush mounted unless otherwise noted on the drawings. Comply with layout drawings for general locations. Consult Engineer or Owner's Representative for locations that have conflict with other devices or manner not suitable for installation. Avoid placing devices behind open doors.

C. Align devices horizontally and vertically. Device plates shall be aligned vertically with tolerance of 1/16". All four edges of device plates shall be in contact with the wall surface.

D. Mounting height as indicated on the drawings and according to ADA requirements.

1. Electrical controls, switches and receptacles to located within a range of no more than 48 inches from the top of devices and no less than 15 inches measured from the bottom of the device to the finished floor or platform.

E. Install device plates on all outlet boxes. Provide blank plates for all empty, spare, and boxes for future use.

F. Securely fasten devices into boxes and attach appropriate cover plates.

G. Caulk around edges or outdoor device plates and boxes when rough wall surfaces prevent rain-tight seal. Use caulking materials approved by Engineer. Fireproof around opening of devices located or penetrating fire-rated construction assemblies.

H. Fireproof around opening of devices located or penetrating fire-rated construction assemblies.

I. Switches

1. Where switches are indicated to be installed near doors, corner walls, etc. mount not less than 2 inches and not more than 18" from trim. Verify exact location with Architect or Engineer prior to rough-in.

2. Coordinate the location of switches to insure locations at the strike side of doors.

3. Furnish and install engraved legend of each switch that controls exhaust fans, motors, equipment systems, etc. not located within sight of the controlling switch.

4. Ganging of Switches - provide barriers for switches of difference phases and voltages. Otherwise switches shall be gauged in one faceplate.

J. Receptacles

1. Mount receptacles vertically with U-shaped ground position on bottom.

2. Do not combine GFCI protected circuits with other circuits in the same raceway. Limit number of GFI protect circuits in any one raceway to a maximum of one (1) circuit.

K. Identification

1. Label all outlets and switches. Mark each wiring device where circuits and panel supply is derived from.

2. All identification shall be legible and readable after completion of installation

3.8 INSTALLATION OF FUSES AND DISCONNECT SWITCHES

A. Fuses shall be installed where noted on plans. Sizes are based on design data provided by equipment mfg. Listed or labeled equipment must be in accordance with instructions included in the listing or labeling. Be sure to observe maximum branch circuit fuse size labels.

B. Disconnect switches shall be mounted on the equipment, where possible. Coordinate with mechanical contractor to ensure switches are not mounted on a removable access panel.

C. Label each disconnect fuse with equipment tag as indicated in the single line diagram, or as directed.

3.9 ELECTRICAL EQUIPMENT GROUNDING

A. Ground non-current carrying metal parts of electrical equipment enclosures, frames, conductor raceways or cable trays to provide a low impedance path for line-to-ground fault current and to bond all non-current carrying metal parts together. Install a ground conductor in each raceway system in addition to conductors shown. Equipment ground conductor shall be electrically and mechanically continuous from the electrical circuit source to the equipment to be grounded. Size ground conductors per NEC 250 unless larger conductors are shown on the drawings.

B. Grounding conductors shall be identified with green insulation, except where a bare ground conductor is specified. Where green insulation is not available, on larger sizes, black insulation shall be used and suitably identified with green tape at each junction box or device enclosure.

C. Install metal raceway couplings, fittings and terminations secure and tight to insure good ground continuity. Provide insulated grounding bushing and bonding jumper where metal raceway is not directly attached to equipment metal enclosure and at concentric knock-outs.

D. Motors shall be connected to equipment ground conductors with a conduit grounding bushing and with a bolted solderless lug connection on the metal frame.

E. Conduit terminating in concentric knockouts at panelboards, cabinets and gutters shall have insulated grounding bushings and bonding jumpers installed interconnecting all such conduits and the panelboard cabinet, gutter, etc.

F. Performance:

1. Measure the resistance to ground of each ground rod before connection to the other ground rods. The resistance shall not exceed 25 ohms.

    a. A single electrode which does not have a resistance to ground of 25 ohms or less shall be augmented by additional electrode(s).

2. Measure the resistance to ground of the total ground system with all connections completed. The resistance shall not exceed 2 ohms for primary services or 5 ohms for secondary services.

3. Tests of the resistance to ground shall be made using either the three point method or the fall-of-potential method.

4. Perform a continuity check from equipment ground bus bars and ground lugs to the ground system.

3.10 BONDING

A. Bonding shall be provided to assure electrical continuity and the capacity to conduct safely any fault current likely to be imposed.

B. Bonding shall be in accordance with NEC Article 250, Part V.

3.11 INSTALLATION

A. Install in accordance with manufacturer's instructions.

END OF SECTION

SECTION 26 05 26
GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Grounding and bonding requirements.

B. Conductors for grounding and bonding.

C. Connectors for grounding and bonding.

1.02 REFERENCE STANDARDS

A. IEEE 81 - IEEE Guide for Measuring Earth Resistivity, Ground Impedance, and Earth Surface Potentials of a Grounding System 2012.

B. NECA 1 - Standard for Good Workmanship in Electrical Construction 2015.

C. NETA ATS - Acceptance Testing Specifications for Electrical Power Equipment and Systems 2017.

D. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

E. UL 467 - Grounding and Bonding Equipment Current Edition, Including All Revisions.

1.03 ADMINISTRATIVE REQUIREMENTS

A. Coordination:

1. Verify exact locations of underground metal water service pipe entrances to building.

2. Coordinate the work with other trades to provide steel reinforcement complying with specified requirements for concrete-encased electrode.

3. Notify Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.

1.04 SUBMITTALS

A. Product Data: Provide manufacturer's standard catalog pages and data sheets for grounding and bonding system components.

B. Field quality control test reports.

C. Project Record Documents: Record actual locations of grounding electrode system components and connections.

1.05 QUALITY ASSURANCE

A. Conform to requirements of NFPA 70.

B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

C. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Receive, inspect, handle, and store products in accordance with manufacturer's instructions.

PART 2 PRODUCTS

2.01 GROUNDING AND BONDING REQUIREMENTS

A. Do not use products for applications other than as permitted by NFPA 70 and product listing.

B. Unless specifically indicated to be excluded, provide all required components, conductors, connectors, conduit, boxes, fittings, supports, accessories, etc. as necessary for a complete grounding and bonding system.

C. Where conductor size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.

D. Grounding System Resistance:

1. Achieve specified grounding system resistance under normally dry conditions unless otherwise approved by Architect. Precipitation within the previous 48 hours does not constitute normally dry conditions.

2. Grounding Electrode System: Not greater than 25 ohms to ground, when tested according to IEEE 81 using "fall-of-potential" method.

E. Grounding Electrode System:

1. Provide connection to required and supplemental grounding electrodes indicated to form grounding electrode system.

a. Provide continuous grounding electrode conductors without splice or joint.

b. Install grounding electrode conductors in raceway where exposed to physical damage. Bond grounding electrode conductor to metallic raceways at each end with bonding jumper.

2. Metal Underground Water Pipe(s):

a. Provide connection to underground metal domestic and fire protection (where present) water service pipe(s) that are in direct contact with earth for at least 10 feet (3.0 m) at an accessible location not more than 5 feet (1.5 m) from the point of entrance to the building.

b. Provide bonding jumper(s) around insulating joints/pipes as required to make pipe electrically continuous.

c. Provide bonding jumper around water meter of sufficient length to permit removal of meter without disconnecting jumper.

3. Metal In-Ground Support Structure:

a. Provide connection to metal in-ground support structure that is in direct contact with earth in accordance with NFPA 70.

4. Concrete-Encased Electrode:

a. Provide connection to concrete-encased electrode consisting of not less than 20 feet (6.0 m) of either steel reinforcing bars or bare copper conductor not smaller than 4 AWG embedded within concrete foundation or footing that is in direct contact with earth in accordance with NFPA 70.

5. Provide additional ground electrode(s) as required to achieve specified grounding electrode system resistance.

F. Bonding and Equipment Grounding:

1. Provide bonding for equipment grounding conductors, equipment ground busses, metallic equipment enclosures, metallic raceways and boxes, device grounding terminals, and other normally non-current-carrying conductive materials enclosing electrical conductors/equipment or likely to become energized as indicated and in accordance with NFPA 70.

2. --CHOOSE ONE OF THE TWO SUBPARAGRAPHS BELOW--

3. Provide insulated equipment grounding conductor in each feeder and branch circuit raceway. Do not use raceways as sole equipment grounding conductor.

4. Where circuit conductor sizes are increased for voltage drop, increase size of equipment grounding conductor proportionally in accordance with NFPA 70.

5. Unless otherwise indicated, connect wiring device grounding terminal to branch circuit equipment grounding conductor and to outlet box with bonding jumper.

6. Terminate branch circuit equipment grounding conductors on solidly bonded equipment ground bus only. Do not terminate on neutral (grounded) or isolated/insulated ground bus.

7. Provide bonding jumper across expansion or expansion/deflection fittings provided to accommodate conduit movement.

2.02 GROUNDING AND BONDING COMPONENTS

A. General Requirements:

1. Provide products listed, classified, and labeled as suitable for the purpose intended.

2. Provide products listed and labeled as complying with UL 467 where applicable.

B. Conductors for Grounding and Bonding, in Addition to Requirements of Section 26 05 26:

1. Use insulated copper conductors unless otherwise indicated.

a. Exceptions:

1) Use bare copper conductors where installed underground in direct contact with earth.

2) Use bare copper conductors where directly encased in concrete (not in raceway).

C. Connectors for Grounding and Bonding:

1. Description: Connectors appropriate for the application and suitable for the conductors and items to be connected; listed and labeled as complying with UL 467.

2. Unless otherwise indicated, use exothermic welded connections for underground, concealed and other inaccessible connections.

3. Unless otherwise indicated, use mechanical connectors, compression connectors, or exothermic welded connections for accessible connections.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that work likely to damage grounding and bonding system components has been completed.

B. Verify that field measurements are as indicated.

C. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

A. Install products in accordance with manufacturer's instructions.

B. Perform work in accordance with NECA 1 (general workmanship).

C. Make grounding and bonding connections using specified connectors.

1. Remove appropriate amount of conductor insulation for making connections without cutting, nicking or damaging conductors. Do not remove conductor strands to facilitate insertion into connector.

2. Remove nonconductive paint, enamel, or similar coating at threads, contact points, and contact surfaces.

3. Exothermic Welds: Make connections using molds and weld material suitable for the items to be connected in accordance with manufacturer's recommendations.

4. Mechanical Connectors: Secure connections according to manufacturer's recommended torque settings.

5. Compression Connectors: Secure connections using manufacturer's recommended tools and dies.

D. Identify grounding and bonding system components in accordance with Section 26 05 53.

3.03 FIELD QUALITY CONTROL

A. Inspect and test in accordance with NETA ATS except Section 4.

B. Perform inspections and tests listed in NETA ATS, Section 7.13.

C. Perform ground electrode resistance tests under normally dry conditions. Precipitation within the previous 48 hours does not constitute normally dry conditions.

D. Investigate and correct deficiencies where measured ground resistances do not comply with specified requirements.

A. END OF SECTION

SECTION 26 05 29
HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Support and attachment requirements and components for equipment, conduit, cable, boxes, and other electrical work.

1.02 RELATED REQUIREMENTS

A. Section 03 30 00 - Cast-in-Place Concrete: Concrete equipment pads.

1.03 REFERENCE STANDARDS

A. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products 2017.

B. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware 2016a.

C. ASTM B633 - Standard Specification for Electrodeposited Coatings of Zinc on Iron and Steel 2019.

D. MFMA-4 - Metal Framing Standards Publication 2004.

E. NECA 1 - Standard for Good Workmanship in Electrical Construction 2015.

F. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination:

1. Coordinate sizes and arrangement of supports and bases with the actual equipment and components to be installed.

2. Coordinate the work with other trades to provide additional framing and materials required for installation.

3. Coordinate compatibility of support and attachment components with mounting surfaces at the installed locations.

4. Coordinate the arrangement of supports with ductwork, piping, equipment and other potential conflicts installed under other sections or by others.

5. Notify Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.

B. Sequencing:

1. Do not install products on or provide attachment to concrete surfaces until concrete has fully cured in accordance with Section 03 30 00.

1.05 SUBMITTALS

A. Product Data: Provide manufacturer's standard catalog pages and data sheets for channel (strut) framing systems.

B. Shop Drawings: Include details for fabricated hangers and supports where materials or methods other than those indicated are proposed for substitution.

1.06 QUALITY ASSURANCE

A. Comply with NFPA 70.

B. Comply with applicable building code.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Receive, inspect, handle, and store products in accordance with manufacturer's instructions.

PART 2 PRODUCTS

2.01 SUPPORT AND ATTACHMENT COMPONENTS

A. General Requirements:

1. Provide all required hangers, supports, anchors, fasteners, fittings, accessories, and hardware as necessary for the complete installation of electrical work.

2. Provide products listed, classified, and labeled as suitable for the purpose intended, where applicable.

3. Where support and attachment component types and sizes are not indicated, select in accordance with manufacturer's application criteria as required for the load to be supportedwith a minimum safety factor of 5 times the applied force. Include consideration for vibration, equipment operation, and shock loads where applicable.

4. Do not use products for applications other than as permitted by NFPA 70 and product listing.

5. Do not use wire, chain, perforated pipe strap, or wood for permanent supports unless specifically indicated or permitted.

6. Steel Components: Use corrosion resistant materials suitable for the environment where installed.

a. Indoor Dry Locations: Use zinc-plated steel or approved equivalent unless otherwise indicated.

b. Outdoor and Damp or Wet Indoor Locations: Use galvanized steel, stainless steel, or approved equivalent unless otherwise indicated.

c. Zinc-Plated Steel: Electroplated in accordance with ASTM B633.

d. Galvanized Steel: Hot-dip galvanized after fabrication in accordance with ASTM A123/A123M or ASTM A153/A153M.

B. Conduit and Cable Supports: Straps, clamps, etc. suitable for the conduit or cable to be supported.

1. Conduit Straps: One-hole or two-hole type; steel or malleable iron.

2. Conduit Clamps: Bolted type unless otherwise indicated.

C. Outlet Box Supports: Hangers, brackets, etc. suitable for the boxes to be supported.

D. Metal Channel (Strut) Framing Systems: Factory-fabricated continuous-slot metal channel (strut) and associated fittings, accessories, and hardware required for field-assembly of supports.

1. Comply with MFMA-4.

2. Channel Material:

a. Indoor Dry Locations: Use painted steel, zinc-plated steel, or galvanized steel.

b. Outdoor and Damp or Wet Indoor Locations: Use galvanized steel.

E. Hanger Rods: Threaded zinc-plated steel unless otherwise indicated.

F. Anchors and Fasteners:

1. Unless otherwise indicated and where not otherwise restricted, use the anchor and fastener types indicated for the specified applications.

2. New Concrete: Use preset concrete inserts.

3. Existing Concrete: Use expansion anchors.

4. Solid or Grout-Filled Masonry: Use expansion anchors.

5. Hollow Masonry: Use toggle bolts.

6. Hollow Stud Walls: Use toggle bolts.

7. Steel: Use welded threaded studs complying with AWS D1.1/D1.1M with lock washers and nuts or Beam clamps (MSS Type 19 21 23 25 or 27) complying with MSS SP-69.

8. Wood: Fasten with lag screws or through bolts.

9. Items Mounted on Hollow Walls and Nonstructural Building Surfaces: Mount cabinets, panelboards, disconnect switches, control enclosures, pull and junction boxes, transformers, and other devices on slotted-channel racks attached to substrate by means that meet seismic-restraint strength and anchorage requirements.

10. Preset Concrete Inserts: Continuous metal channel (strut) and spot inserts specifically designed to be cast in concrete ceilings, walls, and floors.

a. Comply with MFMA-4.

b. Channel Material: Use galvanized steel.

c. Manufacturer: Same as manufacturer of metal channel (strut) framing system.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that field measurements are as indicated.

B. Verify that mounting surfaces are ready to receive support and attachment components.

C. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

A. Install products in accordance with manufacturer's instructions.

B. Perform work in accordance with NECA 1 (general workmanship).

C. Provide independent support from building structure. Do not provide support from piping, ductwork, or other systems.

D. Unless specifically indicated or approved by Architect, do not provide support from suspended ceiling support system or ceiling grid.

E. Unless specifically indicated or approved by Architect, do not provide support from roof deck.

F. Do not penetrate or otherwise notch or cut structural members without approval of Structural Engineer.

G. Equipment Support and Attachment:

1. Use metal fabricated supports or supports assembled from metal channel (strut) to support equipment as required.

2. Use metal channel (strut) secured to studs to support equipment surface-mounted on hollow stud walls when wall strength is not sufficient to resist pull-out.

3. Use metal channel (strut) to support surface-mounted equipment in wet or damp locations to provide space between equipment and mounting surface.

4. Securely fasten floor-mounted equipment. Do not install equipment such that it relies on its own weight for support.

H. Preset Concrete Inserts: Use manufacturer provided closure strips to inhibit concrete seepage during concrete pour.

I. Secure fasteners according to manufacturer's recommended torque settings.

J. Remove temporary supports.

3.03 CONCRETE BASES

A. Construct concrete bases of dimensions indicated but not less than 4 inches (100 mm) larger in both directions than supported unit, and so anchors will be a minimum of 10 bolt diameters from edge of the base.

B. Use 3000-psi (20.7-MPa), 28-day compressive-strength concrete. Concrete materials, reinforcement, and placement requirements are specified in Division 03 Section "Cast-in-Place Concrete or Cast-in-Place Concrete (Limited Applications)" as applicable.

C. Anchor equipment to concrete base.

1. Place and secure anchorage devices. Use supported equipment manufacturer's setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.

2. Install anchor bolts to elevations required for proper attachment to supported equipment.

3. Install anchor bolts according to anchor-bolt manufacturers written instructions.

3.04 FIELD QUALITY CONTROL

A. Inspect support and attachment components for damage and defects.

B. Repair cuts and abrasions in galvanized finishes using zinc-rich paint recommended by manufacturer. Replace components that exhibit signs of corrosion.

C. Correct deficiencies and replace damaged or defective support and attachment components.

A. END OF SECTION

SECTION 26 05 33.13
CONDUIT FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Galvanized steel rigid metal conduit (RMC).

B. PVC-coated galvanized steel rigid metal conduit (RMC).

C. Flexible metal conduit (FMC).

D. Liquidtight flexible metal conduit (LFMC).

E. Electrical metallic tubing (EMT).

F. Rigid polyvinyl chloride (PVC) conduit.

G. Conduit fittings.

H. Accessories.

1.02 REFERENCE STANDARDS

A. ANSI C80.1 - American National Standard for Electrical Rigid Steel Conduit (ERSC) 2015.

B. ANSI C80.3 - American National Standard for Electrical Metallic Tubing -- Steel (EMT-S) 2015.

C. NECA 1 - Standard for Good Workmanship in Electrical Construction 2015.

D. NECA 101 - Standard for Installing Steel Conduits (Rigid, IMC, EMT) 2013.

E. NECA 111 - Standard for Installing Nonmetallic Raceways (RNC, ENT, LFNC) 2017.

F. NEMA FB 1 - Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit, Electrical Metallic Tubing, and Cable 2014.

G. NEMA RN 1 - Polyvinyl-Chloride (PVC) Externally Coated Galvanized Rigid Steel Conduit and Intermediate Metal Conduit 2018.

H. NEMA TC 2 - Electrical Polyvinyl Chloride (PVC) Conduit 2020.

I. NEMA TC 3 - Polyvinyl Chloride (PVC) Fittings for Use with Rigid PVC Conduit and Tubing 2016.

J. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

K. UL 1 - Flexible Metal Conduit Current Edition, Including All Revisions.

L. UL 6 - Electrical Rigid Metal Conduit-Steel Current Edition, Including All Revisions.

M. UL 360 - Liquid-Tight Flexible Steel Conduit Current Edition, Including All Revisions.

N. UL 514B - Conduit, Tubing, and Cable Fittings Current Edition, Including All Revisions.

O. UL 651 - Schedule 40, 80, Type EB and A Rigid PVC Conduit and Fittings Current Edition, Including All Revisions.

P. UL 797 - Electrical Metallic Tubing-Steel Current Edition, Including All Revisions.

1.03 ADMINISTRATIVE REQUIREMENTS

A. Coordination:

1. Coordinate minimum sizes of conduits with the actual conductors to be installed, including adjustments for conductor sizes increased for voltage drop.

2. Coordinate the arrangement of conduits with structural members, ductwork, piping, equipment and other potential conflicts installed under other sections or by others.

3. Verify exact conduit termination locations required for boxes, enclosures, and equipment installed under other sections or by others.

4. Coordinate the work with other trades to provide roof penetrations that preserve the integrity of the roofing system and do not void the roof warranty.

5. Notify Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.

B. Sequencing:

1. Do not begin installation of conductors and cables until installation of conduit is complete between outlet, junction and splicing points.

1.04 SUBMITTALS

A. Product Data: Provide manufacturer's standard catalog pages and data sheets for conduits and fittings.

B. Project Record Documents: Record actual routing for conduits installed underground and conduits 2 inch (53 mm) trade size and larger.

1.05 QUALITY ASSURANCE

A. Conform to requirements of NFPA 70.

B. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

PART 2 PRODUCTS

2.01 CONDUIT APPLICATIONS

A. Do not use conduit and associated fittings for applications other than as permitted by NFPA 70 and product listing.

B. Unless otherwise indicated and where not otherwise restricted, use the conduit types indicated for the specified applications. Where more than one listed application applies, comply with the most restrictive requirements. Where conduit type for a particular application is not specified, use galvanized steel rigid metal conduit.

C. Underground:

1. Under Slab on Grade: Use rigid PVC conduit.

2. Exterior, Direct-Buried: Use rigid PVC conduit.

3. Where rigid polyvinyl (PVC) conduit is provided, transition to galvanized steel rigid metal conduit where emerging from underground.

4. Where rigid polyvinyl (PVC) conduitlarger than 2 inch (53 mm) trade size is provided, use PVC-coated galvanized steel rigid metal conduit elbows for bends.

5. Where steel conduit is installed in direct contact with earth where soil has a resistivity of less than 2000 ohm-centimeters or is characterized as severely corrosive based on soils report or local experience, use corrosion protection tape to provide supplementary corrosion protection or use PVC-coated galvanized steel rigid metal conduit.

6. Where steel conduit emerges from concrete into soil, use corrosion protection tape to provide supplementary corrosion protection for a minimum of 4 inches (100 mm) on either side of where conduit emerges or use PVC-coated galvanized steel rigid metal conduit.

D. Concealed Within Masonry Walls: Use galvanized steel rigid metal conduit or electrical metallic tubing (EMT).

E. Concealed Within Hollow Stud Walls: Use electrical metallic tubing (EMT).

F. Concealed Above Accessible Ceilings: Use electrical metallic tubing (EMT).

G. Interior, Damp or Wet Locations: Use galvanized steel rigid metal conduit.

H. Exposed, Interior, Not Subject to Physical Damage: Use galvanized steel rigid metal conduit or electrical metallic tubing (EMT).

I. Exposed, Interior, Subject to Physical Damage: Use galvanized steel rigid metal conduit.

1. Locations subject to physical damage include, but are not limited to:

a. Where exposed below 8 feet (2.4 m), except within electrical and communication rooms or closets.

J. Exposed, Exterior: Use galvanized steel rigid metal conduit.

K. Concealed, Exterior, Not Embedded in Concrete or in Contact With Earth: Use galvanized steel rigid metal conduit.

L. Connections to Luminaires Above Accessible Ceilings: Use flexible metal conduit.

1. Maximum Length: 6 feet (1.8 m).

M. Connections to Vibrating Equipment:

1. Dry Locations: Use flexible metal conduit.

2. Damp, Wet, or Corrosive Locations: Use liquidtight flexible metal conduit.

3. Maximum Length: 6 feet (1.8 m) unless otherwise indicated.

4. Vibrating equipment includes, but is not limited to:

a. Transformers.

b. Motors.

N. Fished in Existing Walls, Where Necessary: Use flexible metal conduit.

2.02 CONDUIT REQUIREMENTS

A. Provide all conduit, fittings, supports, and accessories required for a complete raceway system.

B. Provide products listed, classified, and labeled as suitable for the purpose intended.

C. Minimum Conduit Size, Unless Otherwise Indicated:

1. Branch Circuits: 3/4 inch (21 mm) trade size.

2. Branch Circuit Homeruns: 3/4 inch (21 mm) trade size.

3. Control Circuits: 1/2 inch (16 mm) trade size.

4. Flexible Connections to Luminaires: 3/8 inch (12 mm) trade size.

5. Underground, Exterior: 1 inch (27 mm) trade size.

D. Where conduit size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.

2.03 GALVANIZED STEEL RIGID METAL CONDUIT (RMC)

A. Description: NFPA 70, Type RMC galvanized steel rigid metal conduit complying with ANSI C80.1 and listed and labeled as complying with UL 6.

B. Fittings:

1. Non-Hazardous Locations: Use fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.

2. Material: Use steel or malleable iron.

3. Connectors and Couplings: Use threaded type fittings only. Threadless set screw and compression (gland) type fittings are not permitted.

2.04 PVC-COATED GALVANIZED STEEL RIGID METAL CONDUIT (RMC)

A. Description: NFPA 70, Type RMC galvanized steel rigid metal conduit with external polyvinyl chloride (PVC) coating complying with NEMA RN 1 and listed and labeled as complying with UL 6.

B. Exterior Coating: Polyvinyl chloride (PVC), nominal thickness of 40 mil (1.02 mm).

C. PVC-Coated Fittings:

1. Manufacturer: Same as manufacturer of PVC-coated conduit to be installed.

2. Non-Hazardous Locations: Use fittings listed and labeled as complying with UL 514B.

3. Material: Use steel or malleable iron.

4. Exterior Coating: Polyvinyl chloride (PVC), minimum thickness of 40 mil (1.02 mm).

D. PVC-Coated Supports: Furnish with exterior coating of polyvinyl chloride (PVC), minimum thickness of 15 mil (0.38 mm).

2.05 FLEXIBLE METAL CONDUIT (FMC)

A. Description: NFPA 70, Type FMC standard wall steel flexible metal conduit listed and labeled as complying with UL 1, and listed for use in classified firestop systems to be used.

B. Fittings:

1. Description: Fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.

2. Material: Use steel or malleable iron.

2.06 LIQUIDTIGHT FLEXIBLE METAL CONDUIT (LFMC)

A. Description: NFPA 70, Type LFMC polyvinyl chloride (PVC) jacketed steel flexible metal conduit listed and labeled as complying with UL 360.

B. Fittings:

1. Description: Fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.

2. Material: Use steel or malleable iron.

2.07 ELECTRICAL METALLIC TUBING (EMT)

A. Description: NFPA 70, Type EMT steel electrical metallic tubing complying with ANSI C80.3 and listed and labeled as complying with UL 797.

B. Fittings:

1. Description: Fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.

2. Material: Use steel or malleable iron.

3. Connectors and Couplings: Use compression (gland) or set-screw type.

a. Do not use indenter type connectors and couplings.

2.08 RIGID POLYVINYL CHLORIDE (PVC) CONDUIT

A. Description: NFPA 70, Type PVC rigid polyvinyl chloride conduit complying with NEMA TC 2 and listed and labeled as complying with UL 651; Schedule 40 unless otherwise indicated, Schedule 80 where subject to physical damage; rated for use with conductors rated 90 degrees C.

B. Fittings:

1. Manufacturer: Same as manufacturer of conduit to be connected.

2. Description: Fittings complying with NEMA TC 3 and listed and labeled as complying with UL 651; material to match conduit.

2.09 ACCESSORIES

A. Conduit Joint Compound: Corrosion-resistant, electrically conductive; suitable for use with the conduit to be installed.

B. Solvent Cement for PVC Conduit and Fittings: As recommended by manufacturer of conduit and fittings to be installed.

C. Pull Strings: Use nylon cord with average breaking strength of not less than 200 pound-force (890 N).

PART 3 EXECUTION

3.01 INSTALLATION

A. Install products in accordance with manufacturer's instructions.

B. Perform work in accordance with NECA 1 (general workmanship).

C. Install galvanized steel rigid metal conduit (RMC) in accordance with NECA 101.

D. Install PVC-coated galvanized steel rigid metal conduit (RMC) using only tools approved by the manufacturer.

E. Install rigid polyvinyl chloride (PVC) conduit in accordance with NECA 111.

F. Conduit Routing:

1. Unless dimensioned, conduit routing indicated is diagrammatic.

2. When conduit destination is indicated without specific routing, determine exact routing required.

3. Conceal all conduits unless specifically indicated to be exposed.

4. Conduits installed underground or embedded in concrete may be routed in the shortest possible manner unless otherwise indicated. Route all other conduits parallel or perpendicular to building structure and surfaces, following surface contours where practical.

5. Arrange conduit to maintain adequate headroom, clearances, and access.

6. Arrange conduit to provide no more than the equivalent of four 90 degree bends between pull points.

7. Arrange conduit to provide no more than 150 feet (46 m) between pull points.

8. Route conduits above water and drain piping where possible.

9. Arrange conduit to prevent moisture traps. Provide drain fittings at low points and at sealing fittings where moisture may collect.

10. Maintain minimum clearance of 6 inches (150 mm) between conduits and piping for other systems.

11. Maintain minimum clearance of 12 inches (300 mm) between conduits and hot surfaces. This includes, but is not limited to:

    a. Heaters.

    b. Hot water piping.

    c. Flues.

12. Group parallel conduits in the same area together on a common rack.

G. Conduit Support:

1. Secure and support conduits in accordance with NFPA 70 and Section 26 05 29 using suitable supports and methods approved by the authority having jurisdiction.

2. Provide independent support from building structure. Do not provide support from piping, ductwork, or other systems.

3. Installation Above Suspended Ceilings: Do not provide support from ceiling support system. Do not provide support from ceiling grid or allow conduits to lay on ceiling tiles.

4. Use conduit strap to support single surface-mounted conduit.

    a. Use clamp back spacer with conduit strap for damp and wet locations to provide space between conduit and mounting surface.

5. Use metal channel (strut) with accessory conduit clamps to support multiple parallel surface-mounted conduits.

6. Use conduit clamp to support single conduit from beam clamp or threaded rod.

7. Use trapeze hangers assembled from threaded rods and metal channel (strut) with accessory conduit clamps to support multiple parallel suspended conduits.

8. Use non-penetrating rooftop supports to support conduits routed across rooftops (only where approved).

9. Use of spring steel conduit clips for support of conduits is not permitted.

10. Use of wire for support of conduits is not permitted.

H. Connections and Terminations:

1. Use approved zinc-rich paint or conduit joint compound on field-cut threads of galvanized steel conduits prior to making connections.

2. Where two threaded conduits must be joined and neither can be rotated, use three-piece couplings or split couplings. Do not use running threads.

3. Use suitable adapters where required to transition from one type of conduit to another.

4. Provide drip loops for liquidtight flexible conduit connections to prevent drainage of liquid into connectors.

5. Terminate threaded conduits in boxes and enclosures using threaded hubs or double lock nuts for dry locations and raintight hubs for wet locations.

6. Provide insulating bushings or insulated throats at all conduit terminations to protect conductors.

7. Secure joints and connections to provide maximum mechanical strength and electrical continuity.

I. Penetrations:

1. Do not penetrate or otherwise notch or cut structural members, including footings and grade beams, without approval of Structural Engineer.

2. Make penetrations perpendicular to surfaces unless otherwise indicated.

3. Provide sleeves for penetrations as indicated or as required to facilitate installation. Set sleeves flush with exposed surfaces unless otherwise indicated or required.

4. Conceal bends for conduit risers emerging above ground.

5. Seal interior of conduits entering the building from underground at first accessible point to prevent entry of moisture and gases.

6. Where conduits penetrate waterproof membrane, seal as required to maintain integrity of membrane.

7. Make penetrations for roof-mounted equipment within associated equipment openings and curbs where possible to minimize roofing system penetrations. Where penetrations are necessary, seal as indicated or as required to preserve integrity of roofing system and maintain roof warranty. Include proposed locations of penetrations and methods for sealing with submittals.

8. Install firestopping to preserve fire resistance rating of partitions and other elements, using materials and methods specified in Section 07 84 00.

J. Underground Installation:

1. --CHOOSE ONE OF THE TWO PARAGRAPHS BELOW--

2. Minimum Cover, Unless Otherwise Indicated or Required:

a. Underground, Exterior: 24 inches (610 mm).

b. Under Slab on Grade: 12 inches (300 mm) to bottom of slab.

3. Provide underground warning tape in accordance with Section 26 05 53 along entire conduit length.

K. Concrete Encasement: Where conduits not otherwise embedded within concrete are indicated to be concrete-encased, provide concrete in accordance with Section Concrete with minimum concrete cover of 3 inches (76 mm) on all sides unless otherwise indicated.

L. Conduit Movement Provisions: Where conduits are subject to movement, provide expansion and expansion/deflection fittings to prevent damage to enclosed conductors or connected equipment. This includes, but is not limited to:

1. Where conduits cross structural joints intended for expansion, contraction, or deflection.

2. Where calculated in accordance with NFPA 70 for rigid polyvinyl chloride (PVC) conduit installed above ground to compensate for thermal expansion and contraction.

3. Where conduits are subject to earth movement by settlement or frost.

M. Condensation Prevention: Where conduits cross barriers between areas of potential substantial temperature differential, provide sealing fitting or approved sealing compound at an accessible point near the penetration to prevent condensation. This includes, but is not limited to:

1. Where conduits pass from outdoors into conditioned interior spaces.

2. Where conduits pass from unconditioned interior spaces into conditioned interior spaces.

N. Provide pull string in all empty conduits and in conduits where conductors and cables are to be installed by others. Leave minimum slack of 12 inches (300 mm) at each end.

O. Provide grounding and bonding in accordance with Section 26 05 26.

P. Identify conduits in accordance with Section 26 05 53.

3.02 FIELD QUALITY CONTROL

A. Repair cuts and abrasions in galvanized finishes using zinc-rich paint recommended by manufacturer. Replace components that exhibit signs of corrosion.

B. Where coating of PVC-coated galvanized steel rigid metal conduit (RMC) contains cuts or abrasions, repair in accordance with manufacturer's instructions.

C. Correct deficiencies and replace damaged or defective conduits.

3.03 CLEANING

A. Clean interior of conduits to remove moisture and foreign matter.

3.04 PROTECTION

A. Immediately after installation of conduit, use suitable manufactured plugs to provide protection from entry of moisture and foreign material and do not remove until ready for installation of conductors.

A. END OF SECTION

SECTION 26 05 33.16
BOXES FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Outlet and device boxes up to 100 cubic inches (1,650 cu cm), including those used as junction and pull boxes.

B. Cabinets and enclosures, including junction and pull boxes larger than 100 cubic inches (1,650 cu cm).

1.02 REFERENCE STANDARDS

A. NECA 1 - Standard for Good Workmanship in Electrical Construction 2015.

B. NECA 130 - Standard for Installing and Maintaining Wiring Devices 2010.

C. NEMA FB 1 - Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit, Electrical Metallic Tubing, and Cable 2014.

D. NEMA OS 1 - Sheet-Steel Outlet Boxes, Device Boxes, Covers, and Box Supports 2013.

E. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum) 2020.

F. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

G. UL 50 - Enclosures for Electrical Equipment, Non-Environmental Considerations Current Edition, Including All Revisions.

H. UL 50E - Enclosures for Electrical Equipment, Environmental Considerations Current Edition, Including All Revisions.

I. UL 508A - UL Standard for Safety Industrial Control Panels 2018.

J. UL 514A - Metallic Outlet Boxes Current Edition, Including All Revisions.

1.03 ADMINISTRATIVE REQUIREMENTS

A. Coordination:

1. Coordinate the work with other trades to avoid placement of ductwork, piping, equipment, or other potential obstructions within the dedicated equipment spaces and working clearances for electrical equipment required by NFPA 70.

2. Coordinate arrangement of electrical equipment with the dimensions and clearance requirements of the actual equipment to be installed.

3. Coordinate minimum sizes of boxes with the actual installed arrangement of conductors, clamps, support fittings, and devices, calculated according to NFPA 70.

4. Coordinate minimum sizes of pull boxes with the actual installed arrangement of connected conduits, calculated according to NFPA 70.

5. Coordinate the placement of boxes with millwork, furniture, devices, equipment, etc. installed under other sections or by others.

6. Coordinate the work with other trades to preserve insulation integrity.

7. Coordinate the work with other trades to provide walls suitable for installation of flush-mounted boxes where indicated.

8. Notify Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.

1.04 SUBMITTALS

A. Product Data: Provide manufacturer's standard catalog pages and data sheets for floor boxes and underground boxes/enclosures.

1.05 QUALITY ASSURANCE

A. Conform to requirements of NFPA 70.

PART 2 PRODUCTS

2.01 BOXES

A. General Requirements:

1. Do not use boxes and associated accessories for applications other than as permitted by NFPA 70 and product listing.

2. Provide all boxes, fittings, supports, and accessories required for a complete raceway system and to accommodate devices and equipment to be installed.

3. Provide products listed, classified, and labeled as suitable for the purpose intended.

4. Where box size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.

5. Provide grounding terminals within boxes where equipment grounding conductors terminate.

B. Outlet and Device Boxes Up to 100 cubic inches (1,650 cu cm), Including Those Used as Junction and Pull Boxes:

1. Use sheet-steel boxes for dry locations unless otherwise indicated or required.

2. Use cast iron boxes or cast aluminum boxes for damp or wet locations unless otherwise indicated or required; furnish with compatible weatherproof gasketed covers.

3. Use suitable concrete type boxes where flush-mounted in concrete.

4. Use suitable masonry type boxes where flush-mounted in masonry walls.

5. Use raised covers suitable for the type of wall construction and device configuration where required.

6. Use shallow boxes where required by the type of wall construction.

7. Do not use "through-wall" boxes designed for access from both sides of wall.

8. Sheet-Steel Boxes: Comply with NEMA OS 1, and list and label as complying with UL 514A.

9. Cast Metal Boxes: Comply with NEMA FB 1, and list and label as complying with UL 514A; furnish with threaded hubs.

10. Boxes for Supporting Luminaires and Ceiling Fans: Listed as suitable for the type and weight of load to be supported; furnished with fixture stud to accommodate mounting of luminaire where required.

11. Boxes for Ganged Devices: Use multigang boxes of single-piece construction. Do not use field-connected gangable boxes unless specifically indicated or permitted.

12. Minimum Box Size, Unless Otherwise Indicated:

    a. Wiring Devices (Other Than Communications Systems Outlets): 4 inch square by 1-1/2 inch deep (100 by 38 mm) trade size.

    b. Communications Systems Outlets: 4 inch square by 2-1/8 inch (100 by 54 mm) trade size.

    c. Ceiling Outlets: 4 inch octagonal or square by 1-1/2 inch deep (100 by 38 mm) trade size.

13. Wall Plates: Comply with Section 26 27 26.

C. Cabinets and Enclosures, Including Junction and Pull Boxes Larger Than 100 cubic inches (1,650 cu cm):

1. Comply with NEMA 250, and list and label as complying with UL 50 and UL 50E, or UL 508A.

2. NEMA 250 Environment Type, Unless Otherwise Indicated:

3. Junction and Pull Boxes Larger Than 100 cubic inches (1,650 cu cm):

    a. Provide screw-cover or hinged-cover enclosures unless otherwise indicated.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install products in accordance with manufacturer's instructions.

B. Install boxes in accordance with NECA 1 (general workmanship) and, where applicable, NECA 130, including mounting heights specified in those standards where mounting heights are not indicated.

C. Arrange equipment to provide minimum clearances in accordance with manufacturer's instructions and NFPA 70.

D. Provide separate boxes for emergency power and normal power systems.

E. Unless otherwise indicated, provide separate boxes for line voltage and low voltage systems.

F. Flush-mount boxes in finished areas unless specifically indicated to be surface-mounted.

G. Box Locations:

1. Locate boxes to be accessible. Provide access panels in accordance with Section Access Panels as requiredwhere approved by the Architect.

2. Unless dimensioned, box locations indicated are approximate.

3. Locate boxes as required for devices installed under other sections or by others.

a. Switches, Receptacles, and Other Wiring Devices: Comply with Section 26 27 26.

4. Locate boxes so that wall plates do not span different building finishes.

5. Locate boxes so that wall plates do not cross masonry joints.

6. Unless otherwise indicated, where multiple outlet boxes are installed at the same location at different mounting heights, install along a common vertical center line.

7. Do not install flush-mounted boxes on opposite sides of walls back-to-back. Provide minimum 6 inches (150 mm) horizontal separation unless otherwise indicated.

8. Acoustic-Rated Walls: Do not install flush-mounted boxes on opposite sides of walls back-to-back; provide minimum 24 inches (610 mm) horizontal separation.

9. Fire Resistance Rated Walls: Install flush-mounted boxes such that the required fire resistance will not be reduced.

a. Do not install flush-mounted boxes on opposite sides of walls back-to-back; provide minimum 24 inches (610 mm) separation where wall is constructed with individual noncommunicating stud cavities or protect both boxes with listed putty pads.

b. Do not install flush-mounted boxes with area larger than 16 square inches (0.0103 sq m) or such that the total aggregate area of openings exceeds 100 square inches (0.0645 sq m) for any 100 square feet (9.29 sq m) of wall area.

10. Locate junction and pull boxes as indicated, as required to facilitate installation of conductors, and to limit conduit length and/or number of bends between pulling points in accordance with Section 26 05 33.13.

11. Locate junction and pull boxes in the following areas, unless otherwise indicated or approved by the Architect:

a. Concealed above accessible suspended ceilings.

b. Within joists in areas with no ceiling.

c. Electrical rooms.

d. Mechanical equipment rooms.

H. Box Supports:

1. Secure and support boxes in accordance with NFPA 70 and Section 26 05 29 using suitable supports and methods approved by the authority having jurisdiction.

2. Provide independent support from building structure except for cast metal boxes (other than boxes used for fixture support) supported by threaded conduit connections in accordance with NFPA 70. Do not provide support from piping, ductwork, or other systems.

I. Install boxes plumb and level.

J. Flush-Mounted Boxes:

1. Install boxes in noncombustible materials such as concrete, tile, gypsum, plaster, etc. so that front edge of box or associated raised cover is not set back from finished surface more than 1/4 inch (6 mm) or does not project beyond finished surface.

2. Install boxes in combustible materials such as wood so that front edge of box or associated raised cover is flush with finished surface.

3. Repair rough openings around boxes in noncombustible materials such as concrete, tile, gypsum, plaster, etc. so that there are no gaps or open spaces greater than 1/8 inch (3 mm) at the edge of the box.

K. Install boxes as required to preserve insulation integrity.

L. Install permanent barrier between ganged wiring devices when voltage between adjacent devices exceeds 300 V.

M. Install firestopping to preserve fire resistance rating of partitions and other elements, using materials and methods specified in Section 07 84 00.

N. Close unused box openings.

O. Install blank wall plates on junction boxes and on outlet boxes with no devices or equipment installed or designated for future use.

P. Provide grounding and bonding in accordance with Section 26 05 26.

3.02 CLEANING

A. Clean interior of boxes to remove dirt, debris, plaster and other foreign material.

3.03 PROTECTION

A. Immediately after installation, protect boxes from entry of moisture and foreign material until ready for installation of conductors.

A. END OF SECTION

SECTION 26 05 53
IDENTIFICATION FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Electrical identification requirements.

B. Identification nameplates and labels.

C. Wire and cable markers.

D. Voltage markers.

E. Underground warning tape.

F. Warning signs and labels.

1.02 RELATED REQUIREMENTS

A. Section 26 05 19 - Low-Voltage Electrical Power Conductors and Cables: Color coding for power conductors and cables 600 V and less; vinyl color coding electrical tape.

B. Section 26 27 26 - Wiring Devices - Lutron: Device and wallplate finishes; factory pre-marked wallplates.

1.03 REFERENCE STANDARDS

A. ANSI Z535.2 - American National Standard for Environmental and Facility Safety Signs 2011.

B. ANSI Z535.4 - American National Standard for Product Safety Signs and Labels 2011.

C. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

D. NFPA 70E - Standard for Electrical Safety in the Workplace 2018.

E. UL 969 - Marking and Labeling Systems Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination:

1. Verify final designations for equipment, systems, and components to be identified prior to fabrication of identification products.

B. Sequencing:

1. Do not conceal items to be identified, in locations such as above suspended ceilings, until identification products have been installed.

2. Do not install identification products until final surface finishes and painting are complete.

1.05 SUBMITTALS

A. Product Data: Provide manufacturer's standard catalog pages and data sheets for each product.

B. Shop Drawings: Provide schedule of items to be identified indicating proposed designations, materials, legends, and formats.

1.06 QUALITY ASSURANCE

A. Conform to requirements of NFPA 70.

1.07 FIELD CONDITIONS

A. Do not install adhesive products when ambient temperature is lower than recommended by manufacturer.

PART 2 PRODUCTS

2.01 IDENTIFICATION REQUIREMENTS

A. Identification for Equipment:

1. Use identification nameplate to identify each piece of electrical distribution and control equipment and associated sections, compartments, and components.

a. Switchboards:

1) Identify ampere rating and name.

2) Identify voltage and phase.

3) Identify power source and circuit number. Include location when not within sight of equipment.

4) Use identification nameplate to identify main overcurrent protective device.

5) Use identification nameplate to identify load(s) served for each branch device.Identify spares and spaces.

b. Panelboards:

1) Identify ampere rating and name.

2) Identify voltage and phase.

3) Identify power source and circuit number. Include location when not within sight of equipment.

4) Use typewritten circuit directory to identify load(s) served for panelboards with a door. Identify spares and spaces using pencil.

5) For power panelboards without a door, use identification nameplate to identify load(s) served for each branch device.Identify spares and spaces.

c. Transformers:

1) Identify kVA rating and name.

2. Service Equipment:

a. Use identification nameplate to identify each service disconnecting means.

3. Available Fault Current Documentation: Use identification label to identify the available fault current and date calculations were performed at locations requiring documentation by NFPA 70 including but not limited to the following.

a. Service equipment.

b. Industrial control panels.

c. Motor control centers.

d. Elevator control panels.

e. Industrial machinery.

4. Arc Flash Hazard Warning Labels: Use warning labels to identify arc flash hazards for electrical equipment, such as switchboards, panelboards, industrial control panels, meter socket enclosures, and motor control centers that are likely to require examination, adjustment, servicing, or maintenance while energized.

a. Minimum Size: 3.5 by 5 inches (89 mm by 127 mm).

b. Legend: Include orange header that reads "WARNING", followed by the word message "Arc Flash and Shock Hazard; Appropriate PPE Required; Do not operate controls or open covers without appropriate personal protection equipment; Failure to comply may result in injury or death; Refer to NFPA 70E for minimum PPE requirements" or approved equivalent.

B. Identification for Conductors and Cables:

1. Color Coding for Power Conductors 600 V and Less: Comply with Section 26 05 19.

2. Use identification nameplate or identification label to identify color code for ungrounded and grounded power conductors inside door or enclosure at each piece of feeder or branch-circuit distribution equipment when premises has feeders or branch circuits served by more than one nominal voltage system.

3. Use wire and cable markers to identify circuit number or other designation indicated for power, control, and instrumentation conductors and cables at the following locations:

a. At each source and load connection.

b. Within boxes when more than one circuit is present.

c. Within equipment enclosures when conductors and cables enter or leave the enclosure.

4. Use wire and cable markers to identify connected grounding electrode system components for grounding electrode conductors.

C. Identification for Raceways:

1. Use voltage markers to identify highest voltage present for accessible conduits at maximum intervals of 20 feet (6.1 m).

2. Use identification labels, handwritten text using indelible marker, or plastic marker tags to identify circuits enclosed for accessible conduits at wall penetrations, at floor penetrations, at roof penetrations, and at equipment terminations when source is not within sight.

3. Use identification labels, handwritten text using indelible marker, or plastic marker tags to identify spare conduits at each end. Identify purpose and termination location.

4. Use underground warning tape to identify underground raceways.

D. Identification for Boxes:

1. Use voltage markers to identify highest voltage present.

2. Use identification labels or handwritten text using indelible marker to identify circuits enclosed.

a. For exposed boxes in public areas, use only identification labels.

E. Identification for Devices:

1. Wiring Device and Wallplate Finishes: Comply with Section 26 27 26.

2. Use identification label or engraved wallplate to identify serving branch circuit for all receptacles.

a. For receptacles in public areas or in areas as directed by Architect, provide identification on inside surface of wallplate.

3. Use identification label or engraved wallplate to identify load controlled for wall-mounted control devices controlling loads that are not visible from the control location and for multiple wall-mounted control devices installed at one location.

F. Identification for Luminaires:

1. Use permanent red dot on luminaire frame to identify luminaires connected to emergency power system.

2.02 IDENTIFICATION NAMEPLATES AND LABELS

A. Identification Nameplates:

1. Materials:

a. Indoor Clean, Dry Locations: Use plastic nameplates.

b. Outdoor Locations: Use plastic, stainless steel, or aluminum nameplates suitable for exterior use.

2. Plastic Nameplates: Two-layer or three-layer laminated acrylic or electrically non-conductive phenolic with beveled edges; minimum thickness of 1/16 inch (1.6 mm); engraved text.

a. Exception: Provide minimum thickness of 1/8 inch (3 mm) when any dimension is greater than 4 inches (100 mm).

3. Stainless Steel Nameplates: Minimum thickness of 1/32 inch (0.8 mm); engraved or laser-etched text.

4. Aluminum Nameplates: Anodized; minimum thickness of 1/32 inch (0.8 mm); engraved or laser-etched text.

5. Mounting Holes for Mechanical Fasteners: Two, centered on sides for sizes up to 1 inch (25 mm) high; Four, located at corners for larger sizes.

B. Identification Labels:

1. Materials: Use self-adhesive laminated plastic labels; UV, chemical, water, heat, and abrasion resistant.

2. Text: Use factory pre-printed or machine-printed text. Do not use handwritten text unless otherwise indicated.

C. Format for Equipment Identification:

1. Minimum Size: 1 inch (25 mm) by 2.5 inches (64 mm).

2. Legend:

a. Equipment designation or other approved description.

3. Text: All capitalized unless otherwise indicated.

4. Minimum Text Height:

a. Equipment Designation: 1/2 inch (13 mm).

b. Other Information: 1/4 inch (6 mm).

5. Color:

a. Normal Power System: White text on black background.

D. Format for Caution and Warning Messages:

1. Minimum Size: 2 inches (51 mm) by 4 inches (100 mm).

2. Legend: Include information or instructions indicated or as required for proper and safe operation and maintenance.

3. Text: All capitalized unless otherwise indicated.

4. Minimum Text Height: 1/2 inch (13 mm).

5. Color: Black text on yellow background unless otherwise indicated.

E. Format for Receptacle Identification:

1. Minimum Size: 3/8 inch (10 mm) by 1.5 inches (38 mm).

2. Legend: Power source and circuit number or other designation indicated.

3. Text: All capitalized unless otherwise indicated.

4. Minimum Text Height: 3/16 inch (5 mm).

5. Color: Black text on clear background.

F. Format for Control Device Identification:

1. Minimum Size: 3/8 inch (10 mm) by 1.5 inches (38 mm).

2. Legend: Load controlled or other designation indicated.

3. Text: All capitalized unless otherwise indicated.

4. Minimum Text Height: 3/16 inch (5 mm).

5. Color: Black text on clear background.

2.03 WIRE AND CABLE MARKERS

A. Markers for Conductors and Cables: Use wrap-around self-adhesive vinyl cloth, wrap-around self-adhesive vinyl self-laminating, heat-shrink sleeve, plastic sleeve, plastic clip-on, or vinyl split sleeve type markers suitable for the conductor or cable to be identified.

B. Markers for Conductor and Cable Bundles: Use plastic marker tags secured by nylon cable ties.

C. Legend: Power source and circuit number or other designation indicated.

D. Text: Use factory pre-printed or machine-printed text, all capitalized unless otherwise indicated.

E. Minimum Text Height: 1/8 inch (3 mm).

F. Color: Black text on white background unless otherwise indicated.

2.04 VOLTAGE MARKERS

A. Markers for Conduits: Use factory pre-printed self-adhesive vinyl, self-adhesive vinyl cloth, or vinyl snap-around type markers.

B. Markers for Boxes and Equipment Enclosures: Use factory pre-printed self-adhesive vinyl or self-adhesive vinyl cloth type markers.

C. Minimum Size:

1. Markers for Conduits: As recommended by manufacturer for conduit size to be identified.

2. Markers for Pull Boxes: 1 1/8 by 4 1/2 inches (29 by 110 mm).

3. Markers for Junction Boxes: 1/2 by 2 1/4 inches (13 by 57 mm).

D. Legend:

1. Markers for Voltage Identification: Highest voltage present.

E. Color: Black text on orange background unless otherwise indicated.

2.05 UNDERGROUND WARNING TAPE

A. Materials: Use non-detectable type polyethylene tape suitable for direct burial, unless otherwise indicated.

B. Non-detectable Type Tape: 6 inches (152 mm) wide, with minimum thickness of 4 mil (0.1 mm).

C. Legend: Type of service, continuously repeated over full length of tape.

D. Color:

2.06 WARNING SIGNS AND LABELS

A. Comply with ANSI Z535.2 or ANSI Z535.4 as applicable.

B. Warning Signs:

1. Materials:

2. Minimum Size: 7 by 10 inches (178 by 254 mm) unless otherwise indicated.

C. Warning Labels:

1. Materials: Use factory pre-printed or machine-printed self-adhesive polyester or self-adhesive vinyl labels; UV, chemical, water, heat, and abrasion resistant; produced using materials recognized to UL 969.

2. Machine-Printed Labels: Use thermal transfer process printing machines and accessories recommended by label manufacturer.

3. Minimum Size: 2 by 4 inches (51 mm by 102 mm) unless otherwise indicated.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install products in accordance with manufacturer's instructions.

B. Install identification products to be plainly visible for examination, adjustment, servicing, and maintenance. Unless otherwise indicated, locate products as follows:

1. Surface-Mounted Equipment: Enclosure front.

2. Flush-Mounted Equipment: Inside of equipment door.

3. Free-Standing Equipment: Enclosure front; also enclosure rear for equipment with rear access.

4. Elevated Equipment: Legible from the floor or working platform.

5. Branch Devices: Adjacent to device.

6. Interior Components: Legible from the point of access.

7. Conduits: Legible from the floor.

8. Boxes: Outside face of cover.

9. Conductors and Cables: Legible from the point of access.

10. Devices: Outside face of cover.

C. Install identification products centered, level, and parallel with lines of item being identified.

D. Secure nameplates to exterior surfaces of enclosures using stainless steel screws and to interior surfaces using self-adhesive backing or epoxy cement.

E. Install self-adhesive labels and markers to achieve maximum adhesion, with no bubbles or wrinkles and edges properly sealed.

F. Install underground warning tape above buried lines with one tape per trench at 3 inches (75 mm) below finished grade.

G. Mark all handwritten text, where permitted, to be neat and legible.

3.02 FIELD QUALITY CONTROL

A. Replace self-adhesive labels and markers that exhibit bubbles, wrinkles, curling or other signs of improper adhesion.

A. END OF SECTION

SECTION 26 05 83
WIRING CONNECTIONS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Electrical connections to equipment.

1.02 REFERENCE STANDARDS

A. NEMA WD 6 - Wiring Devices - Dimensional Specifications 2016.

B. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

1.03 ADMINISTRATIVE REQUIREMENTS

A. Coordination:

1. Obtain and review shop drawings, product data, manufacturer's wiring diagrams, and manufacturer's instructions for equipment furnished under other sections.

2. Determine connection locations and requirements.

B. Sequencing:

1. Install rough-in of electrical connections before installation of equipment is required.

2. Make electrical connections before required start-up of equipment.

1.04 QUALITY ASSURANCE

A. Conform to requirements of NFPA 70.

B. Products: Listed, classified, and labeled as suitable for the purpose intended.

C. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

PART 2 PRODUCTS

2.01 MATERIALS

A. Cords and Caps: NEMA WD 6; match receptacle configuration at outlet provided for equipment.

1. Cord Construction: NFPA 70, Type SO, multiconductor flexible cord with identified equipment grounding conductor, suitable for use in damp locations.

2. Size: Suitable for connected load of equipment, length of cord, and rating of branch circuit overcurrent protection.

2.02 EQUIPMENT CONNECTIONS

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that equipment is ready for electrical connection, wiring, and energization.

3.02 ELECTRICAL CONNECTIONS

A. Make electrical connections in accordance with equipment manufacturer's instructions.

B. Make conduit connections to equipment using flexible conduit. Use liquidtight flexible conduit with watertight connectors in damp or wet locations.

C. Connect heat producing equipment using wire and cable with insulation suitable for temperatures encountered.

D. Provide receptacle outlet to accommodate connection with attachment plug.

E. Provide cord and cap where field-supplied attachment plug is required.

F. Install suitable strain-relief clamps and fittings for cord connections at outlet boxes and equipment connection boxes.

G. Install disconnect switches, controllers, control stations, and control devices to complete equipment wiring requirements.

H. Install terminal block jumpers to complete equipment wiring requirements.

I. Install interconnecting conduit and wiring between devices and equipment to complete equipment wiring requirements.

A. END OF SECTION

SECTION 26 0802
ELECTRICAL ACCEPTANCE TESTING

PART 1 - GENERAL

1.1 OVERVIEW

A. The purpose of these specifications is to assure that all tested electrical equipment and systems are operational and within applicable standards and manufacturer's tolerances and that the equipment and systems are installed in accordance with design specifications.

B. The work specified in these specifications may involve hazardous voltages, materials, operations, and equipment. These specifications do not purport to address all of the safety problems associated with their use. It is the responsibility of the independent testing agency to review all applicable regulatory limitations prior to the use of these specifications.

C. Perform the visual inspections, manual operations and tests on systems and equipment as described in Part 3, "Execution".

D. Tests shall be performed and documented by an independent testing agency.

E. Perform these tests in addition to other electrical tests delineated in other Sections.

1.2 REFERENCES

A. All inspections and field tests shall be in accordance with the latest edition of the following codes, standards, and specifications except as provided otherwise herein.

1. American National Standards Institute - ANSI
2. American Society for Testing and Materials - ASTM
3. Institute of Electrical and Electronic Engineers - IEEE
4. Insulated Cable Engineers Association - ICEA
5. InterNational Electrical Testing Association - NETA
6. National Electrical Manufacturer's Association - NEMA
7. National Fire Protection Association - NFPA
8. Occupational Safety and Health Administration - OSHA
9. State and local codes and ordinances
10. Underwriters Laboratories, Inc. - UL

1.3 SUBMITTAL

A. The testing organization shall submit appropriate documentation to demonstrate that it satisfactorily complies with the following. An organization having a "Full Membership" classification issued by the InterNational Electrical Testing Association meets this criteria.

1. The testing organization shall be an independent, third party, testing organization which can function as an unbiased testing authority, professionally independent of the manufacturers, suppliers, and installers of equipment or systems evaluated by the testing organization.
2. The testing organization shall be regularly engaged in the testing of electrical equipment devices, installations, and systems.

B. The testing organization shall utilize technicians who are regularly employed for testing services.

C. Each on-site crew leader shall hold a current registered certification in electrical testing applicable to each type of apparatus to be inspected or tested. The certification in electrical testing shall be issued by an independent, nationally-recognized, technician certification agency. The following entities shall qualify as independent, nationally-recognized, technician certification agencies:

1. InterNational Electrical Testing Association (NETA)
2. Accepted certifications:
3. Certified Technician/Level III
4. Certified Senior Technician/Level IV

1.4 TEST REPORTS

A. Provide written test reports, signed and dated, for all tests prior to acceptance of the tested equipment by the Owner. Test reports on megger, dielectric absorption and high potential tests shall include the ambient temperature and relative humidity existing at the time of the tests.

PART 2 - PART 2 -PRODUCTS (NOT APPLICABLE)

PART 3 - EXECUTION

3.1 VISUAL INSPECTIONS

A. Prior to any testing, perform visual inspections to verify the following:
   1. The equipment is completely and properly installed
   2. The equipment is free from damage and defects
   3. Shipping blocks and restraints have been removed
   4. Electrical terminations have been properly tightened
   5. The equipment has been properly aligned
   6. The equipment has been properly lubricated
   7. The ventilation louvers are open and unobstructed
   8. The equipment is ready to be tested

3.2 MANUAL OPERATION

A. Prior to any testing, mechanical devices shall be exercised or rotated manually to verify that they operate properly and freely.

3.3 PRIMARY CABLE TESTS

A. Perform a continuity test, 2,500-volt DC megger test, AC high potential test, and a second 2,500-volt DC megger test on primary cables. The high potential test shall be performed at 45kV for new cable installations, and at 30kV when new cable has been spliced to existing cable.

3.4 POWER CABLE TESTS

A. Perform a continuity check and a 1,000 volt DC megger test on 600 volt power cables No. 4 AWG and larger.
   1. The megger test shall be performed between each pair of conductors and from each conductor to ground.
   2. The megger test shall be performed for 15 seconds or until the insulation resistance value stabilizes.
   3. The insulation resistance between conductors and from each conductor to ground shall be 100 megohms minimum in one minute or less. In addition, the lowest insulation resistance value shall not differ from the highest value by more than 20 percent.

3.5 CONTROL CABLE TESTS

A. Perform a continuity check on control and instrumentation wiring.

3.6 SECONDARY SWITCHGEAR AND SWITCHBOARD TESTS

A. Perform a continuity check and 1,000 volt DC megger test on buses, and on main and feeder breakers.

B. Perform a primary current injection test and a 'Ducter' (contact resistance) test on main breakers.

C. Perform a 1,000-volt DC megger test and a turns-ratio test on CT's and PT's.

D. Calibrate the metering.

3.7 SERVICE, DISTRIBUTION AND MOTOR CONTROL EQUIPMENT TESTS

A. Perform a 1,000-volt megger test on buses, motor starters and disconnect switches. This test may be combined with the feeder cable megger test by testing the devices and terminated cables together.

B. Perform a continuity check on motor control circuits and control panel internal wiring.

C. Perform an operational test on the controls.

D. Perform a continuity check and a 1,000-volt DC megger test on 3 phase distribution and isolation transformers.

3.8 MOTOR TESTS

A. Perform a 1,000-volt megger test on 460 volt, 3 phase motors, and a 500 volt megger test on 200 volt, 3 phase motors.

B. “Bump” motors to verify proper direction of rotation.

C. Run motors and check for vibration.

3.9 GROUNDING TESTS

A. Measure the resistance to ground of each ground rod before connection to the other ground rods. The resistance shall not exceed 25 ohms.
   1. A single electrode which does not have a resistance to ground of 25 ohms or less shall be augmented by additional electrode(s).

B. Measure the resistance to ground of the total ground system with all connections completed. The resistance shall not exceed 2 ohms for primary services or 5 ohms for secondary services.

C. Tests of the resistance to ground shall be made using either the three point method or the fall-of-potential method.

D. Perform a continuity check from equipment ground bus bars and ground lugs to the ground system.

END OF SECTION

SECTION 26 09 23
LIGHTING CONTROL DEVICES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Occupancy sensors.

B. Daylighting controls.

1.02 REFERENCE STANDARDS

A. NECA 1 - Standard for Good Workmanship in Electrical Construction 2015.

B. NECA 130 - Standard for Installing and Maintaining Wiring Devices 2010.

C. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum) 2020.

D. NEMA 410 - Performance Testing for Lighting Controls and Switching Devices with Electronic Drivers and Discharge Ballasts 2016.

E. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

F. UL 1472 - Solid-State Dimming Controls Current Edition, Including All Revisions.

1.03 ADMINISTRATIVE REQUIREMENTS

A. Coordination:

1. Coordinate the placement of lighting control devices with millwork, furniture, equipment, etc. installed under other sections or by others.

2. Coordinate the placement of wall switch occupancy sensors with actual installed door swings.

3. Coordinate the placement of occupancy sensors with millwork, furniture, equipment or other potential obstructions to motion detection coverage installed under other sections or by others.

4. Coordinate the placement of photo sensors for daylighting controls with windows, skylights, and luminaires to achieve optimum operation. Coordinate placement with ductwork, piping, equipment, or other potential obstructions to light level measurement installed under other sections or by others.

5. Notify Architect of any conflicts or deviations from Contract Documents to obtain direction prior to proceeding with work.

1.04 SUBMITTALS

A. Product Data: Include ratings, configurations, standard wiring diagrams, dimensions, colors, service condition requirements, and installed features.

1. Occupancy Sensors: Include detailed motion detection coverage range diagrams.

B. Shop Drawings:

1. Occupancy Sensors: Provide lighting plan indicating location, model number, and orientation of each occupancy sensor and associated system component.

2. Daylighting Controls: Provide lighting plan indicating location, model number, and orientation of each photo sensor and associated system component.

C. Field Quality Control Reports.

D. Manufacturer's Installation Instructions: Include application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of product.

E. Operation and Maintenance Data: Include detailed information on device programming and setup.

F. Project Record Documents: Record actual installed locations and settings for lighting control devices.

1.05 QUALITY ASSURANCE

A. Conform to requirements of NFPA 70.

B. Maintain at the project site a copy of each referenced document that prescribes execution requirements.

C. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

1.06 DELIVERY, STORAGE, AND PROTECTION

A. Store products in a clean, dry space in original manufacturer's packaging in accordance with manufacturer's written instructions until ready for installation.

1.07 FIELD CONDITIONS

A. Maintain field conditions within manufacturer's required service conditions during and after installation.

1.08 WARRANTY

A. Provide five year manufacturer warranty for all occupancy sensors.

B. Provide five year manufacturer warranty for all daylighting controls.

PART 2 PRODUCTS

2.01 LIGHTING CONTROL DEVICES - GENERAL REQUIREMENTS

A. Provide products listed, classified, and labeled as suitable for the purpose intended.

B. Unless specifically indicated to be excluded, provide all required conduit, wiring, connectors, hardware, components, accessories, etc. as required for a complete operating system.

2.02 OCCUPANCY SENSORS

A. All Occupancy Sensors:

1. Description: Factory-assembled commercial specification grade devices for indoor use capable of sensing both major motion, such as walking, and minor motion, such as small desktop level movements, according to published coverage areas, for automatic control of load indicated.

2. Sensor Technology:

   a. Passive Infrared (PIR) Occupancy Sensors: Designed to detect occupancy by sensing movement of thermal energy between zones.

   b. Ultrasonic Occupancy Sensors: Designed to detect occupancy by sensing frequency shifts in emitted and reflected inaudible sound waves.

   c. Passive Infrared/Ultrasonic Dual Technology Occupancy Sensors: Designed to detect occupancy using a combination of both passive infrared and ultrasonic technologies.

3. Provide LED to visually indicate motion detection with separate color LEDs for each sensor type in dual technology units.

4. Operation: Unless otherwise indicated, occupancy sensor to turn load on when occupant presence is detected and to turn load off when no occupant presence is detected during an adjustable turn-off delay time interval.

5. Dual Technology Occupancy Sensors: Field configurable turn-on and hold-on activation with settings for activation by either or both sensing technologies.

6. Passive Infrared Lens Field of View: Field customizable by addition of factory masking material, adjustment of integral blinders, or similar means to block motion detection in selected areas.

7. Turn-Off Delay: Field adjustable, with time delay settings up to 30 minutes.

8. Sensitivity: Field adjustable.

9. Adaptive Technology: Field selectable; capable of self-adjusting sensitivity and time delay according to conditions.

10. Integral Photocell: For field selectable and adjustable inhibition of automatic turn-on of load when ambient lighting is above the selected level.

11. Compatibility (Non-Dimming Sensors): Suitable for controlling incandescent lighting, low-voltage lighting with electronic and magnetic transformers, fluorescent lighting with electronic and magnetic ballasts, and fractional motor loads, with no minimum load requirements.

12. Load Rating for Line Voltage Occupancy Sensors: As required to control the load indicated on drawings.

B. Wall Switch Occupancy Sensors:

   1. All Wall Switch Occupancy Sensors:

      a. Description: Occupancy sensors designed for installation in standard wall box at standard wall switch mounting height with a field of view of 180 degrees, integrated manual control capability, and no leakage current to load in off mode.

b. Unless otherwise indicated or required to control the load indicated on drawings, provide line voltage units with self-contained relay.

c. Where indicated, provide two-circuit units for control of two separate lighting loads, with separate manual controls and separately programmable operation for each load.

d. Operation: Field selectable to operate either as occupancy sensor (automatic on/off) or as vacancy sensor (manual-on/automatic off).

e. Manual-Off Override Control: When used to turn off load while in automatic-on mode, unit to revert back to automatic mode after no occupant presence is detected during the delayed-off time interval.

C. Wall Dimmer Occupancy Sensors:

1. General Requirements:

a. Description: Occupancy sensors designed for installation in standard wall box at standard wall switch mounting height with a field of view of 180 degrees, integrated dimming control capability , and no leakage current to load in off mode.

b. Operation: Field selectable to operate either as occupancy sensor (automatic on/off) or as vacancy sensor (manual-on/automatic off).

c. Manual-Off Override Control Capability: When used to turn off load while in automatic-on mode, unit to revert back to automatic mode after no occupant presence is detected during the delayed-off time interval.

d. Dimmer: Solid-state with continuous full-range even control following square law dimming curve, integral radio frequency interference filtering, power failure preset memory, air gap switch accessible without removing wall plate, and listed as complying with UL 1472; type and rating suitable for load controlled.

e. ---CHOOSE ONLY ONE OF THE TWO PARAGRAPHS BELOW---

f. Finish: Color to be selected<>.

D. Ceiling Mounted Occupancy Sensors:

1. All Ceiling Mounted Occupancy Sensors:

a. Description: Low profile occupancy sensors designed for ceiling installation.

b. Unless otherwise indicated or required to control the load indicated on drawings, provide low voltage units, for use with separate compatible accessory power packs.

c. Occupancy sensor to be field selectable as either manual-on/automatic-off or automatic on/off.

d. Finish: White unless otherwise indicated.

2. Passive Infrared/Ultrasonic Dual Technology Ceiling Mounted Occupancy Sensors:

a. Standard Range Sensors: Capable of detecting motion within an area of 1000 at a mounting height of 9 feet (2.7 m), with a field of view of 360 degrees.

E. Power Packs for Low Voltage Occupancy Sensors:

1. Description: Plenum rated, self-contained low voltage class 2 transformer and relay compatible with specified low voltage occupancy sensors for switching of line voltage loads.

2. Provide quantity and configuration of power and slave packs with all associated wiring and accessories as required to control the load indicated on drawings.

3. Input Supply Voltage: Dual rated for 120/277 V ac.

4. --CHOOSE ONE OF THE TWO SUBPARAGRAPHS BELOW--

5. Load Rating: As required to control the load indicated on drawings.

2.03 DAYLIGHTING CONTROLS

A. System Description: Control system consisting of photo sensors and compatible control modules and power packs, contactors, or relays as required for automatic control of load indicated according to available natural light; capable of integrating with occupancy sensors and manual override controls.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that field measurements are as indicated.

B. Verify that outlet boxes are installed in proper locations and at proper mounting heights and are properly sized to accommodate devices and conductors in accordance with NFPA 70.

C. Verify that openings for outlet boxes are neatly cut and will be completely covered by devices or wall plates.

D. Verify that final surface finishes are complete, including painting.

E. Verify that branch circuit wiring installation is completed, tested, and ready for connection to lighting control devices.

F. Verify that the service voltage and ratings of lighting control devices are appropriate for the service voltage and load requirements at the location to be installed.

G. Verify that conditions are satisfactory for installation prior to starting work.

3.02 PREPARATION

A. Provide extension rings to bring outlet boxes flush with finished surface.

B. Clean dirt, debris, plaster, and other foreign materials from outlet boxes.

3.03 INSTALLATION

A. Install lighting control devices in accordance with NECA 1 (general workmanship) and, where applicable, NECA 130, including mounting heights specified in those standards unless otherwise indicated.

B. Coordinate locations of outlet boxes provided under Section 26 05 33.16 as required for installation of lighting control devices provided under this section.

1. Mounting Heights: Unless otherwise indicated, as follows:

a. Wall Switch Occupancy Sensors: 48 inches (1.2 m) above finished floor.

2. Orient outlet boxes for vertical installation of lighting control devices unless otherwise indicated.

3. Locate wall switch occupancy sensors on strike side of door with edge of wall plate 3 inches (80 mm) from edge of door frame. Where locations are indicated otherwise, notify Architect to obtain direction prior to proceeding with work.

C. Install lighting control devices in accordance with manufacturer's instructions.

D. Unless otherwise indicated, connect lighting control device grounding terminal or conductor to branch circuit equipment grounding conductor and to outlet box with bonding jumper.

E. Install lighting control devices plumb and level, and held securely in place.

F. Where required and not furnished with lighting control device, provide wall plate in accordance with Section 26 27 26.

G. Provide required supports in accordance with Section 26 05 29.

H. Where applicable, install lighting control devices and associated wall plates to fit completely flush to mounting surface with no gaps and rough opening completely covered without strain on wall plate. Repair or reinstall improperly installed outlet boxes or improperly sized rough openings. Do not use oversized wall plates in lieu of meeting this requirement.

I. Identify lighting control devices in accordance with Section 26 05 53.

J. Occupancy Sensor Locations:

1. Location Adjustments: Within the design intent, reasonably minor adjustments to locations may be made in order to optimize coverage and avoid conflicts or problems affecting coverage.

2. Locate ultrasonic and dual technology passive infrared/ultrasonic occupancy sensors a minimum of 4 feet (1.2 m) from air supply ducts or other sources of heavy air flow and as per manufacturer's recommendations, in order to minimize false triggers.

K. Daylighting Control Photo Sensor Locations:

1. Unless otherwise indicated, locate photo sensors for closed loop systems to accurately measure the light level controlled at the designated task location, while minimizing the measured amount of direct light from natural or artificial sources such as windows or pendant luminaires.

2. Unless otherwise indicated, locate photo sensors for open loop systems to accurately measure the level of daylight coming into the space, while minimizing the measured amount of lighting from artificial sources.

L. Lamp Burn-In: Operate lamps at full output for minimum of 100 hours or prescribed period per manufacturer's recommendations prior to use with any dimming controls. Replace lamps that fail prematurely due to improper lamp burn-in.

M. Unless otherwise indicated, install power packs for lighting control devices above accessible ceiling or above access panel in inaccessible ceiling near the sensor location.

N. Where indicated, install separate compatible wall switches for manual control interface with lighting control devices or associated power packs.

O. Unless otherwise indicated, install switches on load side of power packs so that switch does not turn off power pack.

3.04 FIELD QUALITY CONTROL

A. Inspect each lighting control device for damage and defects.

B. Test occupancy sensors to verify proper operation, including time delays and ambient light thresholds where applicable. Verify optimal coverage for entire room or area. Record test results in written report to be included with submittals.

C. Test daylighting controls to verify proper operation, including light level measurements and time delays where applicable. Record test results in written report to be included with submittals.

D. Correct wiring deficiencies and replace damaged or defective lighting control devices.

3.05 ADJUSTING

A. Adjust devices and wall plates to be flush and level.

B. Adjust occupancy sensor settings to minimize undesired activations while optimizing energy savings, and to achieve desired function as indicated or as directed by Architect.

C. Where indicated or as directed by Architect, install factory masking material or adjust integral blinders on passive infrared (PIR) and dual technology occupancy sensor lenses to block undesired motion detection.

D. Adjust daylighting controls under optimum lighting conditions after all room finishes, furniture, and window treatments have been installed to achieve desired operation as indicated or as directed by Architect. Record settings in written report to be included with submittals. Readjust controls calibrated prior to installation of final room finishes, furniture, and window treatments that do not function properly as determined by Architect.

3.06 CLEANING

A. Clean exposed surfaces to remove dirt, paint, or other foreign material and restore to match original factory finish.

3.07 CLOSEOUT ACTIVITIES

A. Demonstration: Demonstrate proper operation of lighting control devices to Architect, and correct deficiencies or make adjustments as directed.

B. Training: Train Owner's personnel on operation, adjustment, programming, and maintenance of lighting control devices.

1. Use operation and maintenance manual as training reference, supplemented with additional training materials as required.

2. Provide minimum of two hours of training.

3. Instructor: Qualified contractor familiar with the project and with sufficient knowledge of the installed lighting control devices.

4. Location: At project site.

A. END OF SECTION

SECTION 26 22 00
LOW-VOLTAGE TRANSFORMERS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. General purpose transformers.

1.02 ADMINISTRATIVE REQUIREMENTS

A. Coordination:

1. Coordinate the work with other trades to avoid placement of ductwork, piping, equipment, or other potential obstructions within the dedicated equipment spaces and working clearances required by NFPA 70.

2. Coordinate arrangement of electrical equipment with the dimensions and clearance requirements of the actual equipment to be installed.

3. Coordinate the work with placement of supports, anchors, etc. required for mounting.

4. Verify with manufacturer that conductor terminations are suitable for use with the conductors to be installed.

5. Notify Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.

1.03 SUBMITTALS

A. Product Data: Include voltage, kVA, impedance, tap configurations, insulation system class and rated temperature rise, efficiency, sound level, enclosure ratings, outline and support point dimensions, weight, required clearances, service condition requirements, and installed features.

1. Vibration Isolators: Include attachment method and rated load and deflection.

B. Shop Drawings: Provide dimensioned plan and elevation views of transformers and adjacent equipment with all required clearances indicated.

1.04 QUALITY ASSURANCE

A. Conform to requirements of NFPA 70.

B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

C. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Store in a clean, dry space. Maintain factory wrapping or provide an additional heavy canvas or heavy plastic cover to protect units from dirt, water, construction debris, and traffic.

B. Handle in accordance with manufacturer's written instructions. Lift only with lugs provided for the purpose. Handle carefully to avoid damage to transformer internal components, enclosure, and finish.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Eaton Corporation: www.eaton.com.

B. Schneider Electric; Square D Products: www.schneider-electric.us/#sle.

C. Siemens Industry, Inc: www.usa.siemens.com.

D. Source Limitations: Furnish transformers produced by the same manufacturer as the other electrical distribution equipment used for this project and obtained from a single supplier.

2.02 TRANSFORMERS - GENERAL REQUIREMENTS

A. Description: Factory-assembled, dry type transformers for 60 Hz operation designed and manufactured in accordance with NEMA ST 20 and listed, classified, and labeled as suitable for the purpose intended.

B. Unless noted otherwise, transformer ratings indicated are for continuous loading according to IEEE C57.96 under the following service conditions:

1. Altitude: Less than 3,300 feet (1,000 m).

2. Ambient Temperature:

a. Greater than 10 kVA: Not exceeding 104 degrees F (40 degrees C).

b. Less than 10 kVA: Not exceeding 77 degrees F (25 degrees C).

C. Core: High grade, non-aging silicon steel with high magnetic permeability and low hysteresis and eddy current losses. Keep magnetic flux densities substantially below saturation point, even at 10 percent primary overvoltage. Tightly clamp core laminations to prevent plate movement and maintain consistent pressure throughout core length.

D. Impregnate core and coil assembly with non-hydroscopic thermo-setting varnish to effectively seal out moisture and other contaminants.

E. Basic Impulse Level: 10 kV.

F. Ground core and coil assembly to enclosure by means of a visible flexible copper grounding strap.

G. Isolate core and coil from enclosure using vibration-absorbing mounts.

H. Nameplate: Include transformer connection data, ratings, wiring diagrams, and overload capacity based on rated winding temperature rise.

2.03 GENERAL PURPOSE TRANSFORMERS

A. Description: Self-cooled, two winding transformers listed and labeled as complying with UL 506 or UL 1561; ratings as indicated on the drawings.

B. Insulation System and Allowable Average Winding Temperature Rise:

1. Less than 15 kVA: Class 180 degrees C insulation system with 115 degrees C average winding temperature rise.

2. 15 kVA and Larger: Class 220 degrees C insulation system with 150 degrees C average winding temperature rise.

C. Coil Conductors: Continuous copper windings with terminations brazed or welded.

D. Winding Taps:

1. Less than 3 kVA: None.

2. 3 kVA through 15 kVA: Two 5 percent full capacity primary taps below rated voltage.

3. 15 kVA through 300 kVA: Two 2.5 percent full capacity primary taps above and four 2.5 percent full capacity primary taps below rated voltage.

4. 500 kVA and Larger: Two 2.5 percent full capacity primary taps above and two 2.5 percent full capacity primary taps below rated voltage.

E. Energy Efficiency: Comply with 10 CFR 431, Subpart K.

F. Sound Levels: Standard sound levels complying with NEMA ST 20

G. Mounting Provisions:

1. Less than 15 kVA: Suitable for wall mounting.

2. 15 kVA through 75 kVA: Suitable for wall, floor, or trapeze mounting.

3. Larger than 75 kVA: Suitable for floor mounting.

H. Transformer Enclosure: Comply with NEMA ST 20.

1. Environment Type per NEMA 250: Unless otherwise indicated, as specified for the following installation locations:

2. Construction: Steel.

a. Less than 15 kVA: Totally enclosed, non-ventilated.

b. 15 kVA and Larger: Ventilated.

3. Finish: Manufacturer's standard grey, suitable for outdoor installations.

4. Provide lifting eyes or brackets.

2.04 SOURCE QUALITY CONTROL

A. Factory test transformers according to NEMA ST 20.

PART 3 EXECUTION

3.01 INSTALLATION

A. Perform work in accordance with NECA 1 (general workmanship).

B. Install products in accordance with manufacturer's instructions.

C. Install transformers in accordance with NECA 409 and IEEE C57.94.

D. Use flexible conduit, under the provisions of Section 26 05 33.13, 2 feet (600 mm) minimum length, for connections to transformer case. Make conduit connections to side panel of enclosure.

E. Arrange equipment to provide minimum clearances as specified on transformer nameplate and in accordance with manufacturer's instructions and NFPA 70.

F. Install transformers plumb and level.

G. Transformer Support:

1. Provide required support and attachment in accordance with Section 26 05 29, where not furnished by transformer manufacturer.

2. Use integral transformer flanges to support wall-mounted transformers.

3. Unless otherwise indicated, mount floor-mounted transformers on properly sized 3 inch (80 mm) high concrete pad constructed in accordance with Section 03 30 00.

4. Use trapeze hangers assembled from threaded rods and metal channel (strut) to support suspended transformers. Provide independent support from building structure. Do not provide support from piping, ductwork, or other systems.

H. Provide grounding and bonding in accordance with Section 26 05 26.

I. Remove shipping braces and adjust bolts that attach the core and coil mounting bracket to the enclosure according to manufacturer's recommendations in order to reduce audible noise transmission.

J. Where not factory-installed, install lugs sized as required for termination of conductors as indicated.

3.02 FIELD QUALITY CONTROL

A. Inspect and test in accordance with NETA ATS, except Section 4.

B. Perform inspections and tests listed in NETA ATS Sections 7.2.1.1 and 7.2.1.2. Tests and inspections listed as optional are not required.

3.03 ADJUSTING

A. Measure primary and secondary voltages and make appropriate tap adjustments.

B. Adjust tightness of mechanical and electrical connections to manufacturer's recommended torque settings.

3.04 CLEANING

A. Clean dirt and debris from transformer components according to manufacturer's instructions.

B. Repair scratched or marred exterior surfaces to match original factory finish.

A. END OF SECTION

SECTION 26 24 16
PANELBOARDS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Power distribution panelboards.

B. Overcurrent protective devices for panelboards.

1.02 RELATED REQUIREMENTS

A. Section 26 05 26 - Grounding and Bonding for Electrical Systems.

B. Section 26 05 29 - Hangers and Supports for Electrical Systems.

1.03 REFERENCE STANDARDS

A. FS W-C-375 - Circuit Breakers, Molded Case; Branch Circuit and Service 2013e (Amended 2017).

B. NECA 1 - Standard for Good Workmanship in Electrical Construction 2015.

C. NECA 407 - Standard for Installing and Maintaining Panelboards 2015.

D. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum) 2020.

E. NEMA PB 1 - Panelboards 2011.

F. NEMA PB 1.1 - General Instructions for Proper Installation, Operation and Maintenance of Panelboards Rated 600 Volts or Less 2013.

G. NETA ATS - Acceptance Testing Specifications for Electrical Power Equipment and Systems 2017.

H. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

I. UL 50 - Enclosures for Electrical Equipment, Non-Environmental Considerations Current Edition, Including All Revisions.

J. UL 50E - Enclosures for Electrical Equipment, Environmental Considerations Current Edition, Including All Revisions.

K. UL 67 - Panelboards Current Edition, Including All Revisions.

L. UL 489 - Molded-Case Circuit Breakers, Molded-Case Switches and Circuit Breaker Enclosures Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination:

1. Coordinate the work with other trades to avoid placement of ductwork, piping, equipment, or other potential obstructions within the dedicated equipment spaces and working clearances for electrical equipment required by NFPA 70.

2. Coordinate arrangement of electrical equipment with the dimensions and clearance requirements of the actual equipment to be installed.

3. Coordinate the work with other trades to provide walls suitable for installation of flush-mounted panelboards where indicated.

4. Verify with manufacturer that conductor terminations are suitable for use with the conductors to be installed.

5. Notify Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.

1.05 SUBMITTALS

A. Product Data: Provide manufacturer's standard catalog pages and data sheets for panelboards, enclosures, overcurrent protective devices, and other installed components and accessories.

B. Shop Drawings: Indicate outline and support point dimensions, voltage, main bus ampacity, overcurrent protective device arrangement and sizes, short circuit current ratings, conduit entry locations, conductor terminal information, and installed features and accessories.

C. Project Record Documents: Record actual installed locations of panelboards and actual installed circuiting arrangements.

D. Maintenance Data: Include information on replacement parts and recommended maintenance procedures and intervals.

E. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.

1. Panelboard Keys: Two of each different key.

1.06 QUALITY ASSURANCE

A. Conform to requirements of NFPA 70.

B. Maintain at the project site a copy of each referenced document that prescribes execution requirements.

C. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

D. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Receive, inspect, handle, and store panelboards in accordance with manufacturer's instructions and NECA 407.

B. Store in a clean, dry space. Maintain factory wrapping or provide an additional heavy canvas or heavy plastic cover to protect units from dirt, water, construction debris, and traffic.

C. Handle carefully in accordance with manufacturer's written instructions to avoid damage to panelboard internal components, enclosure, and finish.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Eaton Corporation: www.eaton.com.

B. Schneider Electric; Square D Products: www.schneider-electric.us.

C. Siemens Industry, Inc: www.usa.siemens.com.

D. Source Limitations: Furnish panelboards and associated components produced by the same manufacturer as the other electrical distribution equipment used for this project and obtained from a single supplier.

2.02 PANELBOARDS - GENERAL REQUIREMENTS

A. Provide products listed, classified, and labeled as suitable for the purpose intended.

B. Unless otherwise indicated, provide products suitable for continuous operation under the following service conditions:

1. Altitude: Less than 6,600 feet (2,000 m).

2. Ambient Temperature:

a. Panelboards Containing Circuit Breakers: Between 23 degrees F (-5 degrees C) and 104 degrees F (40 degrees C).

C. Short Circuit Current Rating:

1. Provide panelboards with listed short circuit current rating not less than the available fault current at the installed location as indicated on the drawings.

D. Mains: Configure for top or bottom incoming feed as indicated or as required for the installation.

E. Branch Overcurrent Protective Devices: Replaceable without disturbing adjacent devices.

F. Bussing: Sized in accordance with UL 67 temperature rise requirements.

1. Provide fully rated neutral bus unless otherwise indicated, with a suitable lug for each feeder or branch circuit requiring a neutral connection.

2. Provide solidly bonded equipment ground bus in each panelboard, with a suitable lug for each feeder and branch circuit equipment grounding conductor.

G. Conductor Terminations: Suitable for use with the conductors to be installed.

H. Enclosures: Comply with NEMA 250, and list and label as complying with UL 50 and UL 50E.

1. Environment Type per NEMA 250: Unless otherwise indicated, as specified for the following installation locations:

a. Outdoor Locations: Type 3R.

2. Boxes: Galvanized steel unless otherwise indicated.

a. Provide wiring gutters sized to accommodate the conductors to be installed.

3. Fronts:

a. Fronts for Surface-Mounted Enclosures: Same dimensions as boxes.

b. Fronts for Flush-Mounted Enclosures: Overlap boxes on all sides to conceal rough opening.

4. Lockable Doors: All locks keyed alike unless otherwise indicated.

I. Future Provisions: Prepare all unused spaces for future installation of devices including bussing, connectors, mounting hardware and all other required provisions.

J. Load centers are not acceptable.

2.03 POWER DISTRIBUTION PANELBOARDS

A. Description: Panelboards complying with NEMA PB 1, power and feeder distribution type, circuit breaker type, and listed and labeled as complying with UL 67; ratings, configurations and features as indicated on the drawings.

B. Conductor Terminations:

1. Main and Neutral Lug Material: Aluminum, suitable for terminating aluminum or copper conductors.

2. Main and Neutral Lug Type: Mechanical.

C. Bussing:

1. Phase and Neutral Bus Material: Copper.

2. Ground Bus Material: Copper.

D. Circuit Breakers:

1. Provide bolt-on type.

2. Provide thermal magnetic circuit breakersfor circuit breaker frame sizes less than 225 amperes.

3. Provide electronic trip circuit breakersfor circuit breaker frame sizes 225 amperes and above.

E. Enclosures:

1. Provide surface-mounted or flush-mounted enclosuresas indicated.

2. Fronts: Provide door-in-door trim with hinged cover for access to load terminals and wiring gutters, and separate lockable hinged door with concealed hinges for access to overcurrent protective device handles without exposing live parts.

3. Provide clear plastic circuit directory holder mounted on inside of door.

2.04 OVERCURRENT PROTECTIVE DEVICES

A. Molded Case Circuit Breakers:

1. Description: Quick-make, quick-break, over center toggle, trip-free, trip-indicating circuit breakers listed and labeled as complying with UL 489, and complying with FS W-C-375 where applicable; ratings, configurations, and features as indicated on the drawings.

2. Interrupting Capacity:

a. Provide circuit breakers with interrupting capacity as required to provide the short circuit current rating indicated, but not less than:

1) 10,000 rms symmetrical amperes at 240 VAC or 208 VAC.

2) 14,000 rms symmetrical amperes at 480 VAC.

b. Fully Rated Systems: Provide circuit breakers with interrupting capacity not less than the short circuit current rating indicated.

3. Conductor Terminations:

a. Provide mechanical lugs unless otherwise indicated.

b. Lug Material: Aluminum, suitable for terminating aluminum or copper conductors.

4. Thermal Magnetic Circuit Breakers: For each pole, furnish thermal inverse time tripping element for overload protection and magnetic instantaneous tripping element for short circuit protection.

5. Electronic Trip Circuit Breakers: Furnish solid state, microprocessor-based, true rms sensing trip units.

6. Multi-Pole Circuit Breakers: Furnish with common trip for all poles.

7. Do not use tandem circuit breakers.

8. Provide multi-pole circuit breakers for multi-wire branch circuits as required by NFPA 70.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that field measurements are as indicated.

B. Verify that the ratings and configurations of the panelboards and associated components are consistent with the indicated requirements.

C. Verify that mounting surfaces are ready to receive panelboards.

D. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

A. Perform work in accordance with NECA 1 (general workmanship).

B. Install products in accordance with manufacturer's instructions.

C. Install panelboards in accordance with NECA 407 and NEMA PB 1.1.

D. Arrange equipment to provide minimum clearances in accordance with manufacturer's instructions and NFPA 70.

E. Provide required support and attachment in accordance with Section 26 05 29.

F. Install panelboards plumb.

G. Install flush-mounted panelboards so that trims fit completely flush to wall with no gaps and rough opening completely covered.

H. Mount panelboards such that the highest position of any operating handle for circuit breakers or switches does not exceed 79 inches (2000 mm) above the floor or working platform.

I. Provide minimum of six spare 1 inch (27 mm) trade size conduits out of each flush-mounted panelboard stubbed into accessible space above ceiling and below floor.

J. Provide grounding and bonding in accordance with Section 26 05 26.

K. Install all field-installed branch devices, components, and accessories.

L. Multi-Wire Branch Circuits: Group grounded and ungrounded conductors together in the panelboard as required by NFPA 70.

M. Provide filler plates to cover unused spaces in panelboards.

3.03 FIELD QUALITY CONTROL

A. Inspect and test in accordance with NETA ATS, except Section 4.

B. Molded Case Circuit Breakers: Perform inspections and tests listed in NETA ATS, Section 7.6.1.1 for all main circuit breakers and circuit breakers larger than [_____] amperes. Tests listed as optional are not required.

C. Correct deficiencies and replace damaged or defective panelboards or associated components.

3.04 ADJUSTING

A. Adjust tightness of mechanical and electrical connections to manufacturer's recommended torque settings.

B. Adjust alignment of panelboard fronts.

3.05 CLEANING

A. Clean dirt and debris from panelboard enclosures and components according to manufacturer's instructions.

B. Repair scratched or marred exterior surfaces to match original factory finish.

A. END OF SECTION

SECTION 26 27 26
WIRING DEVICES

<<<<<<<<< UPDATE NOTES

PART 1 GENERAL

2.01 SECTION INCLUDES

A. Wall switches.

B. Receptacles.

C. Wall plates.

2.02 ADMINISTRATIVE REQUIREMENTS

A. Coordination:

1. Coordinate the placement of outlet boxes with millwork, furniture, equipment, etc. installed under other sections or by others.

2. Coordinate wiring device ratings and configurations with the electrical requirements of actual equipment to be installed.

3. Coordinate the placement of outlet boxes for wall switches with actual installed door swings.

4. Coordinate the installation and preparation of uneven surfaces, such as split face block, to provide suitable surface for installation of wiring devices.

5. Notify Architect of any conflicts or deviations from Contract Documents to obtain direction prior to proceeding with work.

B. Sequencing:

1. Do not install wiring devices until final surface finishes and painting are complete.

2.03 SUBMITTALS

A. Product Data: Provide manufacturer's catalog information showing dimensions, colors, and configurations.

2.04 QUALITY ASSURANCE

A. Conform to requirements of NFPA 70.

B. Products: Listed, classified, and labeled as suitable for the purpose intended.

PART 2 PRODUCTS

3.01 MANUFACTURERS

A. Hubbell Incorporated: www.hubbell-wiring.com.

B. Leviton Manufacturing Company, Inc: www.leviton.com.

C. Lutron Electronics Company, Inc: www.lutron.com.

D. Pass & Seymour, a brand of Legrand North America, Inc: www.legrand.us

3.02 WIRING DEVICE APPLICATIONS

A. Provide wiring devices suitable for intended use and with ratings adequate for load served.

B. For single receptacles installed on an individual branch circuit, provide receptacle with ampere rating not less than that of the branch circuit.

C. Provide weather resistant GFCI receptacles with specified weatherproof covers for receptacles installed outdoors or in damp or wet locations.

D. Provide GFCI protection for receptacles installed within 6 feet (1.8 m) of sinks.

E. Provide GFCI protection for receptacles installed in kitchens.

F. Provide GFCI protection for receptacles serving electric drinking fountains.

G. Unless noted otherwise, do not use combination switch/receptacle devices.

3.03 WIRING DEVICE FINISHES

A. Provide wiring device finishes as described below unless otherwise indicated.

B. Wiring Devices, Unless Otherwise Indicated: White with white nylon wall plate.

C. Wiring Devices Installed in Finished Spaces: White with white nylon wall plate.

D. Wiring Devices Installed in Unfinished Spaces: Gray with galvanized steel wall plate.

E. Wiring Devices Installed in Wet or Damp Locations: White with specified weatherproof cover.

3.04 WALL SWITCHES

A. Wall Switches - General Requirements: AC only, quiet operating, general-use snap switches with silver alloy contacts, complying with NEMA WD 1 and NEMA WD 6, and listed as complying with UL 20 and where applicable, FS W-S-896; types as indicated on the drawings.

1. Wiring Provisions: Terminal screws for side wiring and screw actuated binding clamp for back wiring with separate ground terminal screw.

B. Standard Wall Switches: Industrial specification grade, 20 A, 120/277 V with standard toggle type switch actuator and maintained contacts; single pole single throw, double pole single throw, three way, or four way as indicated on the drawings.

3.05 RECEPTACLES

A. Manufacturers:

1. Hubbell Incorporated: www.hubbell-wiring.com.

2. Leviton Manufacturing Company, Inc: www.leviton.com.

3. Lutron Electronics Company, Inc; Designer Style: www.lutron.com/#sle.

4. Pass & Seymour, a brand of Legrand North America, Inc: www.legrand.us

B. Receptacles - General Requirements: Self-grounding, complying with NEMA WD 1 and NEMA WD 6, and listed as complying with UL 498, and where applicable, FS W-C-596; types as indicated on the drawings.

1. Wiring Provisions: Terminal screws for side wiring or screw actuated binding clamp for back wiring with separate ground terminal screw.

2. NEMA configurations specified are according to NEMA WD 6.

C. Convenience Receptacles:

1. Standard Convenience Receptacles: Industrial specification grade, 20A, 125V, NEMA 5-20R; single or duplex as indicated on the drawings.

2. Automatically Controlled Convenience Receptacles: Industrial specification grade, 20A, 125V, NEMA 5-20R; controlled receptacle marking on device face per NFPA 70; single or duplex as indicated on the drawings.

D. GFCI Receptacles:

1. GFCI Receptacles - General Requirements: Self-testing, with feed-through protection and light to indicate ground fault tripped condition and loss of protection; listed as complying with UL 943, class A.

2. Standard GFCI Receptacles: Industrial specification grade, duplex, 20A, 125V, NEMA 5-20R, rectangular decorator style.

3. Weather Resistant GFCI Receptacles: Industrial specification grade, duplex, 20A, 125V, NEMA 5-20R, rectangular decorator style, listed and labeled as weather resistant type complying with UL 498 Supplement SE suitable for installation in damp or wet locations.

3.06 WALL PLATES

A. Manufacturers:

1. Hubbell Incorporated: www.hubbell-wiring.com.

2. Leviton Manufacturing Company, Inc: www.leviton.com.

3. Lutron Electronics Company, Inc: www.lutron.com.

4. Pass & Seymour, a brand of Legrand North America, Inc: www.legrand.us

B. Wall Plates: Comply with UL 514D.

1. Configuration: One piece cover as required for quantity and types of corresponding wiring devices.

2. Size: Standard.

3. Screws: Metal with slotted heads finished to match wall plate finish.

C. Nylon Wall Plates: Smooth finish, high-impact thermoplastic.

D. Stainless Steel Wall Plates: Brushed satin finish, Type 302 stainless steel.

E. Weatherproof Covers for Wet Locations: Gasketed, cast aluminum, with hinged lockable cover and corrosion-resistant screws; listed as suitable for use in wet locations while in use with attachment plugs connected and identified as extra-duty type.

PART 3 EXECUTION

4.01 EXAMINATION

A. Verify that field measurements are as indicated.

B. Verify that outlet boxes are installed in proper locations and at proper mounting heights and are properly sized to accommodate devices and conductors in accordance with NFPA 70.

C. Verify that wall openings are neatly cut and will be completely covered by wall plates.

D. Verify that final surface finishes are complete, including painting.

E. Verify that branch circuit wiring installation is completed, tested, and ready for connection to wiring devices.

F. Verify that conditions are satisfactory for installation prior to starting work.

4.02 PREPARATION

A. Provide extension rings to bring outlet boxes flush with finished surface.

B. Clean dirt, debris, plaster, and other foreign materials from outlet boxes.

4.03 INSTALLATION

A. Perform work in accordance with NECA 1 (general workmanship) and, where applicable, NECA 130, including mounting heights specified in those standards unless otherwise indicated.

B. Coordinate locations of outlet boxes provided under Section 26 05 33.16 as required for installation of wiring devices provided under this section.

1. Mounting Heights: Unless otherwise indicated, as follows:

a. Wall Switches: 48 inches (1200 mm) above finished floor.

b. Receptacles: 18 inches (450 mm) above finished floor or 6 inches (150 mm) above counter.

2. Orient outlet boxes for vertical installation of wiring devices unless otherwise indicated.

3. Where multiple receptacles, wall switches, or wall dimmers are installed at the same location and at the same mounting height, gang devices together under a common wall plate.

4. Locate wall switches on strike side of door with edge of wall plate 3 inches (80 mm) from edge of door frame. Where locations are indicated otherwise, notify Architect to obtain direction prior to proceeding with work.

5. Locate receptacles for electric drinking fountains concealed behind drinking fountain according to manufacturer's instructions.

C. Install wiring devices in accordance with manufacturer's instructions.

D. Install permanent barrier between ganged wiring devices when voltage between adjacent devices exceeds 300 V.

E. Where required, connect wiring devices using pigtails not less than 6 inches (150 mm) long. Do not connect more than one conductor to wiring device terminals.

F. Connect wiring devices by wrapping conductor clockwise 3/4 turn around screw terminal and tightening to proper torque specified by the manufacturer. Where present, do not use push-in pressure terminals that do not rely on screw-actuated binding.

G. Unless otherwise indicated, connect wiring device grounding terminal to branch circuit equipment grounding conductor and to outlet box with bonding jumper.

H. Provide GFCI receptacles with integral GFCI protection at each location indicated. Do not use feed-through wiring to protect downstream devices.

I. Where split-wired duplex receptacles are indicated, remove tabs connecting top and bottom receptacles.

J. Install wiring devices plumb and level with mounting yoke held rigidly in place.

K. Install wall switches with OFF position down.

L. Install vertically mounted receptacles with grounding pole on top and horizontally mounted receptacles with grounding pole on left.

M. Install wall plates to fit completely flush to wall with no gaps and rough opening completely covered without strain on wall plate. Repair or reinstall improperly installed outlet boxes or improperly sized rough openings. Do not use oversized wall plates in lieu of meeting this requirement.

N. Install blank wall plates on junction boxes and on outlet boxes with no wiring devices installed or designated for future use.

O. Identify wiring devices in accordance with Section 26 05 53.

4.04 FIELD QUALITY CONTROL

A. Inspect each wiring device for damage and defects.

B. Operate each wall switch with circuit energized to verify proper operation.

C. Test each receptacle to verify operation and proper polarity.

D. Test each GFCI receptacle for proper tripping operation according to manufacturer's instructions.

E. Correct wiring deficiencies and replace damaged or defective wiring devices.

4.05 ADJUSTING

A. Adjust devices and wall plates to be flush and level.

4.06 CLEANING

A. Clean exposed surfaces to remove dirt, paint, or other foreign material and restore to match original factory finish.

A. END OF SECTION

SECTION 26 28 13
FUSES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Fuses.

1.02 REFERENCE STANDARDS

A. NEMA FU 1 - Low Voltage Cartridge Fuses 2012.

B. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

C. UL 248-1 - Low-Voltage Fuses - Part 1: General Requirements Current Edition, Including All Revisions.

D. UL 248-12 - Low-Voltage Fuses - Part 12: Class R Fuses Current Edition, Including All Revisions.

1.03 ADMINISTRATIVE REQUIREMENTS

A. Coordination:

1. Coordinate fuse clips furnished in equipment provided under other sections for compatibility with indicated fuses.

2. Coordinate fuse requirements according to manufacturer's recommendations and nameplate data for actual equipment to be installed.

3. Notify Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.

1.04 SUBMITTALS

A. Product Data: Provide manufacturer's standard data sheets including voltage and current ratings, interrupting ratings, time-current curves, and current limitation curves.

1.05 QUALITY ASSURANCE

A. Conform to requirements of NFPA 70.

B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Bussmann, a division of Eaton Corporation: www.cooperindustries.com.

B. Littelfuse, Inc: www.littelfuse.com.

C. Mersen: ep-us.mersen.com.

2.02 APPLICATIONS

A. Individual Motor Branch Circuits: Class RK1, time-delay.

2.03 FUSES

A. Provide products listed, classified, and labeled as suitable for the purpose intended.

B. Unless specifically indicated to be excluded, provide fuses for all fusible equipment as required for a complete operating system.

C. Provide fuses of the same type, rating, and manufacturer within the same switch.

D. Comply with UL 248-1.

E. Unless otherwise indicated, provide cartridge type fuses complying with NEMA FU 1, Class and ratings as indicated.

F. Voltage Rating: Suitable for circuit voltage.

G. Class R Fuses: Comply with UL 248-12.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that fuse ratings are consistent with circuit voltage and manufacturer's recommendations and nameplate data for equipment.

B. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

A. Do not install fuses until circuits are ready to be energized.

B. Install fuses with label oriented such that manufacturer, type, and size are easily read.

A. END OF SECTION

SECTION 26 28 16.16
ENCLOSED SWITCHES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Enclosed safety switches.

1.02 ADMINISTRATIVE REQUIREMENTS

A. Coordination:

1. Coordinate the work with other trades. Avoid placement of ductwork, piping, equipment, or other potential obstructions within the dedicated equipment spaces and within working clearances for electrical equipment required by NFPA 70.

2. Coordinate arrangement of electrical equipment with the dimensions and clearance requirements of the actual equipment to be installed.

3. Verify with manufacturer that conductor terminations are suitable for use with the conductors to be installed.

4. Notify Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.

1.03 SUBMITTALS

A. Product Data: Provide manufacturer's standard catalog pages and data sheets for enclosed switches and other installed components and accessories.

B. Shop Drawings: Indicate outline and support point dimensions, voltage and current ratings, short circuit current ratings, conduit entry locations, conductor terminal information, and installed features and accessories.

1. Include dimensioned plan and elevation views of enclosed switches and adjacent equipment with all required clearances indicated.

C. Project Record Documents: Record actual locations of enclosed switches.

1.04 QUALITY ASSURANCE

A. Conform to requirements of NFPA 70.

B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Store in a clean, dry space. Maintain factory wrapping or provide an additional heavy canvas or heavy plastic cover to protect units from dirt, water, construction debris, and traffic.

B. Handle carefully in accordance with manufacturer's written instructions to avoid damage to enclosed switch internal components, enclosure, and finish.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Eaton Corporation: www.eaton.com.

B. Schneider Electric; Square D Products: www.schneider-electric.us.

C. Siemens Industry, Inc: www.usa.siemens.com.

D. Source Limitations: Furnish enclosed switches and associated components produced by the same manufacturer as the other electrical distribution equipment used for this project and obtained from a single supplier.

2.02 ENCLOSED SAFETY SWITCHES

A. Description: Quick-make, quick-break enclosed safety switches listed and labeled as complying with UL 98; heavy duty; ratings, configurations, and features as indicated on the drawings.

B. Provide products listed, classified, and labeled as suitable for the purpose intended.

C. Unless otherwise indicated, provide products suitable for continuous operation under the following service conditions:

1. Altitude: Less than 6,600 feet (2,000 m).

2. Ambient Temperature: Between -22 degrees F (-30 degrees C) and 104 degrees F (40 degrees C).

D. Horsepower Rating: Suitable for connected load.

E. Voltage Rating: Suitable for circuit voltage.

F. Short Circuit Current Rating:

1. Provide enclosed safety switches, when protected by the fuses or supply side overcurrent protective devices to be installed, with listed short circuit current rating not less than the available fault current at the installed location as indicated on the drawings.

2. Minimum Ratings:

a. Heavy Duty Single Throw Switches Protected by Class R, Class J, Class L, or Class T Fuses: 200,000 rms symmetrical amperes.

G. Provide with switch blade contact position that is visible when the cover is open.

H. Fuse Clips for Fusible Switches: As required to accept fuses indicated.

1. Where NEMA Class R fuses are installed, provide rejection feature to prevent installation of fuses other than Class R.

I. Conductor Terminations: Suitable for use with the conductors to be installed.

J. Provide solidly bonded equipment ground bus in each enclosed safety switch, with a suitable lug for terminating each equipment grounding conductor.

K. Enclosures: Comply with NEMA 250, and list and label as complying with UL 50 and UL 50E.

1. Environment Type per NEMA 250: Unless otherwise indicated, as specified for the following installation locations:

a. Indoor Clean, Dry Locations: Type 1.

b. Outdoor Locations: Type 3R.

L. Provide safety interlock to prevent opening the cover with the switch in the ON position with capability of overriding interlock for testing purposes.

M. Heavy Duty Switches:

1. Comply with NEMA KS 1.

2. Conductor Terminations:

a. Lug Material: Aluminum, suitable for terminating aluminum or copper conductors.

3. Provide externally operable handle with means for locking in the OFF position, capable of accepting three padlocks.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that field measurements are as indicated.

B. Verify that the ratings of the enclosed switches are consistent with the indicated requirements.

C. Verify that mounting surfaces are ready to receive enclosed safety switches.

D. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

A. Install products in accordance with manufacturer's instructions.

B. Perform work in accordance with NECA 1 (general workmanship).

C. Arrange equipment to provide minimum clearances in accordance with manufacturer's instructions and NFPA 70.

D. Provide required support and attachment in accordance with Section 26 05 29.

E. Install enclosed switches plumb.

F. Except where indicated to be mounted adjacent to the equipment they supply, mount enclosed switches such that the highest position of the operating handle does not exceed 79 inches (2000 mm) above the floor or working platform.

G. Provide grounding and bonding in accordance with Section 26 05 26.

H. Provide fuses complying with Section 26 28 13 for fusible switches as indicated or as required by equipment manufacturer's recommendations.

3.03 FIELD QUALITY CONTROL

A. Inspect and test in accordance with NETA ATS, except Section 4.

B. Perform inspections and tests listed in NETA ATS, Section 7.5.1.1.

C. Correct deficiencies and replace damaged or defective enclosed safety switches or associated components.

3.04 ADJUSTING

A. Adjust tightness of mechanical and electrical connections to manufacturer's recommended torque settings.

3.05 CLEANING

A. Clean dirt and debris from switch enclosures and components according to manufacturer's instructions.

B. Repair scratched or marred exterior surfaces to match original factory finish.

A. END OF SECTION

SECTION 26 51 00
INTERIOR LIGHTING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Interior luminaires.

B. Emergency lighting units.

C. Exit signs.

D. Ballasts and drivers.

1.02 ADMINISTRATIVE REQUIREMENTS

A. Coordination:

1. Coordinate the installation of luminaires with mounting surfaces installed under other sections or by others. Coordinate the work with placement of supports, anchors, etc. required for mounting. Coordinate compatibility of luminaires and associated trims with mounting surfaces at installed locations.

2. Coordinate the placement of luminaires with structural members, ductwork, piping, equipment, diffusers, fire suppression system components, and other potential conflicts installed under other sections or by others.

3. Coordinate the placement of exit signs with furniture, equipment, signage or other potential obstructions to visibility installed under other sections or by others.

4. Notify Architect of any conflicts or deviations from Contract Documents to obtain direction prior to proceeding with work.

1.03 SUBMITTALS

A. Shop Drawings:

1. Indicate dimensions and components for each luminaire that is not a standard product of the manufacturer.

2. Provide photometric calculations where luminaires are proposed for substitution upon request.

B. Product Data: Provide manufacturer's standard catalog pages and data sheets including detailed information on luminaire construction, dimensions, ratings, finishes, mounting requirements, listings, service conditions, photometric performance, installed accessories, and ceiling compatibility; include model number nomenclature clearly marked with all proposed features.

1. LED Luminaires:

a. Include estimated useful life, calculated based on IES LM-80 test data.

2. Provide electronic files of photometric data certified by a National Voluntary Laboratory Accreditation Program (NVLAP) lab or independent testing agency in IES LM-63 standard format upon request.

3. Ballasts: Include wiring diagrams and list of compatible lamp configurations.

4. Lamps: Include rated life, color temperature, color rendering index (CRI), and initial and mean lumen output.

C. Samples:

1. Provide one sample(s) of each luminaire proposed for substitution upon request.

D. Certificates for Dimming Ballasts: Manufacturer's documentation of compatibility with dimming controls to be installed.

E. Operation and Maintenance Data: Instructions for each product including information on replacement parts.

F. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.

1. Extra Lenses and Louvers: Two percent of total quantity installed for each type, but not less than one of each type.

2. Extra Lamps: Ten percent of total quantity installed for each type, but not less than two of each type.

3. Extra Ballasts: Two percent of total quantity installed for each type, but not less than one of each type.

G. Project Record Documents: Record actual connections and locations of luminaires and any associated remote components.

1.04 QUALITY ASSURANCE

A. Conform to requirements of NFPA 70.

B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

1.05 DELIVERY, STORAGE, AND PROTECTION

A. Receive, handle, and store products according to NECA/IESNA 500 (commercial lighting), NECA/IESNA 502 (industrial lighting), and manufacturer's written instructions.

B. Keep products in original manufacturer's packaging and protect from damage until ready for installation.

1.06 FIELD CONDITIONS

A. Maintain field conditions within manufacturer's required service conditions during and after installation.

1.07 WARRANTY

A. Provide five year manufacturer warranty for all LED luminaires, including drivers.

B. Provide five year pro-rata warranty for batteries for emergency lighting units.

PART 2 PRODUCTS

2.01 ----------

2.02 SECTION 26 06 50.16 - LIGHTING FIXTURE SCHEDULE CAN BE USED AS AN ALTERNATIVE TO A SCHEDULE ON DRAWINGS. USE THE FIRST ARTICLE BELOW TO INDICATE WHERE LUMINAIRE SCHEDULE CAN BE FOUND OR USE THE SECOND ARTICLE BELOW TO INCLUDE A LUMINAIRE SCHEDULE IN THIS SECTION.

2.03 ----------

2.04 LUMINAIRE TYPES

A. Furnish products as indicated in luminaire schedule included on the drawings.

2.05 LUMINAIRES

A. Provide products that comply with requirements of NFPA 70.

B. Provide products that are listed and labeled as complying with UL 1598, where applicable.

C. Provide products listed, classified, and labeled as suitable for the purpose intended.

D. Unless otherwise indicated, provide complete luminaires including lamp(s) and all sockets, ballasts, reflectors, lenses, housings and other components required to position, energize and protect the lamp and distribute the light.

E. Unless specifically indicated to be excluded, provide all required conduit, boxes, wiring, connectors, hardware, supports, trims, accessories, etc. as necessary for a complete operating system.

F. Provide products suitable to withstand normal handling, installation, and service without any damage, distortion, corrosion, fading, discoloring, etc.

G. Recessed Luminaires:

1. Ceiling Compatibility: Comply with NEMA LE 4.

2. Luminaires Recessed in Insulated Ceilings: Listed and labeled as IC-rated, suitable for direct contact with insulation and combustible materials.

H. LED Luminaires:

1. Components: UL 8750 recognized or listed as applicable.

2. Tested in accordance with IES LM-79 and IES LM-80.

3. LED Estimated Useful Life: Minimum of 50,000 hours at 70 percent lumen maintenance, calculated based on IES LM-80 test data.

2.06 EMERGENCY LIGHTING UNITS

A. Description: Emergency lighting units complying with NFPA 101 and all applicable state and local codes, and listed and labeled as complying with UL 924.

B. Operation: Upon interruption of normal power source or brownout condition exceeding 20 percent voltage drop from nominal, solid-state control automatically switches connected lamps to integral battery power for minimum of 90 minutes of rated emergency illumination, and automatically recharges battery upon restoration of normal power source.

C. Battery:

1. Size battery to supply all connected lamps, including emergency remote heads where indicated.

D. Diagnostics: Provide power status indicator light and accessible integral test switch to manually activate emergency operation.

E. Provide low-voltage disconnect to prevent battery damage from deep discharge.

2.07 EXIT SIGNS

2.08 BALLASTS AND DRIVERS

A. Ballasts/Drivers - General Requirements:

1. Provide ballasts containing no polychlorinated biphenyls (PCBs).

2. Minimum Efficiency/Efficacy: Provide ballasts complying with all current applicable federal and state ballast efficiency/efficacy standards.

B. --CHOOSE ONE OF THE TWO PARAGRAPHS BELOW--

C. Dimmable LED Drivers:

1. Dimming Range: Continuous dimming from 100 percent to five percent relative light output unless dimming capability to lower level is indicated, without flicker.

2. Control Compatibility: Fully compatible with the dimming controls to be installed.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that field measurements are as indicated.

B. Verify that outlet boxes are installed in proper locations and at proper mounting heights and are properly sized to accommodate conductors in accordance with NFPA 70.

C. Verify that suitable support frames are installed where required.

D. Verify that branch circuit wiring installation is completed, tested, and ready for connection to luminaires.

E. Verify that conditions are satisfactory for installation prior to starting work.

3.02 PREPARATION

A. Provide extension rings to bring outlet boxes flush with finished surface.

B. Clean dirt, debris, plaster, and other foreign materials from outlet boxes.

3.03 INSTALLATION

A. Coordinate locations of outlet boxes provided under Section 26 05 33.16 as required for installation of luminaires provided under this section.

B. Install products in accordance with manufacturer's instructions.

C. Install luminaires securely, in a neat and workmanlike manner, as specified in NECA 500 (commercial lighting) and NECA 502 (industrial lighting).

D. Provide required support and attachment in accordance with Section 26 05 29.

E. Install luminaires plumb and square and aligned with building lines and with adjacent luminaires.

F. Suspended Ceiling Mounted Luminaires:

1. Do not use ceiling tiles to bear weight of luminaires.

2. Do not use ceiling support system to bear weight of luminaires unless ceiling support system is certified as suitable to do so.

3. Secure surface-mounted and recessed luminaires to ceiling support channels or framing members or to building structure.

4. Secure pendant-mounted luminaires to building structure.

5. Secure lay-in luminaires to ceiling support channels using listed safety clips at four corners.

6. See appropriate Division 9 section where suspended grid ceiling is specified for additional requirements.

G. Recessed Luminaires:

1. Install trims tight to mounting surface with no visible light leakage.

2. Non-IC Rated Luminaires: Maintain required separation from insulation and combustible materials according to listing.

3. Luminaires Recessed in Fire-Rated Ceilings: Install using accessories and firestopping materials to meet regulatory requirements for fire rating.

H. Suspended Luminaires:

1. Unless otherwise indicated, specified mounting heights are to bottom of luminaire.

2. Install using the suspension method indicated, with support lengths and accessories as required for specified mounting height.

3. Provide minimum of two supports for each luminaire equal to or exceeding 4 feet nominal length, with no more than 4 feet (1.2 m) between supports.

4. Install canopies tight to mounting surface.

I. Wall-Mounted Luminaires: Unless otherwise indicated, specified mounting heights are to center of luminaire.

J. Install accessories furnished with each luminaire.

K. Bond products and metal accessories to branch circuit equipment grounding conductor.

L. Emergency Lighting Units:

1. Unless otherwise indicated, connect unit to unswitched power from same circuit feeding normal lighting in same room or area. Bypass local switches, contactors, or other lighting controls.

M. Exit Signs:

1. Unless otherwise indicated, connect unit to unswitched power from same circuit feeding normal lighting in same room or area. Bypass local switches, contactors, or other lighting controls.

N. Install lamps in each luminaire.

3.04 FIELD QUALITY CONTROL

A. Inspect each product for damage and defects.

B. Operate each luminaire after installation and connection to verify proper operation.

C. Test self-powered exit signs, emergency lighting units, and fluorescent emergency power supply units to verify proper operation upon loss of normal power supply.

D. Correct wiring deficiencies and repair or replace damaged or defective products. Repair or replace excessively noisy ballasts as determined by Architect.

3.05 ADJUSTING

A. Aim and position adjustable luminaires to achieve desired illumination as indicated or as directed by Architect. Secure locking fittings in place.

B. Aim and position adjustable emergency lighting unit lamps to achieve optimum illumination of egress path as required or as directed by Architect or authority having jurisdiction.

C. Exit Signs with Field-Selectable Directional Arrows: Set as indicated or as required to properly designate egress path as directed by Architect or authority having jurisdiction.

3.06 CLEANING

A. Clean surfaces according to NECA 500 (commercial lighting), NECA 502 (industrial lighting), and manufacturer's instructions to remove dirt, fingerprints, paint, or other foreign material and restore finishes to match original factory finish.

3.07 CLOSEOUT ACTIVITIES

A. Demonstration: Demonstrate proper operation of luminaires to Architect, and correct deficiencies or make adjustments as directed.

B. Just prior to Substantial Completion, replace all lamps that have failed.

3.08 PROTECTION

A. Protect installed luminaires from subsequent construction operations.

A. END OF SECTION

SECTION 26 56 00
EXTERIOR LIGHTING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Exterior luminaires.

1.02 ADMINISTRATIVE REQUIREMENTS

A. Coordination:

1. Notify Architect of any conflicts or deviations from Contract Documents to obtain direction prior to proceeding with work.

1.03 SUBMITTALS

A. Shop Drawings:

1. Indicate dimensions and components for each luminaire that is not a standard product of the manufacturer.

2. Provide photometric calculations where luminaires are proposed for substitution upon request.

B. Product Data: Provide manufacturer's standard catalog pages and data sheets including detailed information on luminaire construction, dimensions, ratings, finishes, mounting requirements, listings, service conditions, photometric performance, weight, effective projected area (EPA), and installed accessories; include model number nomenclature clearly marked with all proposed features.

1. LED Luminaires:

a. Include estimated useful life, calculated based on IES LM-80 test data.

C. Samples:

1. Provide one sample(s) of each luminaire proposed for substitution upon request.

1.04 QUALITY ASSURANCE

A. Conform to requirements of NFPA 70.

B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Receive, handle, and store products according to NECA/IESNA 501 and manufacturer's written instructions.

B. Keep products in original manufacturer's packaging and protect from damage until ready for installation.

1.06 WARRANTY

A. Provide five year manufacturer warranty for all LED luminaires, including drivers.

PART 2 PRODUCTS

2.01 ----------

2.02 SECTION 26 06 50.16 - LIGHTING FIXTURE SCHEDULE CAN BE USED AS AN ALTERNATIVE TO A SCHEDULE ON DRAWINGS. USE THE FIRST ARTICLE BELOW TO INDICATE WHERE LUMINAIRE SCHEDULE CAN BE FOUND OR USE THE SECOND ARTICLE BELOW TO INCLUDE A LUMINAIRE SCHEDULE IN THIS SECTION.

2.03 ----------

2.04 LUMINAIRE TYPES

A. Furnish products as indicated in luminaire schedule included on the drawings.

2.05 LUMINAIRES

A. Provide products that comply with requirements of NFPA 70.

B. Provide products that are listed and labeled as complying with UL 1598, where applicable.

C. Provide products listed, classified, and labeled as suitable for the purpose intended.

D. Unless otherwise indicated, provide complete luminaires including lamp(s) and all sockets, ballasts, reflectors, lenses, housings and other components required to position, energize and protect the lamp and distribute the light.

E. Unless specifically indicated to be excluded, provide all required conduit, boxes, wiring, connectors, hardware, poles, foundations, supports, trims, accessories, etc. as necessary for a complete operating system.

F. Provide products suitable to withstand normal handling, installation, and service without any damage, distortion, corrosion, fading, discoloring, etc.

G. LED Luminaires:

1. Components: UL 8750 recognized or listed as applicable.

2. Tested in accordance with IES LM-79 and IES LM-80.

3. LED Estimated Useful Life: Minimum of 50,000 hours at 70 percent lumen maintenance, calculated based on IES LM-80 test data.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that field measurements are as indicated.

B. Verify that outlet boxes are installed in proper locations and at proper mounting heights and are properly sized to accommodate conductors in accordance with NFPA 70.

C. Verify that suitable support frames are installed where required.

D. Verify that branch circuit wiring installation is completed, tested, and ready for connection to luminaires.

E. Verify that conditions are satisfactory for installation prior to starting work.

3.02 PREPARATION

A. Provide extension rings to bring outlet boxes flush with finished surface.

B. Clean dirt, debris, plaster, and other foreign materials from outlet boxes.

3.03 INSTALLATION

A. Coordinate locations of outlet boxes provided under Section 26 05 33.16 as required for installation of luminaires provided under this section.

B. Install products in accordance with manufacturer's instructions.

C. Install luminaires in accordance with NECA/IESNA 501.

D. Provide required support and attachment in accordance with Section 26 05 29.

E. Install luminaires plumb and square and aligned with building lines and with adjacent luminaires.

F. Install accessories furnished with each luminaire.

G. Bond products and metal accessories to branch circuit equipment grounding conductor.

H. Install lamps in each luminaire.

3.04 FIELD QUALITY CONTROL

A. Inspect each product for damage and defects.

B. Operate each luminaire after installation and connection to verify proper operation.

C. Correct wiring deficiencies and repair or replace damaged or defective products. Repair or replace excessively noisy ballasts as determined by Architect.

3.05 ADJUSTING

A. Aim and position adjustable luminaires to achieve desired illumination as indicated or as directed by Architect. Secure locking fittings in place.

3.06 CLEANING

A. Clean surfaces according to NECA/IESNA 501 and manufacturer's instructions to remove dirt, fingerprints, paint, or other foreign material and restore finishes to match original factory finish.

3.07 CLOSEOUT ACTIVITIES

A. Demonstration: Demonstrate proper operation of luminaires to Architect, and correct deficiencies or make adjustments as directed.

B. Just prior to Substantial Completion, replace all lamps that have failed.

3.08 PROTECTION

A. Protect installed luminaires from subsequent construction operations.

A. END OF SECTION

SECTION 27 10 00
STRUCTURED CABLING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Communications system design requirements.

B. Communications pathways.

C. Copper cable and terminations.

D. Fiber optic cable and interconnecting devices.

E. Communications outlets.

F. Communications grounding and bonding.

G. Communications identification.

1.02 RELATED REQUIREMENTS

A. Section 26 05 33.13 - Conduit for Electrical Systems.

B. Section 26 05 33.16 - Boxes for Electrical Systems.

1.03 REFERENCE STANDARDS

A. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

B. TIA-455-21 - FOTP-21 - Mating Durability of Fiber Optic Interconnecting Devices 1988a (Reaffirmed 2012).

C. TIA-606 - Administration Standard for Telecommunications Infrastructure 2017c.

D. TIA-607 - Generic Telecommunications Bonding and Grounding (Earthing) for Customer Premises 2015c, with Addendum (2017).

E. UL 514C - Nonmetallic Outlet Boxes, Flush-Device Boxes, and Covers Current Edition, Including All Revisions.

F. UL 1863 - Communications-Circuit Accessories Current Edition, Including All Revisions.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordination:

1. Coordinate requirements for service entrance and entrance facilities with Communications Service Provider.

2. Coordinate the work with other trades to avoid placement of other utilities or obstructions within the spaces dedicated for communications equipment.

3. Coordinate arrangement of communications equipment with the dimensions and clearance requirements of the actual equipment to be installed.

4. Notify Architect of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.

1.05 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide manufacturer's standard catalog pages and data sheets for each product.

C. Shop Drawings: Show compliance with requirements on isometric schematic diagram of network layout, showing cable routings, telecommunication closets, rack and enclosure layouts and locations, service entrance, and grounding, prepared and approved by BICSI Registered Communications Distribution Designer (RCDD).

D. Evidence of qualifications for installer.

E. Manufacturer's Installation Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, installation, and operation of product.

F. Field Test Reports.

1.06 QUALITY ASSURANCE

A. Manufacturer Qualifications: At least 3 years experience manufacturing products of the type specified.

B. Installer Qualifications: A company having at least 3 years experience in the installation and testing of the type of system specified, and:

1. Employing a BICSI Registered Communications Distribution Designer (RCDD).

2. Supervisors and installers factory certified by manufacturers of products to be installed.

C. Products: Listed, classified, and labeled as suitable for the purpose intended.

1.07 WARRANTY

A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.

B. Correct defective Work within a 2 year period after Date of Substantial Completion.

PART 2 PRODUCTS

2.01 SYSTEM DESIGN

A. Provide a complete permanent system of cabling and pathways for voice and data communications, including cables, conduits and wireways, pull wires, support structures, enclosures and cabinets, and outlets.

1. Provide fixed cables and pathways that comply with NFPA 70 and TIA-607 and are UL listed or third party independent testing laboratory certified.

2. Provide connection devices that are rated for operation under conditions of 32 to 140 degrees F (0 to 60 degrees C) at relative humidity of 0 to 95 percent, noncondensing.

3. In this project, the term plenum is defined as return air spaces above ceilings, inside ducts, under raised floors, and other air-handling spaces.

B. Main Distribution Frame (MDF): Centrally located support structure for terminating horizontal cables that extend to telecommunications outlets, functioning as point of presence to external service provider.

1. For the entire campus there is one main distribution frame and for each building there is a building distribution frame (BDF) that functions as the main distribution frame (MDF) for that building.

2. Locate main distribution frame as indicated on the drawings.

C. Intermediate Distribution Frames (IDF): Support structures for terminating horizontal cables that extend to telecommunications outlets.

1. Locate intermediate distribution frames as indicated on the drawings.

D. Cabling to Outlets: Specified horizontal cabling, wired in star topology to distribution frame located at center hub of star; also referred to as "links".

2.02 PATHWAYS

A. Conduit: As specified in Section 26 05 33.13; provide pull cords in all conduit.

B. Overhead Service Entrance: Weatherhead or service entrance fitting located on outside of building with galvanized rigid steel or intermediate metallic conduit running to entrance facility.

C. Underground Service Entrance: Rigid polyvinyl chloride (PVC) conduit, Schedule 40.

2.03 COPPER CABLE AND TERMINATIONS

A. Manufacturers:

B. Copper Cable Terminations: Insulation displacement connection (IDC) type using appropriate tool; use screw connections only where specifically indicated.

C. Jacks and Connectors: Modular RJ-45, non-keyed, terminated with 110-style insulation displacement connectors (IDC); high impact thermoplastic housing; suitable for and complying with same standard as specified horizontal cable; UL 1863 listed.

1. Performance: 750 mating cycles.

2. Voice and Data Jacks: 8-position modular jack, color-coded for both T568A and T568B wiring configurations.

D. Copper Patch Cords:

1. Description: Factory-fabricated 4-pair cable assemblies with 8-position modular connectors terminated at each end.

2.04 FIBER OPTIC CABLE AND INTERCONNECTING DEVICES

A. Manufacturers:

1. CommScope; [_____]: www.commscope.com/#sle.

2. General Cable Technologies Corporation; [_____]: www.generalcable.com/#sle.

3. Siemon Company; [_____]: www.siemon.com/#sle.

B. Fiber Optic Interconnecting Devices:

1. Connector Type: Type SC.

2. Connector Performance: 500 mating cycles, when tested in accordance with TIA-455-21.

3. Maximum Attenuation/Insertion Loss: 0.3 dB.

C. Fiber Optic Patch Cords:

1. Description: Factory-fabricated 2-fiber cable assemblies with suitable connectors at each end.

2.05 COMMUNICATIONS OUTLETS

A. Manufacturers:

1. CommScope; [_____]: www.commscope.com/#sle.

2. Siemon Company; [_____]: www.siemon.com/#sle.

B. Outlet Boxes: Comply with Section 26 05 33.16.

1. Provide depth as required to accommodate cable manufacturer's recommended minimum conductor bend radius.

C. Wall Plates:

1. Comply with system design standards and UL 514C.

2. Accepts modular jacks/inserts.

3. Capacity:

a. Data or Combination Voice/Data Outlets: 6 ports.

4. Wall Plate Material/Finish - Flush-Mounted Outlets: High impact thermoplastic, color to be selected.

2.06 IDENTIFICATION PRODUCTS

A. Comply with TIA-606.

PART 3 EXECUTION

3.01 INSTALLATION - GENERAL

A. Comply with Communication Service Provider requirements.

B. Grounding and Bonding: Perform in accordance with TIA-607 and NFPA 70.

3.02 INSTALLATION OF PATHWAYS

A. Install pathways with the following minimum clearances:

1. 48 inches (1220 mm) from motors, generators, frequency converters, transformers, x-ray equipment, and uninterruptible power systems.

2. 12 inches (300 mm) from power conduits and cables and panelboards.

3. 5 inches (125 mm) from fluorescent and high frequency lighting fixtures.

4. 6 inches (150 mm) from flues, hot water pipes, and steam pipes.

B. Conduit, in Addition to Requirements of Section 26 05 33.13:

C. Outlet Boxes:

1. Coordinate locations of outlet boxes provided under Section 26 05 33.16 as required for installation of telecommunications outlets provided under this section.

3.03 INSTALLATION OF EQUIPMENT AND CABLING

A. Cabling:

1. Do not bend cable at radius less than manufacturer's recommended bend radius; for unshielded twisted pair use bend radius of not less than 4 times cable diameter.

2. Do not over-cinch or crush cables.

3. Do not exceed manufacturer's recommended cable pull tension.

4. When installing in conduit, use only lubricants approved by cable manufacturer and do not chafe or damage outer jacket.

B. Service Loops (Slack or Excess Length): Provide the following minimum extra length of cable, looped neatly:

1. At Distribution Frames: 120 inches (3000 mm).

2. At Outlets - Copper: 12 inches (305 mm).

3. At Outlets - Optical Fiber: 39 inches (1000 mm).

C. Copper Cabling:

1. For 4-pair cables in conduit, do not exceed 25 pounds (110 N) pull tension.

2. Use T568B wiring configuration.

D. Fiber Optic Cabling:

1. Prepare for pulling by cutting outer jacket for 10 inches (250 mm) from end, leaving strength members exposed. Twist strength members together and attach to pulling eye.

2. Support vertical cable at intervals as recommended by manufacturer.

E. Identification:

1. Use wire and cable markers to identify cables at each end.

2. Use manufacturer-furnished label inserts, identification labels, or engraved wallplate to identify each jack at communications outlets with unique identifier.

3.04 FIELD QUALITY CONTROL

A. See Section 01 40 00 - Quality Requirements, for additional requirements.

B. Comply with inspection and testing requirements of specified installation standards.

C. Visual Inspection:

1. Inspect cable jackets for certification markings.

2. Inspect cable terminations for color coded labels of proper type.

3. Inspect outlet plates and patch panels for complete labels.

D. Testing - Copper Cabling and Associated Equipment:

E. Testing - Fiber Optic Cabling:

F. Final Testing: After all work is complete, including installation of telecommunications outlets, and telephone dial tone service is active, test each voice jack for dial tone.

A. END OF SECTION

SECTION 27 41 00
AUDIO/VISUAL SYSTEMS

PART 1 - GENERAL

1.01 SUMMARY

A. The work covered in this document consists of furnishing all labor, material and services necessary to install a complete audiovisual system as indicated on the project drawings and in these specifications.

B. Deliverables: Prior to ordering materials or commencing any construction activities, the contractor shall provide the Owner with a complete bill of materials, including all quantities of components, devices, equipment, and wiring required to complete this work. Submit product data, including manufacturer's data sheets for all proposed system components. Submit three copies with all specific items that will be provided clearly indicated and any options highlighted.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Extron Electronics Address: 1230 South Lewis Street, Anaheim, Ca 92805 Phone 714.491.1500 or 800.633.9876

B. Exceptions to the specifications are not acceptable. No substitutions permitted.

2.02 SYSTEMS DESCRIPTION

A. Provide a complete Audiovisual System for small to medium sized classrooms. The system switching and audio amplification equipment shall be securely mounted and concealed in an enclosure above the ceiling mounted projector. Portable video source equipment (OFE) can be connected to the system and displayed via three interface panels located throughout the room. Video and audio signals from source devices shall be transmitted from the interface panels over standard UTP cabling architecture.

B. Owner Furnished Equipment (OFE): In each system, the video source equipment, projection screen and video projector shall be furnished by the Owner (OFE). Portable source equipment such as DVDs, VCRs, laptop computers, document cameras, etc. shall be owner furnished.

2.03 GENERAL EQUIPMENT REQUIREMENTS

A. Acceptable products are listed below categorized by type of equipment. Quantities are listed for movable, portable or loose equipment, and other selected entries. Where quantities are not listed, refer to the system drawings.

B. Deviations from this specification must be documented in writing to the Architect and Owner at least ten business days prior to the bid date.

C. The System components shall all be listed and labeled by Underwriters Laboratories Incorporated (UL).

D. All products shall be new and under warranty at the time of installation. B-stock, previously installed, refurbished or used equipment shall not be provided on this project.

E. Where the specification lists several manufacturers for a major item, or group of items, the AV Integrator shall provide that entire item from one manufacturer only.

F. The contractor shall provide all options, accessories and hardware necessary to meet the function of the design even if they are not specifically listed (i.e. mounting kits, separate or additional power supplies, input modules, transformers, etc.).

2.04 FIXED EQUIPMENT

2.05 PROVIDE THE FOLLOWING POLEVAULT SYSTEM AS AN ALL INCLUSIVE SYSTEM AS DESCRIBED BELOW, ONE SYSTEM FOR EACH ROOM:

A. Projector Mounting - the Owner Furnished Projector (OFE) shall be mounted using the following components.

1. Extron PCM 240 (Part Number 60-772-03) drop ceiling mount.

a. The PCM 240 projector mount must be capable of mounting to the structural ceiling (concrete or wood joists), above the suspended ceiling via turnbuckles and tie wire or threaded rod. Note: this mount is only applicable for drop or suspended ceiling applications.

1) The mount shall be capable of supporting up to 50 pounds (23 kgs) of A/V equipment.

2) The mount must also include (1) single gang and (1) double gang knockout openings for junction boxes or for use as cable pass-throughs.

3) The mount must also include a 1.5” threaded pipe adapter for projector mount poles.

b. Extron UPB 25 (Part Number 60-773-02) Universal Projector Bracket.

1) The bracket shall be able to support projectors up to 25 pounds.

2) The projector bracket must have independent adjustments of horizontal tilt or roll (± 4 degrees of horizontal tilt), vertical angle or pitch (± 25 degrees of vertical angle), and rotation or yaw (360 degrees of rotation).

3) The projector bracket shall also use a 1.5” NTP (National Tapered Pipe) threaded pipe adapter for mounting a projector pole.

4) The projector bracket should also maintain positioning adjustments even if the projector is removed for service.

5) The bracket should also feature security flanges that enable the entire unit to be padlocked to prevent theft.

c. Extron PMP 6” (Part number 70-511-13) Projector Mounting Pole.

1) The projector mounting pole shall be 1.5” NTP (National Tapered Pipe) threaded pipe threaded at both ends to facilitate mounting the projector to the ceiling mount and to the universal projector mount.

2) The projector mounting pole shall be 6” with available optional lengths of 10” or 12” in lengths.

3) The pole shall provide a cutout section to all for cable access.

d. Extron PMK 450 (Part Number 70-618-03) Multi-Product Projector Mounting Kit.

1) The multi-product projector mounting kit shall mount securely to the PMP mounting pole and house products used in each system. These products may be Extron PVS 204SA TP Switcher, power supplies, audio amplifiers, IP Link products and other Extron quarter rack product options.

2. Media Source Switching:

a. System source selection and switching shall be provided by the Extron PVS Switcher with Stereo Amplifier (Part Number 60-800-01).

1) The PVS 204SA Switcher shall have two (2) RGB video inputs capable of VGA - UXGA RGBHV, RGBS, RBsB and RsGsBs input resolution via (2) two pairs of female RJ-45 connectors.

2) The PVS 204SA Switcher shall have two (2) composite video inputs via two (2) female RJ-45 connectors.

3) Audio input shall be via four (4) stereo, balanced /unbalanced inputs via the same four (4) RJ-45 RGB and Composite video connectors.

4) The PVS 204SA Switcher shall have two video outputs, one (1) RGB output capable of outputting VGA - UXGA RGBHV, RGBS, RBsB and RsGsBs (following input type) via a 15-pin HD female connector and one (1) composite video via one (1) RCA female connector.

5) Connection from the PVS 204SA Switcher to the display device shall be provided with one 3' VGA to VGA molded cable (Part Number 26-567-01) and one 3' composite video cable (Part Number 26-600-03).

6) An onboard audio amplifier shall provide gain / volume adjustment from -10db to +10db, adjustable in 1 db steps. The speaker amplifier shall have two (2) channels, one (1) stereo (default) or dual (2) mono channels via one (1) 5.0 mm 4 pole captive screw connector. The output of the amplifier shall be 11 watts (rms) per channel at 4 ohms and 7 watts (rms) per channel at 8 ohms.

3. Media Source Control:

a. Classroom media sources shall be controlled with the Extron MLC 104 IP Plus (Part Number 60-818-03) MediaLink Controller with IP Link.

1) The MediaLink Controller shall contain six tri-color, multi-status LEDs push-buttons for device selection and projector on / off control. A rotary volume control knob with five (5) LED volume indicators shall permit system volume level control.

2) The MLC 104 IP Plus controller shall feature Extron IP Link Ethernet for monitoring, scheduling and control. This IP technology shall enable the device

to be controlled, scheduled and monitored over a LAN, WAN or the Internet using Extron Global Viewer or MLC controller software.

3) The Controller shall contain a serial host port which shall consist of one (1) bi-directional RS-232 front panel 2.5mm mini stereo jack. This host connection port shall be for configuration and control of the controller itself and to install device drivers for the equipment to be controlled.

4) The Controller shall also feature (2) bi-directional serial ports to provide device control. These two ports shall control the display device and PVS 204SA switcher respectively via bi-directional RS-232 control via one (1) 3.5mm direct insertion captive screw connector.

5) The MLC 104 IP plus shall also have two (3) configurable (via software) digital input / outputs for devices such as sensors, switches, LEDs and relays via one (1) 3.5mm 4-pole direct insertion captive screw connector.

6) Connection from the MLC 104 IP Plus to the display shall be provided by one (1) 50' Projector control cable (Part Number 26-621-50).

7) Connection from the MLC 104 IP Plus to the PVS 204SA switcher shall be provided by one (1) 50' Switcher Control cable (Part Number 26-626-50).

4. Speakers:

a. In suspended ceiling applications, a pair of Extron SI 3CT LP (Part Number 42-103-03 for a pair) shall be used.

1) These speakers shall feature 4” deep low profile metal back can for plenum environments.

2) The speakers shall feature a frequency response of 75 Hz to 17 kHz - 10 db, half space.

3) The power capacity shall be 16 watts of continuous pink noise or 32 watts of continuous program media.

4) The coverage angle of the speaker shall be 170 degrees of conical coverage.

5) The nominal impedance shall be 8 ohms.

6) The speakers shall feature 70volt rotary taps with taps at 16W, 8W, 4W, 2W, 1W and 100volt rotary taps with taps at null, 16W, 8W, 4W, and 2W.

7) The input connector shall be (1) 5mm captive screw for 1 input and 1 loop-through connection.

8) Connection from the PVS 204SA switcher to the SI 3CT LP speaker shall be provided by one (1) 25' Plenum rated 18 Gauge Speaker Cable Extron SPK-18 (Part Number 26-627-25).

9) Optional - second pair of Extron SI 3CT LP speakers and Extron SPK-18 cable

5. Media Source Interfacing:

a. Owner furnished media source equipment (OFE) shall be connected to the audiovisual system via four Twisted Pair Transmitter Wall Plates. These wall plates shall enable the system to display video and graphic data from Laptop computers, DVD and VCRs, document camera, camcorders, etc.

1) These interfaces shall be placed in convenient locations throughout the classroom to facilitate easy connection of sources.

2) Provide two types of interface panels. They are the Extron PVT RGB D VGA Transmitter (Part Number 60-820-03) and the PVT CV D Composite Video Transmitter (Part number 60-819-03).

b. The System shall include two (2) Extron PVT RGB D - RGB Video Twisted Pair Transmitter - Wall Plates (Part Number 60-820-03).

1) The RGB Video Twisted Pair Transmitter - Wall Plates shall be used to connect up to two (2) RGB devices to the system and transmit the video and audio data to the switcher.

2) The RGB Video Twisted Pair Transmitter - Wall plates shall fit in a standard, single-gang electrical box and feature Decora® type faceplates.

3) The RGB Video Twisted Pair Transmitter - Wall plates shall transmit RGB video over UTP cable to the PVS 204SA Switcher and support video input resolutions of VGA - UXGA RGBHV, RGBS, RBsB and RsGsBs via one (1) female 15-pin HD connector.

4) Stereo audio shall be input via one (1) 3.5 mm mini stereo jack.

5) Connection to each PVT RGB D shall be provided via an Extron male VGA to male VGA and male 3.5mm TRS to male 3.5mm TRS cable for RGBHV and audio (Part Number 26-490-XX), length to be coordinated by owner.

6) The output of the interface shall be via two (2) female RJ-45 connectors.

7) Connection to the PVS 204SA Switcher shall be via two (2) plenum rated UTP cables.

c. The System shall include two (2) Extron PVT CV D Composite Video Twisted Pair Transmitter - Wall Plates. (Part number 60-819-03)

1) The Composite Video Twisted Pair Transmitter - Wall Plates shall transmit composite video over UTP cable to the PVS 204SA Switcher and support video input via a RCA female connector.

2) The Composite Video Twisted Pair Transmitter - Wall plates shall fit in a standard, single-gang electrical box and feature Decora® type faceplates.

3) Stereo audio shall be input via two (2) RCA female connectors.

4) Connections to the PVT CV D from the DVD/VCR shall be provided via one (1) Extron male 3 x RCA to male 3 x RCA cable for composite video and audio, cable length to be coordinated by owner.

5) The output of the interface shall be via one (1) female RJ-45 connector.

6) Connection to the PVS 204SA Switcher shall be via one (1) plenum rated UTP cable.

PART 3 - EXECUTION

3.01 GENERAL

A. All equipment and enclosures described in this specification shall be installed plumb and square per manufacturer's instructions.

B. All equipment, except that designated as movable, portable or loose equipment, shall be secured and permanently attached to the permanent structure in a manner which will require the use of a tool (e.g.: screw driver, nut driver, etc.) for removal.

C. All supports shall meet or exceed the load requirements of the intended application with a minimum safety factor of five.

D. Provide support structure and hardware with a SAE Grade 8 load rating (min.).

3.02 EXAMINATION

A. Site Verification of Conditions: Verify that related conditions, including equipment that has been previously installed under other sections, are acceptable for product installation in accordance with manufacturer's instructions.

B. All devices connected to equipment specified in this section shall bear the UL label and comply with the applicable National Electrical Code (NEC) standards.

3.03 INSTALLATION

A. Contractor shall furnish all equipment, labor, system setup, and other services necessary for the proper installation of the products/system as indicated on the drawings and specified herein. System setup information shall include each components proper mounting and alignment and properly verified signal pathways and operation. Proper operational and network support control functions shall be verified.

1. Install in accordance with manufacturer's handling and installation instructions.

B. Install in accordance with all local and pertaining codes and regulations

C. Utilize an installer with demonstrated experience in projects of similar size and complexity.

D. Equipment shall be ready for use to condition at the end of installation.

E. Energize equipment in accordance with manufacturer's instructions.

3.04 PROTECTION AND CLEANING

A. Storage and Protection: Store materials protected from exposure to harmful environmental conditions and at temperature and humidity conditions recommended by the manufacturer.

B. Repair or replace damaged components before Substantial Completion of the project.

C. Remove temporary tags, coverings, and construction debris from interior and exterior surfaces of the equipment. Remove construction debris from equipment area and dispose of properly.

A. END OF SECTION

SECTION 27 51 16
PUBLIC ADDRESS SYSTEMS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Amplifier and control equipment.

B. Input equipment.

C. Reproducer equipment.

D. Sound system cable.

E. Accessories.

1.2 RELATED REQUIREMENTS

A. Section 26 05 26 - Grounding and Bonding for Electrical Systems.

B. Section 26 05 33.16 - Boxes for Electrical Systems.

1.3 REFERENCE STANDARDS

A. California Electrical Code; 2019.

1.4 SYSTEM DESCRIPTION

A. Public address system for voice.

B. Input components:

1. Local VOIP devices.

C. Features:

1. Interface to telephone system.
2. Talk back feature.
3. Selective speaker talkback.

1.5 SUBMITTALS

A. Shop Drawings: Indicate electrical characteristics and connection requirements. Indicate layout of equipment mounted in racks and cabinets, component interconnecting wiring, and wiring diagrams of field wiring to speakers and remote input devices.

B. Product Data: Provide data showing electrical characteristics and connection requirements for each component.

C. Test Reports: Indicate satisfactory completion of each test recommended by the manufacturer.

D. Manufacturer's Installation Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, installation, and starting of product.

E. Project Record Documents: Record actual locations of speakers, control equipment, and outlets for input/output connectors.

F. Operation Data: Include instructions for adjusting, operating, and extending the system.

G. Maintenance Data: Include repair procedures and spare parts documentation.

1.6 QUALITY ASSURANCE

A. Conform to requirements of NFPA 70 and Federal Communications Commission.

B. Installer Qualifications: Authorized installer of specified manufacturer with service facilities within 100 miles of Project.

C. Products: Listed, classified, and labeled as suitable for the purpose intended.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Atlas IED: www.atlasied.com.

B. Substitutions: See Section 01 60 00 - Product Requirements.

2.2 PAGING HEAD END

A. Analog Inputs: 1 10kohm input with 2.0 VPP maximum.

B. Compatible with SIP server or VOIP communications manager.

C. Atlas IED IPS-VPS

2.3 COMPONENTS

A. Speakers: 8 inch POE+ Indoor Horn System with LED Display

1. Power Rating: 15 watts.

2. Frequency Range: 600Hz - 14kHz.

3. IEEE802.3 10/100Base0T Ethernet

4. Product: Atlas IED I8SCH+ w/ SEA-I8SC.

B. Software: Advanced Notification Application Software.

1. Atlas IED GCK

2.4 WIRE AND CABLE

A. Existing CAT6A

PART 3 EXECUTION

3.1 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Mounting Heights: Coordinate existing drop locations with school district prior to installation.

C. Splice cable only in accessible junction boxes or at terminal block units.

D. Remove all existing PA/Clock equipment from existing MPOE equipment room.

3.2 FIELD QUALITY CONTROL

A. See Section 01 40 00 - Quality Requirements, for additional requirements.

B. Measure and record sound power levels at designated locations.

3.3 ADJUSTING

A. Adjust devices and wall plates to be flush and level.

3.4 CLOSEOUT ACTIVITIES

A. Demonstration: Demonstrate operation of system to Owner's personnel.

1. Use operation and maintenance data as reference during demonstration.

2. Conduct walking tour of project.

3. Briefly describe function, operation, and maintenance of each component.

B. Training: Train Owner's personnel on operation and maintenance of system.

1. Use operation and maintenance manual as training reference, supplemented with additional training materials as required.

2. Provide minimum of two hours of training.

3. Location: At project site.

END OF SECTION

SECTION 27 51 30
HEARING ASSISTANCE SYSTEM

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Furnishing and installing a complete Hearing Assistance System.

B. Furnish, install and connect all conductors and terminal strips necessary to provide for functions and requirements specified herein, including interface cabling to Public Address - Sound System.

C. Provide all labor, engineering, design, testing, materials, components and supervision necessary to provide a complete operable installation.

D. Entire system shall be supported by shop drawings showing engineering documentation including:

1. Floor plans indicating all devices, conduit runs, wire types, and terminal cabinets and connections.

2. Block diagrams indicating all items and their point-to-point connections in a manner following floor plan layout.

E. The Hearing Assistance system shall be compatible with existing PA system and shall be approved by the School District.

1.02 SUBMITTALS

A. Contractor shall provide following submittals and shop drawings for review and approval:

1. A complete list of equipment and materials proposed for system, with catalog cuts, technical data, manufacturers specifications and detail drawings.

2. A complete set of detailed scaled drawings of all devices/components with designations, dimensions, color, operating controls, instrument wiring and schematic diagrams of all circuits.

3. Shop drawings shall show interfaces to existing equipment, identifying numbers of wires, termination requirements, voltages, and other pertinent details. Include front elevations, dimensions, types of mounting, catalog number of locks, and finishes for terminal cabinets.

B. Operating and Servicing Manuals, Record Drawings:

1. Deliver required number of copies of operating and servicing manual. Each complete manual shall be bound in a flexible binder and all data shall be typewritten or drafted.

2. Each manual shall include all instructions necessary for proper operation and servicing of system and shall include complete 2 wire circuit diagrams of system, a wiring destination schedule for each circuit leaving console and each rack, a schematic diagram of all components, and replacement part numbers. Each manual shall also include as-built cable site plot plan and floor plans indicating all cables with conduit, and as-built coding used on each cable. Programming forms of each system shall be submitted with complete information.

3. Provide shop drawings, indicating location of equipment, conduit, cable runs and other pertinent information.

1.03 QUALITY ASSURANCE

A. Work shall conform to CCR, Title 24 Part 3, Basic Electrical Regulation and California Electrical Code, latest edition.

B. Work shall be done by a qualified sound Contractor holding C-10, C-61 and all licenses required by legally constituted authorities having jurisdiction over work. Sound Contractor shall have completed at least 5 school systems of equal scope to system described herein and shall have been engaged in business of supplying and installing specified type of systems for at least 5 years. Sound Contractor shall maintain a fully equipped service organization capable of furnishing adequate repair service to equipment.

C. Installation shall be carried out under direction of a qualified Sound Engineer and costs of all such direction shall be included in Contractor's bid. Include name and statement of qualifications with submittals.

PART 2 - PRODUCTS

2.01 GROUNDING

A. Grounding:

1. Wiring outlets and emitters shall be grounded and such grounding shall be done in compliance with requirements of California Electrical Code and as specified herein.

2. Circuits shall be grounded as recommended by manufacturer of equipment to which they are connected unless otherwise specified.

2.02 CONDUCTOR/CABLES

A. Cables for input source shall be plenum rated coax cable with Flamarrest jacket for audio application. Cable shall be Belden 1506A or equal.

2.03 KEYS AND LOCKS

A. Contractor shall provide keys and locks for all cabinets and equipment, which shall be keyed alike.

2.04 MULTI-USE ROOMS HEARING ASSISTANCE SYSTEM

A. Hearing Assistance System: Infrared Hearing Assistance System shall be manufactured by Phonic Ear and consist of the following components:

1. Cat. No. PE 560T transmitter Panel must be a dual-channel system operating on both 2.3 and 2.8 MHz frequencies. The channels must be designated “CHANNEL A” for the left and “CHANNEL B” for the right AUDIO IN jacks to accept an input signal from a sound system. The emitter must have an array of 130 infrared L.E.D.'s covered by a purple acrylic lens. The infrared signal from each emitter must cover up to 4000 sq. ft. The transformer must be U.L. approved.

2. Cat. No. PE 500R/506R Dual Channel Receiver for use by the listener with standard Walkman-style headset AT541. Receiver must be capable of being clipped to a pocket or belt. Unit must be furnished with two AA rechargeable nickel cadmium batteries. See Architectural Document for number of devices required.

3. Cat. No. PE300C Battery Charger Organizer. Unit must be capable of storing or recharging up to 12 receivers at one time. The charger must be capable of recharging the nickel cadmium batteries without removing the batteries from the receiver. A total of 4 battery chargers must be furnished for each project.

PART 3 - EXECUTION

3.01 INSTALLATION

A. The emitter must be capable of being mounted to a wall either directly or with an adjustable wall-mounting bracket.

3.02 EXAMINATION AND OPERATION

A. Contractor shall properly instruct School Principal and other persons designated by the Principal, in correct operation of system, in presence of the District Inspector.

3.03 SPECIAL PUBLIC ADDRESS AND HEARING ASSISTANCE SYSTEM TESTS

A. Provide all instruments for testing and demonstrate, in presence of the District Inspector, that all circuits and wiring test free of shorts and grounds.

B. Furnish all labor, instruments, appliances, equipment and materials necessary to demonstrate to the District that installation performs as required and specified.

C. The District reserves the right to make independent tests of equipment furnished, to determine whether or not equipment complies with requirements specified, and to accept or reject any or all equipment on basis of results obtained.

A. END OF SECTION

SECTION 28 10 00
ACCESS CONTROL

PART 2 PRODUCTS

1.01 ACCESS CONTROL SYSTEM REQUIREMENTS

A. Provide new access control system consisting of required equipment, conduit, boxes, wiring, connectors, hardware, supports, accessories, software, system programming, etc. as necessary for a complete operating system that provides the functional intent indicated.

B. Provide products listed, classified, and labeled as suitable for the purpose intended.

1. Access Control Units and Readers: Listed and labeled as complying with UL 294.

1.02 ACCESS CONTROL UNITS AND SOFTWARE

A. Provide access control units and software compatible with readers to be connected.

B. Unless otherwise indicated, provide software and licenses required for fully operational system.

1.03 ACCESS CONTROL POINT PERIPHERALS

A. Provide devices compatible with control units and software.

B. Provide devices suitable for operation under the service conditions at the installed location.

C. Door Locking Devices (Electric Strikes and Magnetic Locks): Comply with Section 08 7100.

A. END OF SECTION

SECTION 28 16 00
INTRUSION DETECTION

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.02 SUMMARY

A. This Section includes the following:

1. The work under this section includes all labor, materials, equipment, and accessories required to furnish and install additions to the existing Intrusion Detection System as indicated on the drawings and as specified herein.

2. The system shall consist of door switches and motion detection devices connected to detect intrusion into covered areas. The system shall be zoned per classroom or as indicated on the drawings and have a control panel capable of providing alarm and trouble signals, by zone, for connection to the district equipment or transmitted as per District requirements. System on-off and access control from remote equipment furnished by the district or by a remote pushbutton key pad.

3. Each building shall be a separate compartment and can have a key pad mounted as shown. A master key pad position shall be provided as shown in the administrative area.

4. Document affecting work of the section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and sections of Division 16 of these specifications.

5. The work described by this part includes the furnishing of all materials, equipment, supplies, labor and the performing of all operations necessary of the installation of complete and operation systems.

6. All conduits, outlet boxes, back boxes, junction boxes, terminal cabinets, backboards, wiring, cables, equipment, devices, etc., shall be furnished and installed complete under this section. Conduit and junction box size shall be determined by the Installing Alarm System Contractor for the particular wire and cable fills required for the systems installed. Conduit sizes shall comply with requirements indicated in section 1611, Conduit. The entire responsibility of the systems, including the installation, operation, function, testing, and maintenance as required by this section shall be the responsibility of the Alarm System Contractor.

7. The Installing Contractor shall furnish and install all equipment, cables, devices, and other materials even though not specifically mentioned herein, which are necessary for the proper integration of all equipment so that the system shall perform the functions listed herein in compliance with all specified requirements.

1.03 DEFINITIONS

A. LCD: Liquid-crystal display.

B. LED: Light-emitting diode.

C. PIR: Passive infrared.

D. RFI: Radio-frequency interference.

E. UPS: Uninterruptible power supply.

1.04 SUBMITTALS

A. Product Data: Components for sensing, detecting, systems integration, and control, including dimensions and data on features, performance, electrical characteristics, ratings, and finishes.

B. Shop Drawings: Detail assemblies of standard components that are custom assembled for specific application on this Project.

1. Functional Block Diagram: Show single-line interconnections between components including interconnections between components specified in this Section and those furnished under other Sections. Indicate methods used to achieve systems integration. Indicate control, signal, and data communication paths and identify programmable logic controllers networks and control interface devices and media to be used. Describe characteristics of network and other data communication lines.

2. Raceway Riser Diagrams: Detail raceway runs required for intrusion detection and for systems integration. Include designation of devices connected by raceway, raceway type, and size, and type and size of wire and cable fill for each raceway run.

3. UPS: Sizing calculations.

4. Site and Floor Plans: Indicate final outlet and device locations, routing of raceways, and cables inside and outside the building. Include room layout for central-station control-unit console, terminal cabinet, racks, and UPS.

5. Central-Station Control-Unit Console Layout: At 1" = 1'-0" (1:12) scale, showing required artwork and device identification.

6. Device Address List: Coordinate with final system programming.

7. System Wiring Diagrams: Include system diagrams unique to Project. Show connections for all devices, components, and auxiliary equipment. Include diagrams for equipment and for system with all terminals and interconnections identified.

8. Details of surge-protection devices and their installation.

9. Sensor detection patterns and adjustment ranges.

C. Equipment and System Operation Description: Include method of operation and supervision of each component and each type of circuit. Show sequence of operations for manually and automatically initiated system or equipment inputs. Description must cover this specific Project; manufacturer's standard descriptions for generic systems are not acceptable.

D. Samples for Initial Selection: For units with factory-applied color finishes.

E. Samples for Verification: For each type of exposed finish required.

F. Qualification Data: For Installer and testing agency.

G. Field quality-control test reports.

H. Operation and Maintenance Data: For intrusion detection system to include in emergency, operation, and maintenance manuals. In addition to items specified in Division 01 Section "Operation and Maintenance Data," include the following:

1. Data for each type of product, including features and operating sequences, both automatic and manual.

2. Central-station control-unit hardware and software data.

I. Warranty: Special warranty specified in this Section.

J. Other Information Submittals:

1. Test Plan and Schedule: Test plan defining all tests required to ensure that system meets technical, operational, and performance specifications within 15 of date of Contract award.

2. Examination reports documenting inspections of substrates, areas, and conditions.

3. Anchor inspection reports documenting inspections of built-in and cast-in anchors.

1.05 QUALITY ASSURANCE

A. Installer Qualifications:

1. An employer of workers, at least one of whom is a technician certified by the National Burglar & Fire Alarm Association.

2. Manufacturer's authorized representative who is trained and approved for installation of units required for this Project.

B. Intrusion Detection Systems Integrator Qualifications: An experienced intrusion detection equipment supplier and Installer who has completed systems integration work for installations 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.

C. Testing Agency Qualifications: An independent testing agency, with the experience and capability to conduct the testing indicated, that is a member company of the National Burglar & Fire Alarm Association or is a nationally recognized testing laboratory (NRTL) as defined by OSHA in 29 CFR 1910.7, and that is acceptable to Owner's insurance underwriter.

1. Testing Agency's Field Supervisor: Person currently certified as an advanced alarm technician by the National Burglar & Fire Alarm Association to supervise on-site testing specified in Part 3.

D. Product Options: Drawings indicate size, profiles, and dimensional requirements of detection devices and central-station control units and are based on the specific system indicated. Refer to Division 01 Section "Product Requirements."

E. Electrical Components, Devices, and Accessories: Listed and labeled as defined in CEC, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

F. FMG Compliance: FMG-approved and -labeled intrusion detection devices and equipment.

G. Comply with CEC

1.06 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer and Installer agree to repair or replace components of intrusion detection devices and equipment that fail in materials or workmanship within specified warranty period.

1. Warranty Period: One year from date of Substantial Completion.

1.07 EXTRA MATERIALS

A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Intrusion Detection Devices: Furnish quantity equal to five percent of the number of units of each type installed, but no fewer than one of each type.

2. Fuses: Three of each kind and size.

3. Tool Kit: Provide six sets of tools for use with security fasteners, each packaged in a compartmented kit configured for easy handling and storage.

4. Security Fasteners: Furnish no fewer than 1 box for every 50 boxes or fraction thereof, of each type and size of security fastener installed.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Radonics or approved equal

2.02 SYSTEM COMPONENT REQUIREMENTS

A. Compatibility: Detection devices and their communication features, connecting wiring, and central-station control unit shall be selected and configured with accessories for full compatibility with the existing system .

B. Surge Protection: Protect components from voltage surges originating external to equipment housing and entering through power, communication, signal, control, or sensing leads. Include surge protection for external wiring of each conductor entry connection to components.

1. Minimum Protection for Power Lines 120 V and More: Auxiliary panel suppressors complying with requirements in Division 16 Section "Transient-Voltage Suppression for Low-Voltage Electrical Power Circuits."

2. Minimum Protection for Communication, Signal, Control, and Low-Voltage Power Lines: Comply with requirements in Division 16 Section "Transient-Voltage Suppression for Low-Voltage Electrical Power Circuits" as recommended by manufacturer for type of line being protected.

C. Interference Protection: Components shall be unaffected by radiated RFI and electrical induction of 15 V/m over a frequency range of 10 to 10,000 MHz and conducted interference signals up to 0.25-V RMS injected into power supply lines at 10 to 10,000 MHz.

D. Tamper Protection: Tamper switches on detection devices, controllers, annunciators, pull boxes, junction boxes, cabinets, and other system components shall initiate a tamper-alarm signal when unit is opened or partially disassembled and when entering conductors are cut or disconnected. Central-station control-unit alarm display shall identify tamper alarms and indicate locations.

E. Self-Testing Devices: Automatically test themselves periodically, but not less than once per hour, to verify normal device functioning and alarm initiation capability. Devices transmit test failure to central-station control unit.

F. Antimasking Devices: Automatically check operation continuously or at intervals of a minute or less, and use signal-processing logic to detect blocking, masking, jamming, tampering, or other operational dysfunction. Devices transmit detection of operational dysfunction to central-station control unit as an alarm signal.

G. Addressable Devices: Transmitter and receivers shall communicate unique device identification and status reports to central-station control unit.

H. Remote-Controlled Devices: Individually and remotely adjustable for sensitivity and individually monitored at central-station control unit for calibration, sensitivity, and alarm condition.

2.03 SECURE AND ACCESS DEVICES

A. Manufacturers:

1. Radionics

B. Keypad and Display Module: Arranged for entering and executing commands for system-status changes and for displaying system-status and command-related data.

C. Key-Operated Switch: Change protected zone between secure and access conditions.

2.04 DOOR SWITCHES

A. Manufacturers:

1. Sentrol or approved equal.

B. Description: Balanced-magnetic switch, complying with UL 634, installed on frame with integral overcurrent device to limit current to 80 percent of switch capacity. Bias magnet and minimum of three encapsulated reed switches shall resist compromise from introduction of foreign magnetic fields.

C. Flush-Mounted Switches: Unobtrusive and flush with surface of door and window frame.

D. Overhead Door Switch: Balanced-magnetic type, listed for outdoor locations, and having door-mounting magnet and floor-mounting switch unit.

E. Remote Test: Simulate movement of actuating magnet from central-station control unit.

2.05 MICROWAVE-PIR DUAL-TECHNOLOGY MOTION SENSORS

A. Manufacturers:

1. Sentrol or approved equal.

B. Description: Single unit combining a sensor that detects changes in microwave signals and a PIR sensor that detects changes in ambient level of infrared emissions caused by standard-intruder movement within detection pattern.

C. Device Performance: An alarm is transmitted when either sensor detects a standard intruder within a period of three to eight seconds from when the other sensor detects a standard intruder.

1. Minimum Detection Pattern: A room 20 by 30 feet (6 by 9 m).

2. PIR Sensor Sensitivity: Adjustable pattern coverage to detect a change in temperature of 2 deg F (1 deg C) or less, and standard-intruder movement within sensor's detection patterns at any speed between 0.3 to 7.5 fps (0.09 to 2.3 m/s) across 2 adjacent segments of detector's field of view.

3. Microwave Sensor Sensitivity: Adjustable, able to detect standard-intruder movement within sensor's detection pattern at any speed between 0.3 to 7.5 fps (0.09 to 2.3 m/s). Sensor sensitivity adjustments shall be accessible only when sensor housing is removed, and sensors shall comply with 47 CFR 15.

4. Activation Indicator: LED indicator shall not be visible during normal operation. Indicator shall light when sensor detects a standard intruder. Locate test enabling switch under sensor housing cover.

5. Remote Test: When initiated by central-station control unit, start a test sequence for each detector element that simulates standard-intruder movement within sensor's detection patterns, causing an alarm.

2.06 PROVIDE ALL NECESSARY HARDWARE AND SOFTWARE FOR A COMPLETE AND OPERABLE SYSTEM.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of intrusion detection.

1. Examine roughing-in for embedded and built-in anchors to verify actual locations of intrusion detection connections before intrusion detection installation.

2. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of intrusion detection.

B. Inspect built-in and cast-in anchor installations, before installing intrusion detection, to verify that anchor installations comply with requirements. Prepare inspection reports.

1. Remove and replace anchors where inspections indicate that they do not comply with requirements. Reinspect after repairs or replacements are made.

2. Perform additional inspections to determine compliance of replaced or additional anchor installations. Prepare inspection reports.

C. For material whose orientation is critical for its performance as a ballistic barrier, verify installation orientation.

D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 SYSTEM INSTALLATION

A. Comply with UL 681.

B. Security Fasteners: Where accessible to inmates, install intrusion detection components using security fasteners with head style appropriate for fabrication requirements, strength, and finish of adjacent materials except that a maximum of two different sets of tools shall be required to operate security fasteners for Project. Provide stainless-steel security fasteners in stainless-steel materials.

3.03 WIRING INSTALLATION

A. Wiring Method: Install wiring in metal raceways according to Division 16 Section "Raceway and Boxes for Electrical Systems." Conceal raceway except in unfinished spaces and as indicated. Minimum conduit size shall be ¾ inch (20 mm). Control and data transmission wiring shall not share conduit with other building wiring systems.

B. Wiring Method: Install wiring in raceways except in accessible indoor ceiling spaces and in interior hollow gypsum board partitions where cable may be used. Conceal raceways and wiring except in unfinished spaces and as indicated. Minimum conduit size shall be ¾ inch (20 mm). Control and data transmission wiring shall not share conduit with other building wiring systems.

C. Wiring Method: Cable, concealed in accessible ceilings, walls, and floors when possible.

D. Wiring within Enclosures: Bundle, lace, and train conductors to terminal points. Use lacing bars and distribution spools. Separate power-limited and non-power-limited conductors as recommended in writing by manufacturer. Install conductors parallel with or at right angles to sides and back of enclosure. Connect conductors that are terminated, spliced, or interrupted in any enclosure associated with intrusion system to terminal blocks. Mark each terminal according to system's wiring diagrams. Make all connections with approved crimp-on terminal spade lugs, pressure-type terminal blocks, or plug connectors.

E. Wires and Cables:

1. Conductors: Size as recommended in writing by system manufacturer, unless otherwise indicated.

2. 120-V Power Wiring: Install according to Division 16 Section "Low-Voltage Electrical Power Conductors and Cables," unless otherwise indicated.

3. Control and Signal Transmission Conductors: Install unshielded, twisted-pair cable, unless otherwise indicated or if manufacturer recommends shielded cable, according to Division 16 Section "Conductors and Cables for Electronic Safety and Security."

F. Splices, Taps, and Terminations: Make connections only on numbered terminal strips in junction, pull, and outlet boxes; terminal cabinets; and equipment enclosures.

G. Install power supplies and other auxiliary components for detection devices at controllers, unless otherwise indicated or required by manufacturer. Do not install such items near devices they serve.

H. Identify components with engraved, laminated-plastic or metal nameplate for central-station control unit and each terminal cabinet, mounted with corrosion-resistant screws. Nameplates and label products are specified in Division 16 Section "Identification for Electrical Systems."

3.04 GROUNDING

A. Ground system components and conductor and cable shields to eliminate shock hazard and to minimize ground loops, common-mode returns, noise pickup, cross talk, and other impairments.

B. Signal Ground Terminal: Locate at main equipment rack or cabinet. Isolate from power system and equipment grounding. Provide 5-ohm ground. Measure, record, and report ground resistance.

C. Install grounding electrodes of type, size, location, and quantity indicated. Comply with installation requirements in Division 16 Section "Grounding and Bonding for Electrical Systems."

3.05 FIELD QUALITY CONTROL

A. Pretesting: After installation, align, adjust, and balance system and perform complete pretesting to determine compliance of system with requirements in the Contract Documents. Correct deficiencies observed in pretesting. Replace malfunctioning or damaged items with new ones and retest until satisfactory performance and conditions are achieved. Prepare forms for systematic recording of acceptance test results.

1. Report of Pretesting: After pretesting is complete, provide a letter certifying that installation is complete and fully operable; include names and titles of witnesses to preliminary tests.

B. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect, test, and adjust field-assembled components and equipment installation, including connections, and to assist in field testing. Report results in writing.

C. Testing Agency: Engage a qualified testing and inspecting agency to perform the following field tests and inspections and prepare test reports:

D. Perform the following field tests and inspections and prepare reports:

1. Inspection: Verify that units and controls are properly labeled and interconnecting wires and terminals are identified.

2. Operational Tests: Schedule tests after pretesting has been successfully completed. Test all modes of system operation and intrusion detection at each detection device. Test for detection of intrusion and for false alarms in each protected zone. Test for false alarms by simulating activities outside indicated detection patterns.

3. Electrical Tests: Comply with NFPA 72, Section A-7. Minimum required tests are as follows:

a. Verify the absence of unwanted voltages between circuit conductors and ground.

b. Test all conductors for short circuits using an insulation-testing device.

c. With each circuit pair, short circuit at the far end of circuit and measure circuit resistance with an ohmmeter. Record circuit resistance of each circuit on Record Drawings.

d. Verify that each controller is in normal condition as detailed in manufacturer's operation and maintenance manual.

e. Test signal and data transmission circuits complying with requirements in Division 16 Section "Conductors and Cables for Electronic Safety and Security" for proper signal transmission under open-circuit conditions. One connection each should be opened at not less than 10 percent of initiating and indicating devices. Observe proper signal transmission according to class of wiring used.

f. Verify that transient surge-protection devices are installed according to manufacturer's written instructions.

g. Test each initiating and indicating device for alarm operation and proper response at central-station control unit.

h. Test both primary and secondary power. Verify, by test, that UPS is capable of operating the system for period and in manner specified.

E. Report of Tests and Inspections: Prepare a written record of tests, inspections, and detailed test results in the form of a test log.

F. Tag all equipment, stations, and other components for which tests have been satisfactorily completed.

3.06 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain intrusion detection. Refer to Division 01 Section "Demonstration and Training."

3.07 ADJUSTING

A. Occupancy Adjustments: When requested within 12 months of Substantial Completion, provide on-site assistance in adjusting system to suit actual occupied conditions. Provide up to three visits to Project during other than normal occupancy hours for this purpose. Visits for this purpose shall be in addition to any required by warranty.

A. END OF SECTION

SECTION 28 20 00
VIDEO SURVEILLANCE

PART 2 PRODUCTS

1.01 VIDEO SURVEILLANCE SYSTEM

A. Provide new video surveillance system consisting of all required equipment, conduit, boxes, wiring, connectors, hardware, supports, accessories, software, system programming, etc. as necessary for a complete operating system that provides the functional intent indicated.

B. System Description: IP system with connection to network (IP) cameras.

C. Provide products listed, classified, and labeled as suitable for the purpose intended.

D. Electromagnetic Interference/Radio Frequency Interference (EMI/RFI) Limits: Comply with FCC requirements of 47 CFR 15, for Class B, consumer application.

A. END OF SECTION

Section 28 31 11
DIGITAL, ADDRESSABLE FIRE ALARM SYSTEM

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. Fire-alarm control unit.
2. Manual fire-alarm boxes.
3. System smoke detectors.
4. Air-sampling smoke detectors.
5. Nonsystem smoke detectors.
6. Heat detectors.
7. Notification appliances.
8. Device guards.
9. Firefighters' two-way telephone communication service.
10. Firefighters' smoke-control station.
11. Magnetic door holders.
12. Remote annunciator.
13. Graphic annunciator.
14. Addressable interface device.
15. Digital alarm communicator transmitter.
16. Radio alarm transmitter.
17. Network communications.
18. System printer.

B. RELATED REQUIREMENTS:

1. Section 280513 "Conductors and Cables for Electronic Safety and Security" for cables and conductors for fire-alarm systems.

1.3 DEFINITIONS

A. RETAIN TERMS THAT REMAIN AFTER THIS SECTION HAS BEEN EDITED FOR A PROJECT.

B. EMT: ELECTRICAL METALLIC TUBING.

C. FACP: FIRE ALARM CONTROL PANEL.

D. HLI: HIGH LEVEL INTERFACE.

E. NICET: NATIONAL INSTITUTE FOR CERTIFICATION IN ENGINEERING TECHNOLOGIES.

F. PC: PERSONAL COMPUTER.

G. VESDA: VERY EARLY SMOKE-DETECTION APPARATUS.

1.4 ACTION SUBMITTALS

A. PRODUCT DATA: FOR EACH TYPE OF PRODUCT, INCLUDING FURNISHED OPTIONS AND ACCESSORIES.

1. Include construction details, material descriptions, dimensions, profiles, and finishes.

2. Include rated capacities, operating characteristics, and electrical characteristics.

B. SHOP DRAWINGS: FOR FIRE-ALARM SYSTEM.

1. Comply with recommendations and requirements in the "Documentation" section of the "Fundamentals" chapter in NFPA 72.
2. Include plans, elevations, sections, details, and attachments to other work.
3. Include details of equipment assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and locations. Indicate conductor sizes, indicate termination locations and requirements, and distinguish between factory and field wiring.
4. Detail assembly and support requirements.
5. Include voltage drop calculations for notification-appliance circuits.
6. Include battery-size calculations.
7. Include input/output matrix.
8. Include statement from manufacturer that all equipment and components have been tested as a system and meet all requirements in this Specification and in NFPA 72.
9. Include performance parameters and installation details for each detector.
10. Verify that each duct detector is listed for complete range of air velocity, temperature, and humidity possible when air-handling system is operating.
11. Provide program report showing that air-sampling detector pipe layout balances pneumatically within the airflow range of the air-sampling detector.
12. Include plans, sections, and elevations of heating, ventilating, and air-conditioning ducts, drawn to scale; coordinate location of duct smoke detectors and access to them.
    a. Show critical dimensions that relate to placement and support of sampling tubes, detector housing, and remote status and alarm indicators.

b. Retain one of first three subparagraphs below.
c. Show field wiring required for HVAC unit shutdown on alarm.
d. Show field wiring and equipment required for HVAC unit shutdown on alarm and override by firefighters' control system.
e. Show field wiring and equipment required for HVAC unit shutdown on alarm and override by firefighters' smoke-evacuation system.
f. Locate detectors according to manufacturer's written recommendations.
g. Show air-sampling detector pipe routing.

13. Include voice/alarm signaling-service equipment rack or console layout, grounding schematic, amplifier power calculation, and single-line connection diagram.
14. Retain subparagraph below for projects where routing of cable or conduit is critical and only outlet locations are indicated on Drawings. Delete reference to device addresses if indicated on Drawings.
15. Include floor plans to indicate final outlet locations showing address of each addressable device. Show size and route of cable and conduits and point-to-point wiring diagrams.

C. GENERAL SUBMITTAL REQUIREMENTS:

1. Submittals shall be approved by authorities having jurisdiction prior to submitting them to Architect.
2. Shop Drawings shall be prepared by persons with the following qualifications:
   a. Trained and certified by manufacturer in fire-alarm system design.
   b. NICET-certified, fire-alarm technician; Level III minimum.
   c. Retain subparagraph below if authorities having jurisdiction have licensing requirements.
   d. Licensed or certified by authorities having jurisdiction.

D. Delegated-Design Submittal: For notification appliances and smoke and heat detectors, in addition to submittals listed above, indicate compliance with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
1. Drawings showing the location of each notification appliance and smoke and heat detector, ratings of each, and installation details as needed to comply with listing conditions of the device.
2. Design Calculations: Calculate requirements for selecting the spacing and sensitivity of detection, complying with NFPA 72. Calculate spacing and intensities for strobe signals and sound-pressure levels for audible appliances.
3. Indicate audible appliances required to produce square wave signal per NFPA 72.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

B. Seismic Qualification Certificates: For fire-alarm control unit, accessories, and components, from manufacturer.
1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
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.

C. Field quality-control reports.

1.6 Sample Warranty: For special warranty.

1.7 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For fire-alarm systems and components to include in emergency, operation, and maintenance manuals.

1. In addition to items specified in Section 017823 "Operation and Maintenance Data," include the following:
   a. Comply with the "Records" section of the "Inspection, Testing and Maintenance" chapter in NFPA 72.
   b. Provide "Fire Alarm and Emergency Communications System Record of Completion Documents" according to the "Completion Documents" Article in the "Documentation" section of the "Fundamentals" chapter in NFPA 72.
   c. Complete wiring diagrams showing connections between all devices and equipment. Each conductor shall be numbered at every junction point with indication of origination and termination points.
   d. Riser diagram.
   e. Device addresses.
   f. Air-sampling system sample port locations and modeling program report showing layout meets performance criteria.
   g. Record copy of site-specific software.
   h. Provide "Inspection and Testing Form" according to the "Inspection, Testing and Maintenance" chapter in NFPA 72, and include the following:
      1) Equipment tested.
      2) Frequency of testing of installed components.
      3) Frequency of inspection of installed components.
      4) Requirements and recommendations related to results of maintenance.
      5) Manufacturer's user training manuals.
   i. Manufacturer's required maintenance related to system warranty requirements.
   j. Abbreviated operating instructions for mounting at fire-alarm control unit and each annunciator unit.

B. Software and Firmware Operational Documentation:
1. Software operating and upgrade manuals.
2. Program Software Backup: On magnetic media or compact disk, complete with data files.
3. Device address list.
4. Printout of software application and graphic screens.

1.8 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
1. Revise subparagraphs below to suit Project.
2. Lamps for Remote Indicating Lamp Units: Quantity equal to 10 percent of amount installed, but no fewer than one unit.
3. Lamps for Strobe Units: Quantity equal to 10 percent of amount installed, but no fewer than one unit.
4. Insert flame detectors in Part 2 if retaining first option in "Smoke Detectors, Fire Detectors(, and Flame Detectors)" Subparagraph below.
5. Smoke Detectors, Fire Detectors: Quantity equal to 10 percent of amount of each type installed, but no fewer than one unit of each type.
6. Detector Bases: Quantity equal to two percent of amount of each type installed, but no fewer than one unit of each type.
7. Keys and Tools: One extra set for access to locked or tamperproofed components.
8. Audible and Visual Notification Appliances: One of each type installed.

9. Fuses: Two of each type installed in the system. Provide in a box or cabinet with compartments marked with fuse types and sizes.
10. Filters for Air-Sampling Detectors: Quantity equal to two percent of amount of each type installed, but no fewer than one unit of each type.

1.9 QUALITY ASSURANCE

A. Installer Qualifications: Personnel shall be trained and certified by manufacturer for installation of units required for this Project.

B. Installer Qualifications: Installation shall be by personnel certified by NICET as fire-alarm Level III technician.

C. Retain one of four "NFPA Certification" paragraphs below to require independent system verification.

D. NFPA Certification: Obtain certification according to NFPA 72 by an NRTL (nationally recognized testing laboratory).

E. NFPA Certification: Obtain certification according to NFPA 72 by a UL-listed alarm company.

F. NFPA Certification: Obtain certification according to NFPA 72 in the form of a placard by an FM Global-approved alarm company.

G. NFPA Certification: Obtain certification according to NFPA 72

1.10 PROJECT CONDITIONS

A. Perform a full test of the existing system prior to starting work. Document any equipment or components not functioning as designed.

B. Interruption of Existing Fire-Alarm Service: Do not interrupt fire-alarm service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary guard service according to requirements indicated:
1. Notify Construction Manager no fewer than three days in advance of proposed interruption of fire-alarm service.
2. Do not proceed with interruption of fire-alarm service without Construction Manager's written permission.

C. Use of Devices during Construction: Protect devices during construction unless devices are placed in service to protect the facility during construction.

1.11 SEQUENCING AND SCHEDULING

A. Existing Fire-Alarm Equipment: Maintain existing equipment fully operational until new equipment has been tested and accepted. As new equipment is installed, label it "NOT IN SERVICE" until it is accepted. Remove labels from new equipment when put into service, and label existing fire-alarm equipment "NOT IN SERVICE" until removed from the building.

B. Equipment Removal: After acceptance of new fire-alarm system, remove existing disconnected fire-alarm equipment and wiring.

1.12 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace fire-alarm system equipment and components that fail in materials or workmanship within specified warranty period.
   1. Warranty Extent: All equipment and components not covered in the Maintenance Service Agreement.
   2. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 SYSTEM DESCRIPTION

A. Source Limitations for Fire-Alarm System and Components: Components shall be compatible with, and operate as an extension of, existing system. Provide system manufacturer's certification that all components provided have been tested as, and will operate as, a system.

B. Noncoded, UL-certified addressable system, with multiplexed signal transmission and horn/strobe evacuation.

C. Automatic sensitivity control of certain smoke detectors.

D. All components provided shall be listed for use with the selected system.

E. 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.

2.2 SYSTEMS OPERATIONAL DESCRIPTION

A. Fire-alarm signal initiation shall be by one or more of the following devices:
   1. Manual stations.
   2. Heat detectors.
   3. Flame detectors.
   4. Smoke detectors.
   5. Duct smoke detectors.
   6. Carbon monoxide detectors.
   7. Automatic sprinkler system water flow.

B. Fire-alarm signal shall initiate the following actions:
   1. Continuously operate alarm notification appliances.
   2. Identify alarm and specific initiating device at fire-alarm control unit and remote annunciators.
   3. Transmit an alarm signal to the remote alarm receiving station.
   4. Unlock electric door locks in designated egress paths.
   5. Release fire and smoke doors held open by magnetic door holders.
   6. Activate voice/alarm communication system.
   7. Switch heating, ventilating, and air-conditioning equipment controls to fire-alarm mode.
   8. Activate smoke-control system (smoke management) at firefighters' smoke-control system panel.
   9. Activate stairwell and elevator-shaft pressurization systems.
   10. Close smoke dampers in air ducts of designated air-conditioning duct systems.
   11. Coordinate first subparagraph below with "Elevator Recall" Paragraph in "Fire-Alarm Control Unit" Article.
   12. Activate emergency lighting control.
   13. If supplies are not essential to life safety, retain first subparagraph below for shutoffs installed in supplies that may be hazardous.

14. Activate emergency shutoffs for gas and fuel supplies.
15. Record events in the system memory.
16. Record events by the system printer.
17. Indicate device in alarm on the graphic annunciator.

C. Supervisory signal initiation shall be by one or more of the following devices and actions:

1. Valve supervisory switch.
2. Independent fire-detection and -suppression systems.
3. User disabling of zones or individual devices.
4. Loss of communication with any panel on the network.

D. System trouble signal initiation shall be by one or more of the following devices and actions:

1. Open circuits, shorts, and grounds in designated circuits.
2. Opening, tampering with, or removing alarm-initiating and supervisory signal-initiating devices.
3. Loss of communication with any addressable sensor, input module, relay, control module, remote annunciator, printer interface, or Ethernet module.
4. Loss of primary power at fire-alarm control unit.
5. Ground or a single break in internal circuits of fire-alarm control unit.
6. Abnormal ac voltage at fire-alarm control unit.
7. Break in standby battery circuitry.
8. Failure of battery charging.
9. Abnormal position of any switch at fire-alarm control unit or annunciator.

E. System Supervisory Signal Actions:

1. Initiate notification appliances.
2. Identify specific device initiating the event at fire-alarm control unit and remote annunciators.
3. Record the event on system printer.
4. After a time delay of 200 seconds, transmit a trouble or supervisory signal to the remote alarm receiving station.
5. Transmit system status to building management system.
6. Display system status on graphic annunciator.

2.3 PERFORMANCE REQUIREMENTS

A. Seismic Performance: Fire-alarm control unit and raceways shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.

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]."

2.4 FIRE-ALARM CONTROL UNIT

A. General Requirements for Fire-Alarm Control Unit:

1. Field-programmable, microprocessor-based, modular, power-limited design with electronic modules, complying with UL 864.

a. System software and programs shall be held in nonvolatile flash, electrically erasable, programmable, read-only memory, retaining the information through failure of primary and secondary power supplies.
b. Include a real-time clock for time annotation of events on the event recorder and printer.
c. Provide communication between the FACP and remote circuit interface panels, annunciators, and displays.
d. The FACP shall be listed for connection to a central-station signaling system service.
e. Provide nonvolatile memory for system database, logic, and operating system and event history. The system shall require no manual input to initialize in the event of a complete power down condition. The FACP shall provide a minimum 500-event history log.

2. Addressable Initiation Device Circuits: The FACP shall indicate which communication zones have been silenced and shall provide selective silencing of alarm notification appliance by building communication zone.
3. Addressable Control Circuits for Operation of Notification Appliances and Mechanical Equipment: The FACP shall be listed for releasing service.

B. Alphanumeric Display and System Controls: Arranged for interface between human operator at fire-alarm control unit and addressable system components including annunciation and supervision. Display alarm, supervisory, and component status messages and the programming and control menu.

1. Annunciator and Display: Liquid-crystal type, 80 characters, minimum.
2. Keypad: Arranged to permit entry and execution of programming, display, and control commands.

C. Alphanumeric Display and System Controls: Arranged for interface between human operator at fire-alarm control unit and addressable system components including annunciation and supervision. Display alarm, supervisory, and component status messages and the programming and control menu.

1. Annunciator and Display: Liquid-crystal type, 80 characters, minimum.
2. Keypad: Arranged to permit entry and execution of programming, display, and control commands.

D. Initiating-Device, Notification-Appliance, and Signaling-Line Circuits:

1. Pathway Class Designations: NFPA 72, Class B.
2. Pathway Survivability: Level 0.
3. Install no more than 50 addressable devices on each signaling-line circuit.
4. Serial Interfaces:

a. One dedicated RS 485 port for central-station operation using point ID DACT.
b. One RS 485 port for remote annunciators, Ethernet module, or multi-interface module (printer port).
c. One USB port for PC configuration.
d. One RS 232 port for VESDA HLI connection.
e. One RS 232 port for voice evacuation interface.

E. Smoke-Alarm Verification:

1. Initiate audible and visible indication of an "alarm-verification" signal at fire-alarm control unit.
2. Activate an approved "alarm-verification" sequence at fire-alarm control unit and detector.
3. Record events by the system printer.
4. Sound general alarm if the alarm is verified.
5. Cancel fire-alarm control unit indication and system reset if the alarm is not verified.

F. Notification-Appliance Circuit:

1. Audible appliances shall sound in a three-pulse temporal pattern, as defined in NFPA 72.

2. Where notification appliances provide signals to sleeping areas, the alarm signal shall be a 520-Hz square wave with an intensity 15 dB above the average ambient sound level or 5 dB above the maximum sound level, or at least 75 dBA, whichever is greater, measured at the pillow.
3. Visual alarm appliances shall flash in synchronization where multiple appliances are in the same field of view, as defined in NFPA 72.

G. Door Controls: Door hold-open devices that are controlled by smoke detectors at doors in smoke-barrier walls shall be connected to fire-alarm system.

H. Remote Smoke-Detector Sensitivity Adjustment: Controls shall select specific addressable smoke detectors for adjustment, display their current status and sensitivity settings, and change those settings. Allow controls to be used to program repetitive, time-scheduled, and automated changes in sensitivity of specific detector groups. Record sensitivity adjustments and sensitivity-adjustment schedule changes in system memory, and print out the final adjusted values on system printer.

I. Transmission to Remote Alarm Receiving Station: Automatically transmit alarm, supervisory, and trouble signals to a remote alarm station.

J. Printout of Events: On receipt of signal, print alarm, supervisory, and trouble events. Identify zone, device, and function. Include type of signal (alarm, supervisory, or trouble) and date and time of occurrence. Differentiate alarm signals from all other printed indications. Also print system reset event, including same information for device, location, date, and time. Commands initiate the printing of a list of existing alarm, supervisory, and trouble conditions in the system and a historical log of events.

K. Primary Power: 24-V dc obtained from 120-V ac service and a power-supply module. Initiating devices, notification appliances, signaling lines, trouble signals, supervisory signals supervisory and digital alarm communicator shall be powered by 24-V dc source.

1. Alarm current draw of entire fire-alarm system shall not exceed 80 percent of the power-supply module rating.

L. Secondary Power: 24-V dc supply system with batteries, automatic battery charger, and automatic transfer switch.

1. Batteries: Sealed lead calcium.

M. Instructions: Computer printout or typewritten instruction card mounted behind a plastic or glass cover in a stainless-steel or aluminum frame. Include interpretation and describe appropriate response for displays and signals. Briefly describe the functional operation of the system under normal, alarm, and trouble conditions.

2.5 MANUAL FIRE-ALARM BOXES

A. General Requirements for Manual Fire-Alarm Boxes: Comply with UL 38. Boxes shall be finished in red with molded, raised-letter operating instructions in contrasting color; shall show visible indication of operation; and shall be mounted on recessed outlet box. If indicated as surface mounted, provide manufacturer's surface back box.
1. Double-action mechanism requiring two actions to initiate an alarm, pull-lever type; with integral addressable module arranged to communicate manual-station status (normal, alarm, or trouble) to fire-alarm control unit.
2. Station Reset: Key- or wrench-operated switch.
3. Indoor Protective Shield: Factory-fabricated, clear plastic enclosure hinged at the top to permit lifting for access to initiate an alarm. Lifting the cover actuates an integral battery-powered audible horn intended to discourage false-alarm operation.
4. Weatherproof Protective Shield: Factory-fabricated, clear plastic enclosure hinged at the top to permit lifting for access to initiate an alarm.

2.6 SYSTEM SMOKE DETECTORS

A. General Requirements for System Smoke Detectors:

1. Comply with UL 268; operating at 24-V dc, nominal.
2. Detectors shall be two-wire type.
3. Integral Addressable Module: Arranged to communicate detector status (normal, alarm, or trouble) to fire-alarm control unit.
4. Base Mounting: Detector and associated electronic components shall be mounted in a twist-lock module that connects to a fixed base. Provide terminals in the fixed base for connection to building wiring.
5. Self-Restoring: Detectors do not require resetting or readjustment after actuation to restore them to normal operation.
6. Integral Visual-Indicating Light: LED type, indicating detector has operated.
7. Remote Control: Unless otherwise indicated, detectors shall be digital-addressable type, individually monitored at fire-alarm control unit for calibration, sensitivity, and alarm condition and individually adjustable for sensitivity by fire-alarm control unit.

    a. Rate-of-rise temperature characteristic of combination smoke- and heat-detection units shall be selectable at fire-alarm control unit for 15 or 20 deg F (8 or 11 deg C) per minute.
    b. Fixed-temperature sensing characteristic of combination smoke- and heat-detection units shall be independent of rate-of-rise sensing and shall be settable at fire-alarm control unit to operate at 135 or 155 deg F (57 or 68 deg C).
    c. Multiple levels of detection sensitivity for each sensor.
    d. Sensitivity levels based on time of day.

B. Photoelectric Smoke Detectors:

1. Detector address shall be accessible from fire-alarm control unit and shall be able to identify the detector's location within the system and its sensitivity setting.
2. An operator at fire-alarm control unit, having the designated access level, shall be able to manually access the following for each detector:

    a. Primary status.
    b. Device type.
    c. Present average value.
    d. Present sensitivity selected.
    e. Sensor range (normal, dirty, etc.).

C. Ionization Smoke Detector:

1. Detector address shall be accessible from fire-alarm control unit and shall be able to identify the detector's location within the system and its sensitivity setting.
2. An operator at fire-alarm control unit, having the designated access level, shall be able to manually access the following for each detector:

    a. Primary status.
    b. Device type.
    c. Present average value.
    d. Present sensitivity selected.
    e. Sensor range (normal, dirty, etc.).

D. Duct Smoke Detectors: Photoelectric type complying with UL 268A.

1. Detector address shall be accessible from fire-alarm control unit and shall be able to identify the detector's location within the system and its sensitivity setting.
2. An operator at fire-alarm control unit, having the designated access level, shall be able to manually access the following for each detector:

    a. Primary status.
    b. Device type.
    c. Present average value.
    d. Present sensitivity selected.
    e. Sensor range (normal, dirty, etc.).

3. Weatherproof Duct Housing Enclosure: NEMA 250, Type 4X; NRTL listed for use with the supplied detector for smoke detection in HVAC system ducts.
4. Each sensor shall have multiple levels of detection sensitivity.
5. Sampling Tubes: Design and dimensions as recommended by manufacturer for specific duct size, air velocity, and installation conditions where applied.
6. Relay Fan Shutdown: Fully programmable relay rated to interrupt fan motor-control circuit.

2.7 CARBON MONOXIDE DETECTORS

A. General: Carbon monoxide detector listed for connection to fire-alarm system.

1. Mounting: Adapter plate for outlet box mounting.
2. Testable by introducing test carbon monoxide into the sensing cell.
3. Detector shall provide alarm contacts and trouble contacts.
4. Detector shall send trouble alarm when nearing end-of-life, power supply problems, or internal faults.
5. Comply with UL 2075.
6. Locate, mount, and wire according to manufacturer's written instructions.
7. Provide means for addressable connection to fire-alarm system.
8. Test button simulates an alarm condition.

2.8 NOTIFICATION APPLIANCES

A. General Requirements for Notification Appliances: Individually addressed, connected to a signaling-line circuit, equipped for mounting as indicated, and with screw terminals for system connections.

B. General Requirements for Notification Appliances: Connected to notification-appliance signal circuits, zoned as indicated, equipped for mounting as indicated, and with screw terminals for system connections.

1. Combination Devices: Factory-integrated audible and visible devices in a single-mounting assembly, equipped for mounting as indicated, and with screw terminals for system connections.

C. Chimes, Low-Level Output: Vibrating type, 75-dBA minimum rated output.

D. Chimes, High-Level Output: Vibrating type, 81-dBA minimum rated output.

E. Horns: Electric-vibrating-polarized type, 24-V dc; with provision for housing the operating mechanism behind a grille. Comply with UL 464. Horns shall produce a sound-pressure level of 90 dBA, measured 10 feet (3 m) from the horn, using the coded signal prescribed in UL 464 test protocol.

F. Visible Notification Appliances: Xenon strobe lights complying with UL 1971, with clear or nominal white polycarbonate lens mounted on an aluminum faceplate. The word "FIRE" is engraved in minimum 1-inch- (25-mm-) high letters on the lens.

1. Rated Light Output:
   a. 15/30/75/110 cd, selectable in the field.

2. Mounting: Wall mounted unless otherwise indicated.
3. For units with guards to prevent physical damage, light output ratings shall be determined with guards in place.
4. Flashing shall be in a temporal pattern, synchronized with other units.
5. Strobe Leads: Factory connected to screw terminals.
6. Mounting Faceplate: Factory finished, white.

G. Voice/Tone Notification Appliances:

1. Comply with UL 1480.
2. Speakers for Voice Notification: Locate speakers for voice notification to provide the intelligibility requirements of the "Notification Appliances" and "Emergency Communications Systems" chapters in NFPA 72.
3. High-Range Units: Rated 2 to 15 W.
4. Low-Range Units: Rated 1 to 2 W.
5. Mounting: Flush, semirecessed or surface mounted and bidirectional.
6. Matching Transformers: Tap range matched to acoustical environment of speaker location.

H. Exit Marking Audible Notification Appliance:

1. Exit marking audible notification appliances shall meet the audibility requirements in NFPA 72.
2. Provide exit marking audible notification appliances at the entrance to all building exits.
3. Provide exit marking audible notification appliances at the entrance to areas of refuge with audible signals distinct from those used for building exit marking.

2.9 MAGNETIC DOOR HOLDERS

A. Description: Units are equipped for wall or floor mounting as indicated and are complete with matching doorplate.

1. Electromagnets: Require no more than 3 W to develop 25-lbf (111-N) holding force.
2. Wall-Mounted Units: Flush mounted unless otherwise indicated.
3. Rating: 24-V ac or dc.
4. Rating: 120-V ac.

B. Material and Finish: Match door hardware.

2.10 REMOTE ANNUNCIATOR

A. Description: Annunciator functions shall match those of fire-alarm control unit for alarm, supervisory, and trouble indications. Manual switching functions shall match those of fire-alarm control unit, including acknowledging, silencing, resetting, and testing.

1. Mounting: Surface cabinet, NEMA 250, Type 1.

B. Display Type and Functional Performance: Alphanumeric display and LED indicating lights shall match those of fire-alarm control unit. Provide controls to acknowledge, silence, reset, and test functions for alarm, supervisory, and trouble signals.

2.11 ADDRESSABLE INTERFACE DEVICE

A. General:

1. Include address-setting means on the module.
2. Store an internal identifying code for control panel use to identify the module type.
3. Listed for controlling HVAC fan motor controllers.

B. Monitor Module: Microelectronic module providing a system address for alarm-initiating devices for wired applications with normally open contacts.

C. Integral Relay: Capable of providing a direct signal

1. Allow the control panel to switch the relay contacts on command.
2. Have a minimum of two normally open and two normally closed contacts available for field wiring.

D. Control Module:

1. Operate notification devices.
2. Operate solenoids for use in sprinkler service.

2.12 DIGITAL ALARM COMMUNICATOR TRANSMITTER

A. Digital alarm communicator transmitter shall be acceptable to the remote central station and shall comply with UL 632.

B. Functional Performance: Unit shall receive an alarm, supervisory, or trouble signal from fire-alarm control unit and automatically capture two telephone line(s) and dial a preset number for a remote central station. When contact is made with central station(s), signals shall be transmitted. If service on either line is interrupted for longer than 45 seconds, transmitter shall initiate a local trouble signal and transmit the signal indicating loss of telephone line to the remote alarm receiving station over the remaining line. Transmitter shall automatically report telephone service restoration to the central station. If service is lost on both telephone lines, transmitter shall initiate the local trouble signal.

C. Local functions and display at the digital alarm communicator transmitter shall include the following:

1. Verification that both telephone lines are available.
2. Programming device.
3. LED display.
4. Manual test report function and manual transmission clear indication.
5. Communications failure with the central station or fire-alarm control unit.

D. Digital data transmission shall include the following:

1. Address of the alarm-initiating device.
2. Address of the supervisory signal.
3. Address of the trouble-initiating device.

4. Loss of ac supply.
5. Loss of power.
6. Low battery.
7. Abnormal test signal.
8. Communication bus failure.

E. Secondary Power: Integral rechargeable battery and automatic charger.

F. Self-Test: Conducted automatically every 24 hours with report transmitted to central station.

2.13 RADIO ALARM TRANSMITTER

A. Transmitter shall comply with NFPA 1221 and 47 CFR 90.

B. Description: Manufacturer's standard commercial product; factory assembled, wired, and tested; ready for installation and operation.

1. Packaging: A single, modular, NEMA 250, Type 1 metal enclosure with a tamper-resistant flush tumbler lock.
2. Signal Transmission Mode and Frequency: VHF or UHF 2-W power output, coordinated with operating characteristics of the established remote alarm receiving station designated by Owner.
3. Normal Power Input: 120-V ac.
4. Secondary Power: Integral-sealed, rechargeable, 12-V battery and charger. Comply with NFPA 72 requirements for battery capacity; submit calculations.
5. Antenna: Omnidirectional, coaxial half-wave, dipole type with driving point impedance matched to transmitter and antenna cable output impedance. Wind-load strength of antenna and mounting hardware and supports shall withstand [100 mph (160 km/h)] <Insert value> with a gust factor of 1.3 without failure.
6. Antenna Cable: Coaxial cable with impedance matched to the transmitter output impedance.
7. Antenna-Cable Connectors: Weatherproof.
8. Alarm Interface Devices: Circuit boards, modules, and other auxiliary devices, integral to the transmitter, matching fire-alarm and other system outputs to message-generating inputs of the transmitter that produce required message transmissions.

C. Functional Performance: Unit shall receive alarm, supervisory, or trouble signal from fire-alarm control unit or from its own internal sensors or controls and shall automatically transmit signal along with a unique code that identifies the transmitting station to the remote alarm receiving station. Transmitted messages shall correspond to standard designations for fire-reporting system to which the signal is being transmitted and shall include separately designated messages in response to the following events or conditions:

1. Transmitter Low-Battery Condition: Sent when battery voltage is below 85 percent of rated value.
2. System Test Message: Initiated manually by a test switch within the transmitter cabinet, or automatically at an optionally preselected time, once every 24 hours, with transmission time controlled by a programmed timing device integral to transmitter controls.
3. Transmitter Trouble Message: Actuated by failure, in excess of one-minute duration, of the transmitter normal power source, derangement of the wiring of the transmitter, or any alarm input interface circuit or device connected to it.
4. Local Fire-Alarm-System Trouble Message: Initiated by events or conditions that cause a trouble signal to be indicated on the building system.
5. Local Fire-Alarm-System Alarm Message: Actuated when the building system goes into an alarm state. Identifies device that initiated the alarm.
6. Local Fire-Alarm-System, Supervisory-Alarm Message: [Actuated when the building alarm system indicates a supervisory alarm] <Insert condition>.

2.14 SYSTEM PRINTER

A. Printer shall be listed and labeled as an integral part of fire-alarm system.

2.15 DEVICE GUARDS

A. Description: Welded wire mesh of size and shape for the manual station, smoke detector, gong, or other device requiring protection.

1. Factory fabricated and furnished by device manufacturer.
2. Finish: Paint of color to match the protected device.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and conditions for compliance with requirements for 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 and wiring are installed, before installation begins.

B. Examine roughing-in for electrical connections to verify actual locations of connections before installation.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 EQUIPMENT INSTALLATION

A. Comply with NFPA 72, NFPA 101, and requirements of authorities having jurisdiction for installation and testing of fire-alarm equipment. Install all electrical wiring to comply with requirements in NFPA 70 including, but not limited to, Article 760, "Fire Alarm Systems."

1. Devices placed in service before all other trades have completed cleanup shall be replaced.
2. Devices installed but not yet placed in service shall be protected from construction dust, debris, dirt, moisture, and damage according to manufacturer's written storage instructions.

B. Install wall-mounted equipment, with tops of cabinets not more than 78 inches (1980 mm) above the finished floor.

1. Comply with requirements for seismic-restraint devices specified in Section 260548.16 "Seismic Controls for Electrical Systems."

C. Manual Fire-Alarm Boxes:

1. Install manual fire-alarm box in the normal path of egress within 60 inches (1520 mm) of the exit doorway.
2. Mount manual fire-alarm box on a background of a contrasting color.
3. The operable part of manual fire-alarm box shall be between 42 inches (1060 mm) and 48 inches (1220 mm) above floor level. All devices shall be mounted at the same height unless otherwise indicated.

D. Smoke- or Heat-Detector Spacing:

1. Comply with the "Smoke-Sensing Fire Detectors" section in the "Initiating Devices" chapter in NFPA 72, for smoke-detector spacing.
2. Comply with the "Heat-Sensing Fire Detectors" section in the "Initiating Devices" chapter in NFPA 72, for heat-detector spacing.
3. Smooth ceiling spacing shall not exceed 30 feet (9 m).
4. Spacing of detectors for irregular areas, for irregular ceiling construction, and for high ceiling areas shall be determined according to Annex A in NFPA 72.
5. HVAC: Locate detectors not closer than 36 inches ((910 mm)) from air-supply diffuser or return-air opening.
6. Lighting Fixtures: Locate detectors not closer than 12 inches (300 mm) from any part of a lighting fixture and not directly above pendant mounted or indirect lighting.

E. Install a cover on each smoke detector that is not placed in service during construction. Cover shall remain in place except during system testing. Remove cover prior to system turnover.

F. Duct Smoke Detectors: Comply with NFPA 72 and NFPA 90A. Install sampling tubes so they extend the full width of duct. Tubes more than 36 inches (9100 mm) long shall be supported at both ends.

1. Do not install smoke detector in duct smoke-detector housing during construction. Install detector only during system testing and prior to system turnover.

G. Air-Sampling Smoke Detectors: If using multiple pipe runs, the runs shall be pneumatically balanced.

H. Elevator Shafts: Coordinate temperature rating and location with sprinkler rating and location. Do not install smoke detectors in sprinklered elevator shafts.

I. Single-Station Smoke Detectors: Where more than one smoke alarm is installed within a dwelling or suite, they shall be connected so that the operation of any smoke alarm causes the alarm in all smoke alarms to sound.

J. Remote Status and Alarm Indicators: Install in a visible location near each smoke detector, sprinkler water-flow switch, and valve-tamper switch that is not readily visible from normal viewing position.

K. Audible Alarm-Indicating Devices: Install not less than 6 inches (150 mm) below the ceiling. Install bells and horns on flush-mounted back boxes with the device-operating mechanism concealed behind a grille. Install all devices at the same height unless otherwise indicated.

L. Visible Alarm-Indicating Devices: Install adjacent to each alarm bell or alarm horn and at least 6 inches (150 mm) below the ceiling. Install all devices at the same height unless otherwise indicated.

M. Device Location-Indicating Lights: Locate in public space near the device they monitor.

N. Antenna for Radio Alarm Transmitter: Mount to building structure where indicated. Use mounting arrangement and substrate connection that resists 100-mph (160-km/h) wind load with a gust factor of 1.3 without damage.

3.3 PATHWAYS

A. Pathways above recessed ceilings and in nonaccessible locations may be routed exposed.

1. Exposed pathways located less than 96 inches (2440 mm) above the floor shall be installed in EMT.

B. Pathways shall be installed in EMT.

C. Exposed EMT shall be painted red enamel.

3.4 CONNECTIONS

A. For fire-protection systems related to doors in fire-rated walls and partitions and to doors in smoke partitions, comply with requirements in Section 087100 "Door Hardware." Connect hardware and devices to fire-alarm system.

1. Verify that hardware and devices are listed for use with installed fire-alarm system before making connections.

B. Make addressable connections with a supervised interface device to the following devices and systems. Install the interface device less than 36 inches (910 mm) from the device controlled. Make an addressable confirmation connection when such feedback is available at the device or system being controlled.

1. Alarm-initiating connection to smoke-control system (smoke management) at firefighters' smoke-control system panel.
2. Alarm-initiating connection to stairwell and elevator-shaft pressurization systems.
3. Smoke dampers in air ducts of designated HVAC duct systems.
4. Magnetically held-open doors.
5. Electronically locked doors and access gates.
6. Alarm-initiating connection to elevator recall system and components.
7. Alarm-initiating connection to activate emergency lighting control.
8. Alarm-initiating connection to activate emergency shutoffs for gas and fuel supplies.
9. Supervisory connections at valve supervisory switches.
10. Supervisory connections at low-air-pressure switch of each dry-pipe sprinkler system.
11. Supervisory connections at elevator shunt-trip breaker.
12. Data communication circuits for connection to building management system.
13. Data communication circuits for connection to mass notification system.
14. Supervisory connections at fire-extinguisher locations.
15. Supervisory connections at fire-pump power failure including a dead-phase or phase-reversal condition.

3.5 IDENTIFICATION

A. Identify system components, wiring, cabling, and terminals. Comply with requirements for identification specified in Section 260553 "Identification for Electrical Systems."

B. Install framed instructions in a location visible from fire-alarm control unit.

3.6 GROUNDING

A. Ground fire-alarm control unit and associated circuits; comply with IEEE 1100. Install a ground wire from main service ground to fire-alarm control unit.

B. Ground shielded cables at the control panel location only. Insulate shield at device location.

3.7 FIELD QUALITY CONTROL

A. Field tests shall be witnessed by authorities having jurisdiction.

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. Perform the following tests and inspections:

1. Visual Inspection: Conduct visual inspection prior to testing.

    a. Inspection shall be based on completed record Drawings and system documentation that is required by the "Completion Documents, Preparation" table in the "Documentation" section of the "Fundamentals" chapter in NFPA 72.
    b. Comply with the "Visual Inspection Frequencies" table in the "Inspection" section of the "Inspection, Testing and Maintenance" chapter in NFPA 72; retain the "Initial/Reacceptance" column and list only the installed components.

2. System Testing: Comply with the "Test Methods" table in the "Testing" section of the "Inspection, Testing and Maintenance" chapter in NFPA 72.
3. Test audible appliances for the public operating mode according to manufacturer's written instructions. Perform the test using a portable sound-level meter complying with Type 2 requirements in ANSI S1.4.
4. Test audible appliances for the private operating mode according to manufacturer's written instructions.
5. Test visible appliances for the public operating mode according to manufacturer's written instructions.
6. Factory-authorized service representative shall prepare the "Fire Alarm System Record of Completion" in the "Documentation" section of the "Fundamentals" chapter in NFPA 72 and the "Inspection and Testing Form" in the "Records" section of the "Inspection, Testing and Maintenance" chapter in NFPA 72.

E. Reacceptance Testing: Perform reacceptance testing to verify the proper operation of added or replaced devices and appliances.

F. Fire-alarm system will be considered defective if it does not pass tests and inspections.

G. Prepare test and inspection reports.

H. Maintenance Test and Inspection: Perform tests and inspections listed for weekly, monthly, quarterly, and semiannual periods. Use forms developed for initial tests and inspections.

I. Annual Test and Inspection: One year after date of Substantial Completion, test fire-alarm system complying with visual and testing inspection requirements in NFPA 72. Use forms developed for initial tests and inspections.

3.8 MAINTENANCE SERVICE

A. Initial Maintenance Service: Beginning at Substantial Completion, maintenance service shall include 12 months' full maintenance by skilled employees of manufacturer's designated service organization. Include preventive maintenance, repair or replacement of worn or defective components, lubrication, cleaning, and adjusting as required for proper operation. Parts and supplies shall be manufacturer's authorized replacement parts and supplies.

1. Include visual inspections according to the "Visual Inspection Frequencies" table in the "Testing" paragraph of the "Inspection, Testing and Maintenance" chapter in NFPA 72.
2. Perform tests in the "Test Methods" table in the "Testing" paragraph of the "Inspection, Testing and Maintenance" chapter in NFPA 72.
3. Perform tests per the "Testing Frequencies" table in the "Testing" paragraph of the "Inspection, Testing and Maintenance" chapter in NFPA 72.

3.9 SOFTWARE SERVICE AGREEMENT

A. Comply with UL 864.

B. Technical Support: Beginning at Substantial Completion, service agreement shall include software support for two years.

C. Upgrade Service: At Substantial Completion, update software to latest version. Install and program software upgrades that become available within two years from date of Substantial Completion. Upgrading software shall include operating system and new or revised licenses for using software.

1. Upgrade Notice: At least 30 days to allow Owner to schedule access to system and to upgrade computer equipment if necessary.

3.10 DEMONSTRATION

A. Train Owner's maintenance personnel to adjust, operate, and maintain fire-alarm system.

END OF SECTION 283111

SECTION 31 1000
SITE CLEARING

PART 1 – GENERAL

1.1 SUMMARY

A. This Section requires the selective removal and subsequent off-site disposal of the following:

1. Removal and disposal of all abandoned pipe and conduit except for pipe or conduit indicated specifically on plans for abandonment in place.

2. Removal and offsite disposal of grass and root mat.

3. Demolition of asphalt concrete and pavements as indicated on the drawings to straight, neatly saw cut surface.

4. Trees as indicated on plans, completed including roots.

5. All other removals which may or may not been shown on plans as required for the project construction.

1.2 SITE CONDITIONS

A. Protections: Contractor shall provide temporary barricades and other forms of protection to protect general public from injury due to demolition work.

B. Traffic: Conduct demolition operations and debris removal to ensure minimum interference with roads, streets, walks, bike paths, and other adjacent occupied or used facilities. Access must be coordinated with District's Representative.

C. Utility Services: Maintain all existing utilities to remain in service and protect them against damage during demolition operations.

D. Environmental Controls: Use water sprinkling, temporary enclosures, and other methods to limit dust and dirt migration. Comply with governing regulations and County Air Pollution Control District pertaining to environmental protection. Do not use water when it may create hazardous or objectionable conditions such as flooding and pollution.

1.3 REFERENCES

A. Standard Specifications for Public Works Construction (Green Book), latest edition.

PART 2 – PRODUCTS (NOT APPLICABLE)

PART 3 – EXECUTION

3.1 DEMOLITION

A. General: Perform demolition work in a systematic manner. Use such methods as required to complete work indicated on drawings in accordance with governing regulations.

B. Provide services for effective air and water pollution controls as required by County Air Pollution Control District regulations.

C. Prior to commencing grading operations, soil containing debris, organics, pavement, or other unsuitable materials, shall be stripped from the foundation and pavement areas. Demolition areas shall be cleared of old foundations, slabs, abandoned utilities, tree roots, and soil disturbed during the demolition process. Depressions or disturbed

areas left from the removal of such material shall be replaced with compacted fill under observation by the Geotechnical representative.

D. Concrete sidewalks will be removed to the nearest construction or expansion joint to the limits of removal as shown on the plans. Exact locations will be determined in the field by the District's Representative.

3.2 DISPOSAL OF DEMOLISHED MATERIALS

A. Remove from Project site debris, rubbish, and other materials resulting from demolition operations. Transport and legally dispose of off site.

B. If hazardous materials are encountered during demolition operations, contact District's Representative.

C. Burning of removed materials is not permitted on project site.

3.3 HAZARDOUS MATERIALS

A. Except as otherwise specified, in the event Contractor encounters on the Project site material reasonably believed to be asbestos, polychlorinated biphenyl (PCB), or other hazardous materials which have not been rendered harmless, Contractor shall immediately stop Work in the area affected and report the condition to the District's Representative in writing. The Work in the affected area shall not thereafter be resumed except by written agreement of the Contractor if in fact the material is asbestos, PCB, or other hazardous materials and has not been rendered harmless. The Work in the affected area shall be resumed in the absence of asbestos, PCB, or other hazardous materials, or when such materials have been rendered harmless.

B. Construction involving asbestos cement (transite) pipe shall be performed by qualified personnel in accordance with the standards and specifications set forth by American Water Works Association (AWWA), the Occupational Safety and Health Act (OSHA) and the Environmental Protection Agency (EPA), as well as location jurisdictional codes.

3.4 CLEANUP AND REPAIR

A. General: Upon completion of demolition work, remove tools, equipment and demolished materials from site.

1. Repair demolition performed in excess of that required. Return elements of construction and surfaces to existing condition prior to start of operations. Repair adjacent construction or surfaces soiled or damaged by demolition work.

END OF SECTION

SECTION 31 2000
EARTHWORK

PART 1 – GENERAL

1.1 SUMMARY

A. Section includes: Excavation, Compaction and Fill.

1.2 REFERENCE

A. Standard Specifications for Public Works Construction (SSPWC), latest edition.

B. Geotechnical Report.

1.3 QUALITY ASSURANCE

A. Codes and Standards: Perform earthwork in compliance with applicable requirements of governing authorities having jurisdiction.

1. Standard Specifications for Public Works Construction (SSPWC), latest edition.

2. CAL/OSHA Construction Safety Order Requirements.

B. Soil Testing Service

1. The District will engage a soil testing service to include testing soil materials proposed for use in the Work and for quality control testing during grading operations.

2. Samples of materials shall be furnished to the testing service by the Contractor at least one week before their anticipated use.

3. Work for this Section includes smoothing out areas for density tests and otherwise facilitate testing work, as directed.

4. Shoring Systems: Pre-engineered systems, clearly labeled as such, may be used. Refer to the Geotechnical Study for further requirements.

1.4 PROJECT CONDITIONS

A. The Contractor shall visit the site and familiarize himself with existing site conditions.

B. Additional test borings and other exploratory operations may be made by the Contractor at no cost or liability to the District.

C. Existing Utilities:

1. Where uncharted or incorrectly charted piping or other utilities are encountered during excavation, consult District 's Representative immediately for directions. Cooperate with the District's Representative in keeping respective services and facilities in operation. Repair damaged utilities to the satisfaction of the District's Representative at no cost to the District. Disturbed trench sections shall be replaced in kind.

D. Protection of Subgrade: Do not allow equipment to pump, rut, or disturb subgrade, stripped areas, or other areas prepared for Project.

E. Contractor shall implement measures to prevent soil erosion, and where possible, sediment shall be retained onsite.

F. Contractor shall implement all necessary recommendations contained in the Geotechnical Study.

PART 2 – PRODUCTS (NOT APPLICABLE)

PART 3 – EXECUTION

3.1 SITE PREPARATION

A. General:

1. Remove vegetation, improvements, or obstructions interfering with installation of new construction. Transport and legally dispose of off site. Removal includes stumps and roots. Contractor shall utilize the best construction method to minimize the erosive effect from the removal of site vegetation.

2. Carefully and cleanly cut roots and branches of trees indicated to be left standing, where such roots and branches obstruct new construction. Paint cuts over one inch in size with tree pruning compound. Care shall be taken so as not to scar any area of the tree's bark.

3. In order to protect from sediment transfer or contamination from urban run-off during construction, the following grading and erosion control practices shall be followed:

a. If grading occurs during the rainy season (November through April), sediment traps, barriers, covers or other methods shall be used to reduce erosion and sedimentation.

b. Excavated materials shall not be deposited or stored where the material can be washed away by high water or storm run-off.

c. Grading operations on site shall be conducted so as to prevent damaging effects of sediment production and dust on the site and on adjoining properties.

d. When vegetation has to be removed on site, the methods shall be one that minimizes the erosive effects from the removal.

e. Exposure of soil to erosion by removing vegetation shall be limited to the area required for construction operations. The construction area shall be fenced to define the project.

f. Temporary mulching, seeding, or other suitable stabilization shall be used to protect areas during construction or other land disturbance activities on site.

g. Topsoil, removed from the surface in preparation for grading and construction activities on Campus is to be stored on or near the site and protected from erosion while grading operations are underway, provided that such storage may not be located where it would cause suffocation of root systems of trees to be preserved. After completion of such grading, topsoil is to be restored to exposed cut and fill embankments of building pads so as to provide a suitable base of seeding and planting.

h. Sediment basins, sediment traps, or similar control measures shall be installed before extensive clearing and grading operations begin for site development.

i. Water or dust palliatives shall be applied to exposed earth services as necessary to control dust emissions.

j. Revegetation or stabilization of exposed earth surfaces shall take place as soon as possible.

B. Removals

1. Clear the site of trees, shrubs, and other vegetation, which is indicated to be removed.

2. Completely remove stumps, roots, and other debris to avoid problems with future utilities.

3. Use only hand methods for grubbing inside the drip line of trees indicated to be left standing.

4. Existing fills, soil containing debris, organics, pavement, or other unsuitable materials shall be excavated and removed prior to commencing grading operations. Demolition areas shall be cleared of old foundations, slabs, abandoned utilities, landscaping, and soils disturbed during the demolition process. Depressions or disturbed areas left from the removal of such material shall be replaced with compacted fill.

5. The limits and depths for removal of existing fill materials shall be evaluated by project soils engineer during grading.

6. Revegetation or stabilization of exposed earth surface shall take place as soon as possible.

C. Removal of Improvements

1. Remove above-grade and below-grade improvements necessary to permit construction and other work as indicated.

2. Remove from site and legally dispose of off-site, existing fill materials, soil debris, or other unsuitable materials prior to commencing grading operations.

3.2 EXCAVATION

A. Excavation for Pavements: Cut surface under pavements to comply with cross-sections, elevations and grades as shown, within a tolerance of plus or minus 0.04 foot.

B. Excavation for Planting Areas: Conform to cross-sections, elevations and dimensions shown, within a tolerance of plus or minus 0.10 foot.

3.3 COMPACTION

A. General: Control soil compaction during construction providing minimum percentage of density specified for each area, under the provisions of the Geotechnical Study.

B. Percentage of Maximum Density Requirements: Compact soil to not less than the percentages of maximum dry density specified in the Geotechnical Study and in accordance with ASTM D1557-91 method of compaction.

C. Moisture Control:

1. When moisture content of exposed scarified soil and/or full material is below that sufficient to achieve recommended compaction, water shall be added to the soil and/or fill. While water is being added, soil shall be bladed and mixed to provide relatively uniform moisture content throughout the material.

2. When moisture content of exposed scarified soil and/or fill material is excessive, material shall be aerated by blading or other methods. Fill placed in pavement areas shall be compacted at near optimum moisture content. Jetting is not permitted for compaction.

3.4 FILL

A. In all excavations, use satisfactory excavated or borrow material sampled and tested by the District 's Testing Laboratory. Fill selection shall be per Geotechnical Study.

B. Fill excavations as promptly as Work permits, but not until completion of the following:

1. Acceptance by District’s Representative of construction below finish grade including, where applicable, waterproofing, damp-proofing, and drainage pipe.

2. Examination, testing, approval and recording locations of underground utilities.

3. Removal of concrete formwork.

4. Removal of shoring and bracing and backfilling of voids with satisfactory materials.

5. Removal of trash and debris.

6. Permanent or temporary horizontal bracing is in place on horizontally supported walls.

7. Protect excavations by methods required to prevent cave-in or loose soil from falling into excavation.

C. Continual dust control, as required by the District, and in accordance with County Air Pollution Control District's Standards shall be required for the project construction.

3.5 GRADING

A. General: To provide support for building floor slabs, all existing fill and unsuitable natural soils shall be excavated and replaced as properly compacted fill.

B. Compaction: After grading, compact subgrade surfaces to the depth and percentage of compaction for each area classification.

C. Fill placement and grading operations shall be performed only under the observation of the District 's Testing Laboratory.

D. The exterior grades around building areas shall be sloped to drain away from the buildings to prevent ponding of water adjacent to foundations.

E. Grading operation shall be conducted so as to prevent damaging effects of sediment product and dust on the site and adjoining properties.

3.6 DISPOSAL OF EXCESS AND WASTE MATERIALS

A. Transport excess excavated material and legally dispose of off site.

3.7 FIELD QUALITY CONTROL

A. Quality Control Testing During Construction: District 's Testing Laboratory will observe, test and approve subgrades and fill layers before further construction Work can be performed. The District's Representative will determine the frequency of tests. Subgrade: Allow at least one field density test of subgrade to be made for every 2000 sq. ft. of paved area, but in no case less than 3 tests.

B. Field examination and testing will be performed by the District 's Testing Laboratory. The Contractor shall cooperate with such testing and shall give the District's Representative advance notice of grading scheduling.

C. Frequency of Tests for Trenching: As specified in Geotechnical Study Section 8 and as determined by the District's Representative.

D. If in the opinion of the District's Representative, based on soil testing reports and observations, subgrades or fills which have been placed are below specified density, provide corrective work as specified at no additional expense to the District, and pay for retesting of the soil.

3.8 PROTECTION

A. Protect newly graded areas from traffic and erosion. Keep free of trash and debris.

B. Repair and re-establish grades in settled, eroded, and rutted areas to specified tolerances.

C. Reconditioning Compacted Areas: Where completed compacted areas are disturbed by subsequent construction operations or adverse weather, scarify surface, reshape, compact to required density and provide other corrective work as specified, with retesting, prior to further construction.

END OF SECTION

SECTION 31 2333
TRENCHING AND BACKFILLING

PART 1 - GENERAL

1.1 SUMMARY

A. Excavating trenches for construction of utilities.

B. Trench backfill materials.

C. Backfilling and compacting requirements.

1.2 REFERENCES

A. Standard Specifications for Public Works Construction (SSPWC), latest edition.

B. Geotechnical Report.

1.3 SUBMITTALS

A. Materials source.

B. Sand equivalent test reports per ASTM D2419.

C. Certificates.

D. Drawings for shoring, bracing, sloping, or other provisions for worker protection for any excavation shall conform to the requirements of the CAL/OSHA Construction Safety Orders Requirements.

1.4 EXISTING UTILITIES

A. Drawings show existing major underground utilities from reference drawings. Prior to excavation, the Contractor shall notify the District's Representative to obtain any additional information which may be applicable to the Work.

B. Any incident of a utility being inadvertently damaged by the Contractor shall be immediately shutoff and then be immediately repaired by the Contractor at no cost to the District.

C. Contractor to pothole all utility connections and verify exact size, location and material prior to beginning construction and notify engineer of any discrepancies.

PART 2 - MATERIALS

2.1 APPROVALS

A. Imported material shall be approved by the District's Representative prior to being brought to the site. Provide a sample of the material in sufficient quantity for the District's Representative's use in evaluating the material.

2.2 TRENCH BACKFILL MATERIAL

A. Sand bedding shall have a sand equivalent (SE) of 30 or greater. The SE shall be evaluated during grading. Materials shall conform to the specification of the Geotechnical Study.

B. Slurry Backfill shall be a two-sack slurry mix and shall conform to the requirements of Section 201 of the SSPWC for Backfill Slurry.

C. Aggregate base course shall be per Plan.

D. Topsoil removed from trenches shall be stockpiled at locations approved by the District's Representative.

2.3 SOURCE QUALITY CONTROL

A. Inspection and testing shall be performed by the District's Representative.

PART 3 - EXECUTION

3.1 PREPARATION

A. Identify required lines, levels, contours, and datum.

3.2 TRENCH EXCAVATION

A. All saw cutting shall be neat, straight cuts and shall conform to Section 401 of the SSPWC. All cuts shall be square unless otherwise specifically noted on plans.

B. Trench excavation shall conform to Section 306-3 of the SSPWC and the following requirements:

1. The bottom of the trench shall be graded and prepared to provide a firm and uniform bearing throughout the entire length of the pipe barrel. Suitable excavations shall be made to receive the bell of the pipe and the joint shall not bear upon the bottom of the trench. All adjustments to line and grade shall be made by scraping away or filling in with sand under the body of the pipe and not by wedging or blocking.

2. If the trench is excavated below the required grade, correct any part of the trench excavated below the grade, at no additional cost to the District per the Geotechnical Study. Place the backfill material over the full width of trench in compacted layers not exceeding 6 inches deep to the established grade with allowance for the pipe base. If shoring is required, the trenches shall be shored and braced in accordance with the Trench Construction Safety Orders of the Division of Industrial Safety.

3. When subgrade is encountered that in the opinion of the District's Representative is unsuitable for pipe support, the District's Representative may order the excavation to be carried to an approved depth below the bottom of the pipe and backfilled with sand, to the lines and grades shown on the drawings and specified by the District's Representative.

4. The minimum width of the trench at the top of the pipe zone shall be as necessary to install the pipe. The utility lines shall be centered in the trench. In the event of (1) actual physical interference between existing crossing subsurface utilities and the proposed utility lines and (2) vertical discrepancy in connecting proposed utility lines to existing utility system, a minimum clearance of 0.5 feet between the utility line and the crossing, interfering utility shall be provided, unless otherwise indicated on the plans.

5. Where existing utilities or tree roots are to be protected, trench excavation shall be by hand. No mechanical excavating equipment shall be used within 6 inches of any utility or root.

6. Trenching machinery may be used for excavations provided the specified trench width can be maintained.

3.3 TRENCH BACKFILL

A. Pipe bedding and trench backfill materials: Suitable imported pipe bedding for utilities shall consist of material having a sand equivalent of at least 30. The sand backfill material shall be placed within the pipe zone that extends from the bottom of the pipe to at least 12 inches above the top of the pipe for the full width of the trench. The horizontal distance between the springline of the pipe and the side walls of the trench shall be such that bedding material can be properly placed and compacted below the haunches of the pipe. Pipe bedding and pipe zone backfill shall be compacted to at least 95 percent relative compaction. Backfill material placement shall conform to provisions of Geotechnical Study.

B. Trench backfill placed above the pipe zone shall consist of suitable onsite or imported soil per Geotechnical Study. The trench backfill materials shall be compacted to at least 90 percent relative compaction. Compaction shall be increased to a minimum of 95 percent of maximum dry density within structural fills within building areas. Mechanical

compaction of trench backfill shall be performed and water consolidation (jetting) methods of compaction shall not be permitted. Trench backfill in landscape areas shall be compacted to a minimum of 90 percent relative compaction or per landscape specifications.

C. Trench Backfilling shall conform to the requirements of Sections 306-6 of the SSPWC and Geotechnical Study:

1. During the process of laying pipe in trenches, sufficient material shall be carefully placed and hand tamped about the pipe to hold it firmly to established line and grade. Oversized material, broken rock or shale, if encountered, shall not be used for backfill.

2. No motor driven mechanical compacting equipment shall be used over pipelines until the backfill has been compacted to 12 inches over the crown of the pipe.

3. All backfill material shall be deposited in horizontal layers not exceeding the thickness specified in Section 217 of the SSPWC and not exceeding 8 inches in thickness. The distribution of materials shall be such that all material following compaction and consolidation will form a homogeneous mass free of voids, pockets, streaks or other imperfections. Backfilling shall be done with earth free from lumps, hardpan, chunks, paving material, organic matter or other deleterious substances.

4. Jetting of bedding or backfill material to obtain specific moisture content or for compaction shall not be permitted. If encountered, existing fill in the utility excavation shall be excavated and recompacted or removed and replaced with new fill materials per requirements of Section 2.02.

5. Compaction of all backfill material for trenches, pavements or structures, shall be per provisions of the Geotechnical Study. Appropriate warning detector tape shall be placed over all utilities.

6. Prior to final cleanup or resurfacing, the District's Representative shall take compaction tests in any backfill area and at any depth, with the Contractor providing equipment and operator to assist in such test. If any such compaction test fails, the Contractor shall correct such failure and pay for any retesting that is required. The District's Representative shall make as many tests as he feels is required to receive a satisfactory and acceptable job.

3.4 STOCKPILING

A. Stockpiling of imported materials or excavated materials shall direct surface water away from approved stockpile site to prevent erosion.

B. After stockpiles are removed, leave area in a clean and neat condition.

3.5 FIELD QUALITY CONTROL

A. Inspection and testing shall be performed by District's Representative.

END OF SECTION

SECTION 31 2500
EROSION CONTROL

PART 1 GENERAL

1.1 SUMMARY

A. Provide erosion control systems.

1.2 SUMMARY

A. This Section includes slope protection and erosion control for slopes that are 3:1 (run:rise) and greater. This section shall also reference the site specific Storm Water Pollution Control Plan (SWPPP) and State of California Construction General Permit.

B. Systems shall follow the basic criteria set forth in these Specifications and on the Drawings, and shall be developed to complete working systems.

1.3 SUBMITTALS

A. Product Data: Manufacturer's current catalogue cuts and specifications for erosion control fabric.

B. Samples:

1. Erosion control fabric

C. Quality Control Submittals:

1. Manufacturer's installation specifications.

2. Manufacturer's field report.

1.4 PROJECT/SITE CONDITIONS

A. Existing Conditions: For protection of existing trees to remain, see Section 311100 “Clearing & Grubbing”.

1.5 PREINSTALLATION CONFERENCE

A. Conduct a conference at the Project Site to comply with the requirements of Section 013100 “Project Management and Coordination.”

PART 2 PRODUCTS

2.1 EROSION CONTROL FABRIC

A. Jute Mesh: Uniform open plain weave of single jute yarn averaging 130 lbs. per 14,400 yard spindle. The yarn shall be of loosely twisted construction and meet the following requirements:

1. Size: 1” x 1” x 48” roll width.

2. Weight of Cloth: 1.22 lbs. per linear yard +5%.

3. Color: Natural.

B. Staples: Hog rings or "U"-shaped steel wires.

1. Lengthwise Overlaps: 1½” hog rings.

2. End Overlaps: #11 gauge steel wire formed into a "U" shape, 1” wide x 6” long.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verification of Conditions:

1. Finished Grades: Verify that areas to receive erosion control fabric have been graded to within 1” plus or minus of the required finished grades.

2. Soil Preparation: Do not commence installation of erosion control fabric prior to acceptance of soil preparation under another section.

3. Irrigation: Do not commence installation of erosion control fabric prior to acceptance of irrigation under another section.

3.2 PREPARATION

A. Rip or cultivate subgrade in planting areas to a depth of 3” immediately prior to installing erosion control fabric.

3.3 INSTALLATION

A. Jute Mesh Fabric:

1. Layout: Place fabric neatly, perpendicular to the slope, with straight seams and no unsightly wrinkles after shrinkage. Do not stretch fabric during installation.

2. Top and Bottom Slopes: Bury top edge of fabric in 6” trench 1 foot back from lip of slope and staple with 6” #11 gauge staples at 12” on center maximum. Anchor and staple bottom edge in same manner.

3. End of Roll Overlap: At junction of two rolls, provide 18” overlap as per "Top and Bottom of Slopes" above.

4. Edge of Roll Overlap: Provide 4 in. overlap at edges of adjacent rolls and staple with 6” #11 gauge wire staples at 3 ft. to 4 ft. on center.

B. Planting: See Section 02 02900, “Exterior Plants”.

END OF SECTION

SECTION 31 5000
EXCAVATION SUPPORT AND PROTECTION

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes temporary excavation support and protection systems.

B. Related Sections include the following:

1. Section 01 5000, "Temporary Facilities and Controls" for temporary utilities and support facilities.

2. Section 31 2000, "Earth Moving" for excavating and backfilling.

3. Section 03 03361, "Shotcrete" for use in excavation support and protection.

1.2 PERFORMANCE REQUIREMENTS

A. Design, furnish, install, monitor, and maintain excavation support and protection system capable of supporting excavation sidewalls and of resisting soil and hydrostatic pressure and superimposed and construction loads.

1. Provide professional engineering services needed to assume engineering responsibility, including preparation of Shop Drawings and a comprehensive engineering analysis by a qualified California Registered Professional Engineer.

2. Prevent surface water from entering excavations by grading, dikes, or other means.

3. Install excavation support and protection systems without damaging existing buildings, pavements, and other improvements adjacent to excavation.

1.3 SUBMITTALS

A. Shop Drawings for Information: Prepared by or under the supervision of a qualified professional engineer for excavation support and protection systems.

1. Include Shop Drawings signed and sealed by the qualified California Registered Professional Engineer responsible for their preparation.

2. Qualification Data: For Installer and California Registered Professional Engineer.

3. Photographs or videotape, sufficiently detailed, of existing conditions of adjoining construction and site improvements that might be misconstrued as damage caused by the absence of, the installation of, or the performance of excavation support and protection systems.

1.4 PROJECT CONDITIONS

A. Existing Utilities: Do not interrupt utilities serving facilities occupied by Agency or others unless permitted in writing by Agency's Representative and then only after arranging to provide temporary utility services according to requirements indicated.

B. Project-Site Information: A geotechnical report has been prepared for this Project and is available for information only. The opinions expressed in this report are those of geotechnical engineer and represent interpretations of subsoil conditions, tests, and results of analyses conducted by geotechnical engineer. Agency will not be responsible for interpretations or conclusions drawn from this data.

1. Make additional test borings and conduct other exploratory operations necessary for excavation support and protection.

2. Refer to geotechnical report in RFP, Agency Furnished Information (Section 23)

C. Survey adjacent structures and improvements, employing a registered, professional engineer or land surveyor; establish exact elevations at fixed points to act as benchmarks. Clearly identify benchmarks and record existing elevations.

1. During installation of excavation support and protection systems, regularly re-survey benchmarks, maintaining an accurate log of surveyed elevations and positions for comparison with original elevations and positions. Promptly notify Agency's Representative if changes in elevations or positions occur or if cracks, sags, or other damage is evident in adjacent construction.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.1 PREPARATION

A. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards that could develop during excavation support and protection system operations.

1. Shore, support, and protect utilities encountered.

B. Install excavation support and protection systems to ensure minimum interference with roads, streets, walks, and other adjacent occupied and used facilities.

1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Agency's Representative. Provide alternate routes around closed or obstructed traffic ways if required by Agency's Representative.

C. Locate excavation support and protection systems clear of permanent construction so that forming and finishing of concrete surfaces is not impeded.

D. Monitor excavation support and protection systems daily during excavation progress and for as long as excavation remains open. Promptly correct bulges, breakage, or other evidence of movement to ensure that excavation support and protection systems remain stable.

E. Promptly repair damages to adjacent facilities caused by installing excavation support and protection systems.

3.2 SOLDIER BEAMS AND LAGGING

A. Install steel soldier beams before starting excavation. Space soldier beams at regular intervals not to exceed allowable flexural strength of wood lagging. Accurately align exposed faces of flanges to vary not more than 2 inches from a horizontal line and not more than 1:120 out of vertical alignment.

B. Install wood lagging within flanges of soldier beams as excavation proceeds. Trim excavation as required to install lagging. Fill voids behind lagging with soil, and compact.

C. Install wales horizontally at centers indicated and secure to soldier beams.

3.3 SHEET PILING

A. Before starting excavation, install one-piece sheet piling lengths and tightly interlock to form a continuous barrier. Limit vertical offset of adjacent sheet piling to 60 inches. Accurately align exposed faces of sheet piling to vary not more than 2 inches from a horizontal line and not more than 1:120 out of vertical alignment. Cut tops of sheet piling to uniform elevation at top of excavation.

3.4 TIEBACKS

A. Tiebacks: Drill for, install, grout, and tension tiebacks into position. Test load-carrying capacity of each tieback and replace and retest deficient tiebacks.

1. Test loading shall be observed by a qualified California Registered Professional Engineer responsible for design of excavation support and protection system.

a. Maintain tiebacks in place until permanent construction is able to withstand lateral earth and hydrostatic pressures.

3.5 BRACING

A. Bracing: Locate bracing to clear columns, floor framing construction, and other permanent work. If necessary to move brace, install new bracing before removing original brace.

1. Do not place bracing where it will be cast into or included in permanent concrete work, unless otherwise approved by Agency's Representative.

2. Install internal bracing, if required, to prevent spreading or distortion of braced frames.

3. Maintain bracing until structural elements are supported by other bracing or until permanent construction is able to withstand lateral earth and hydrostatic pressures.

3.6 MAINTENANCE

A. Maintain temporary excavation support and protection systems on a continuing basis until removal.

B. Inspect and resurvey all benchmarks at least once per week on a continuing basis to detect any cracks, sags, settlement, movement or other damage. All results shall be accurately logged. Promptly notify the Agency's Representative of any changes in elevations or positions.

C. If movement is detected, initiation immediate corrective action to correct the movement and prevent further negative movements

3.7 REMOVAL AND REPAIRS

A. Remove excavation support and protection systems when construction has progressed sufficiently to support excavation and bear soil and hydrostatic pressures. Remove in stages to avoid disturbing underlying soils or damaging structures, pavements, facilities, and utilities.

B. All wooden members included as part of the temporary excavation support and protection systems shall be removed. Steel sheet pile shall either be removed or cut off and left in place. If cut off, the top of the portion left in place shall be a minimum of 3' and maximum of 4' below finished surface.

C. All soil compaction requirements on both sides of the temporary excavation support and protection systems during removal shall be as required and approved by the Soils Engineer of Record..

END OF SECTION

SECTION 32 0190
LANDSCAPE MAINTENANCE

PART 1 GENERAL

1.1 SECTION INCLUDES

A. This section includes General Requirements and Specifications for the Landscape Maintenance.

1.2 RELATED SECTIONS

A. Section 32 8400 Irrigation System

B. Section 32 9000 Landscape Planting

1.3 REQUIREMENTS OF REGULATORY AGENCIES

A. Follow all Federal, State and Local laws and regulations governing the use, storage and disposal of fertilizers and pesticides and training of applicators and pest control advisors

B. When using fertilizers, herbicides, and pesticides, follow the Guidelines specified in the CASQA Landscape Maintenance SC-73.

1.4 MAINTENANCE PERIOD

A. Maintenance period shall be ninety (90) days after approval of the installation.

PART 2 PRODUCTS

2.1 MATERIALS

A. All materials used in conjunction with the maintenance work shall conform to the material requirements originally specified for the work. Apply at manufacturer's recommended rate.

PART 3 EXECUTION

3.1 TURF MAINTENANCE

A. Mowing and Trimming

1. Debris shall be removed prior to weekly mowing to prevent shredding of debris and a detrimental appearance of the turf stress.

2. A uniform high quality of cut shall be provided by mowers with sharp cutting edges.

3. Clippings will be collected after each mowing and removed from the site.

4. Trimmings around trees shall be performed using hand labor/mechanical device after each mowing.

B. Edging in turf areas – lawn areas shall be edged on a weekly basis along curbs, sidewalks, sprinklers, planter headers, valve boxes, fences, and berms. Grass clippings and trimmings shall not be allowed to remain on sidewalks, streets, driveways or gutters and shall be disposed of offsite. At no time shall turf areas be allowed to encroach upon shrubs or ground cover areas.

C. Weed Control in Turf Areas

1. Broadleaf weeds shall be controlled with a District approved selective herbicide at Manufacturer’s recommended rates.

2. Pre-emergent herbicide shall be applied prior to crabgrass germination. In areas where crabgrass has already been permitted to germinate, a selective post-emergent herbicide shall be applied.

D. Pest and Disease Control in turf Areas

1. Provide rodent, insect, pest and disease control services at the first sign or symptom of infestations, or as directed by the District Representative.

2. Notify the District Representative at the first sign or symptom of pest or disease.

3. Perform pest and disease control services in accordance with applicable laws regulations set forth for commercial spraying for hire.

E. Fertilization Program – Turf Areas

1. Turfgrass areas shall be fertilized frequently enough to maintain a healthy vigorous and green appearance.

2. Turf areas shall be fertilized not less than once every two months supplying one pound of actual nitrogen per 1,000 sq. ft., using an approved fertilizer containing micronutrients or approved equivalent.

3. During the cool season (November to February) the Contractor may elect to use a nitrate fertilizer at the rate of not less than one pound actual nitrogen per 1,000 sq. ft. All areas within this contract shall be fertilized within the same 30-day period.

F. Aeration in Turf Areas

1. Contractor shall aerate turfgrass areas no less than once per year. Aeration shall be conducted within the months of May through September.

2. Contractor shall drag and/or rake aerated turfgrass areas immediately after aeration; removing all plus and/or debris over ¼ inch in diameter.

3. Contractor shall immediately clean up adjacent areas disturbed by aeration procedures.

3.2 SHRUB AND GROUND COVERS

A. Trimming

1. Trimming, selective pruning, thinning and training of ornamental plants shall be performed as needed or required to maintain a pleasing appearance.

2. Hedging of shrubs into geometric shapes shall be permitted at the direction of the District Representative where conditions are dictated by structural elements. Shrubbery in parking areas shall be trimmed to permit non-impaired vehicular visibility at all times. Plant material under stress shall be trimmed to reduce evaporation.

3. At no time shall shrub growth be permitted to grow uncontrolled or to restrict pedestrian or vehicular passage along sidewalks, driveways, road and roadsides. At no time shall dead and declining flower stalks be left on plant material.

B. Edging

1. Edging of ground covers shall be performed frequently enough to prevent encroachment of the plant materials into trees, shrub beds and onto hardscapes (curbs, driveways, walls, sidewalks, rock areas, drainage ditches, etc.). At no time shall ground cover or shrubs be permitted to impede sprinkler coverage or cover over valve boxes.

2. Dirt and debris from edging shall be removed completely. Method of edging shall be mechanical. Chemical edging shall be considered unacceptable.

C. Weed Control – Areas shall be kept in "weed-free" appearance. Weeds may be controlled with a District approved pre-emergent herbicide and/or post emergent herbicide and removed offsite immediately after desiccation. At no time shall weeds be allowed to become established. Contractor is herewith advised that at no time on the Owner's property under this specification shall weed oil or diesel fuel be allowed as an herbicide. Use of such may result in cancellation of the contract.

D. Pest and Disease Control

1. Provide rodent, insect, pest and disease control services at the first sign or symptom of infestations, or as directed by the District Representative.

2. Notify the District Representative at the first sign or symptom of pest or disease.

3. Perform pest and disease control services in accordance with applicable laws regulations set forth for commercial spraying for hire.

E. Fertilization – Fertilize all ground cover and shrub beds with an approved fertilizer containing micronutrients not less than four (4) times per year (to achieve a rate of four pounds actual nitrogen per year). All facilities within this contract shall be fertilized within the same 30-day period.

F. Trash and Debris Pickup – Areas shall be "trashed" weekly and debris picked up and removed from site with that visit.

3.3 TREE CARE

A. A. The extent of tree pruning shall be: removal of broken, dead and crossed branches and removal of sucker growth and excessive growth to minimize potential wind damage to trees and structures and to eliminate safety hazards for the public and employees. Every effort shall be made to achieve and maintain basic tree symmetry and balance. B. All driveways and parking lots shall be kept clear for safe vehicular passage and parking.

B. Particular attention shall be paid to guying and staking to prevent girdling or loss of tree due to wind. Height clearance for all trees will be as follows: street clearance – 12' above top of curb; sidewalk clearance – 9' above sidewalk.

C. Control rodents by providing insect, pest and disease control services at the first sign or symptom of infestations, or as directed by the District Representative.

3.4 IRRIGATION SYSTEMS

A. A. Contractor is responsible for maintaining, operating and adjusting the irrigation system, and performing minor repairs as required, as herein defined.

1. On each visit, Contractor shall visually and hydraulically inspect the irrigation system to ensure that no sprinkler breakage has occurred, no foreign matter is clogging the sprinkler heads and that sprinkler coverage and arc of sprays is proper, and shall correct any other inadequacies that might impair the proper performance of the irrigation system. Minor irrigation repairs shall be accomplished by the weekly maintenance crew as needed with the like kind materials unless otherwise authorized by District Representative.

2. The Contractor is required to adjust the height of sprinkler heads in turf and ground cover areas to insure proper coverage. Excavation around sprinkler heads in order to assure coverage from sprinklers is strictly prohibited.

3. Malfunctioning valves shall be brought to the attention of the District Representative for approval of appropriate repair.

4. At least once every two weeks, the Contractor shall review water requirements of the project by probing in at least one area covered by each sectional valve and ascertaining the anticipated water requirements, adjusting the automatic controller accordingly. Particular attention shall be given to avoid applying more water than the

soil can absorb at one time. Where more water is required than the soil is capable of taking at one time, Contractor shall set the automatic timer for repeat cycles at short intervals to satisfy the ultimate water demand. In no cases shall water be allowed to run across the surface of the ground.

5. At sites where there are no automatic controllers, the Contractor shall still abide by those items expressed in the above paragraphs 1-4. The irrigation schedule shall coincide when Contractor services this site. Additional watering requirements shall be satisfied by the Contractor.

6. Contractor is discouraged from attempting to repair controllers in case of malfunctions, unless the problem is extremely minor.

7. Contractor shall notify the District Representative immediately of any system failure or disruption in order that steps can be taken to rectify the problem.

3.5 HARDSCAPED AREAS

A. A. Maintain all hardscape areas weed-free. This includes curbings, pavements, rockscapes, etc. Weeds growing around or through hardscaped areas may be treated with a chemical weed killer, providing that material used does not migrate into or onto areas not intended to be so treated. Use of such chemicals is elective with Contractor, subject to prior approval the District Representative, and shall perform as specified. The use of toxic chemicals shall require proof of proper permit for use on this jobsite. Weed control shall be performed as often as needed or required.

3.6 ADDITIONAL WORK

A. Drainage channels and catch basins shall be kept clean and weed free at all times.

B. All clinging vines shall be trimmed close to walls to maintain a neat appearance. At no time shall they be allowed to grow out of control.

C. Weed control to be maintained by chemical or mechanical means to result in a weed free condition at all times.

D. Litter and debris shall be picked up and removed from all areas of the site with each weekly visit.

E. Litter, debris and dust shall be vacuumed up from all sidewalks and building entrances with each weekly visit.

F. Contractor shall do graffiti removal on an as-needed basis.

END OF SECTION

SECTION 32 1123
AGGREGATE BASE COURSES

PART 1 - GENERAL

1.1 SUMMARY

A. Aggregate base course for curbs, gutters, sidewalks, and fire access driveway.

1.2 RELATED SECTIONS

A. Section 31 2000 Earthwork.

B. Section 32 1600 Curbs, Gutters, Sidewalks, and Driveways.

1.3 REFERENCES

A. Standard Specifications for Public Works (SSPWC), latest edition.

B. ASTM Standards.

C. State Standard Specifications (SSS), Caltrans, latest edition.

D. Geotechnical Report.

1.4 SUBMITTALS

A. Submit material samples and reports in accordance with requirements of District.

B. Submit samples in sufficient quantities for material testing.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Aggregate Base Material shall be Class 2 Aggregate Base conforming to SSS Section 26-1.02A. Aggregate Base shall have a minimum sand equivalence of 22 and a minimum R-value of 78 and shall be free of organic materials and other deleterious substances.

B. Aggregate Base materials used within building areas shall be free of asphaltic materials.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify substrate has been inspected; gradients and elevations are correct, and dry.

3.2 AGGREGATE BASE PLACEMENT

A. Aggregate base placement shall conform to the provisions of the SSPWC, Section 301

B. Level and contour surfaces to elevations and gradients indicated.

C. Add water to assist compaction. If excess water is apparent, remove aggregate and aerate to reduce moisture content.

D. Where the required aggregate base thickness is 6 inches or less, the watered base may be spread and compacted in one layer. Where the required thickness is more than 6 inches, the aggregate base material shall be spread and

compacted in 2 or more layers of approximately equal thickness. The maximum compacted thickness of any one layer shall not exceed 6 inches.

E. Aggregate base course shall be dense and unyielding upon proof-rolling with full water truck.

3.3 TOLERANCES

A. Flatness: Maximum variation of 1/4 inch.

B. Scheduled Compacted Thickness shall conform to the provisions of the SSPWC Section 301-2.2.

3.4 FIELD QUALITY CONTROL

A. Inspection and testing shall be performed by the District's Testing Laboratory. Compaction testing will be performed in accordance with ASTM D1557, latest edition.

B. If tests indicate work does not meet specified requirements, remove work, replace and retest at Contractor's expense.

END OF SECTION

SECTION 32 1216
ASPHALTIC CONCRETE PAVING

PART 1 - GENERAL

1.1 DESCRIPTION

A. Provide asphaltic concrete paving in accordance with Contract Documents.

B. Related Work Specified Elsewhere.

1. Section 31 2000, “Earth Moving”.

2. Section 33 1100, “Water Utility Distribution Piping”.

3. Section 33 3000, “Sanitary Sewerage Utilities”

4. Section 33 4000, “Storm Drainage”.

1.2 STANDARD SPECIFICATIONS

A. Unless indicated otherwise, all work to be performed and materials to be used shall be in accordance with The “Greenbook” (2009) Standard Specifications for Public Works Construction and the latest edition supplements, including Standard Plans.

B. The Standard Specifications apply only to performance and materials and how they are to be incorporated into the Work. The legal/contractual relationship sections and the measurement and pavement sections do not apply to this document.

1.3 QUALITY ASSURANCE

A. Testing Agency: Agency will engage, at his own expense, Agency’s Testing Agency to inspect asphaltic concrete paving, to perform tests specified, and to submit reports to Agency’s Representative.

1. Agency’s Testing Agency will be responsible for conducting and interpreting tests, will state in each report whether or not test results comply with Contract Documents, will specifically note deviation there from, and will indicate corrective measures required and taken.

1.4 SUBMITTALS

A. Design Builder shall, as a minimum, provide the following submittals:

1. Test reports of materials incorporated in Work.

2. Proposed asphalt concrete pavement mix.

3. Time and place of plant mixing and Project Site paving operations.

4. Representative samples of material requested for testing.

5. Manufacture’s catalog sheets together with MSDS sheets for herbicide.

1.5 PREINSTALLATION CONFERENCE

A. Conduct a conference at the Project site to comply with requirements in Section 01 3100, “Project Management and Coordination”.

1.6 REFERENCES

A. Except as modified by governing codes and by Contract Documents, comply with applicable provisions and recommendations of the following:

1. Standard Specifications for Public Works Construction (indicated "SSPWC).

    a. Terms "Board" or "Agency" refer to Agency.

    b. Terms "Engineer" or Inspector" refer to Agency's Representative or Agency's Testing Laboratory.

    c. Provisions relating to methods of payment do not apply.

    d. State Department of Highways, Division of Highways, State of California "Standard Specifications" (indicated "Caltrans").

1.7 PROJECT CONDITIONS

A. Environmental Requirements: Do not install asphalt materials if the base is wet or excessively damp, or if the following conditions are not met:

B. Prime and tack coats: minimum surface temperature of 60° Fahrenheit.

C. Asphalt base course: minimum surface temperature of 40° Fahrenheit and rising at time of placement.

D. Asphalt surface course: minimum surface temperature of 60° Fahrenheit at time of placement.

PART 2 - PRODUCTS

2.1 MATERIALS

A. General: Provide materials in accordance with SSPWC requirements unless otherwise noted.

B. Aggregate Base Course: SSPWC Section 200-2.2, Crushed Aggregate Base.

C. Asphalt Prime and Tack Coat: SSPWC Section 302-5.3 and 302-5.4, respectfully.

D. Asphaltic Concrete: Dense hot-laid, hot-mix asphalt plant mixes design according to procedures in the Standard Specification.

1. Provide mixes complying with composition, grading and tolerance requirements in ASTM D3515 for the following nominal, maximum aggregate sizes.

    a. Base Course: Class B per Table 203-6.3.2.(A) of the SSPWC.

    b. Surface Course: Class D1 per Table 203-6.3.2.(A) of the SSPWC.

E. Herbicide: Commercial chemical for weed control, registered with the EPA. Provide in granular, liquid or wetable powder form.

F. Header Boards: Header boards shall be nominal 2" redwood. The vertical dimension shall be such as to be not more than ½"less than the pavement thickness at the header line.

G. All other material shall be manufacturer's standard for the items required or type best suited for the intended use.

PART 3 - EXECUTION

3.1 INSPECTION

A. Examine substrates, adjoining construction, and conditions under which Work is to be installed. Do not proceed with Work until unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Surface Preparation

1. Do not commence base preparation until all underground utility systems as discussed in the Sections/Divisions listed in paragraph 1.1C. above have been installed.

2. Do not commence asphaltic concrete paving work until concrete curbs are constructed and cured.

3. Maintain sub-grade in satisfactory condition and properly drained, until pavement is placed thereon.

4. Herbicide Treatment: Apply herbicide according to manufacturer's recommended rates and written application instructions. Apply to dry prepared subgrade or surface of compacted aggregate base before applying paving materials

3.3 INSTALLATION

A. Aggregate Base Course: Construct in accordance with SSPWC Section 301-2.

B. Asphaltic Prime Coat: Apply in accordance with SSPWC Section 302-5.3.

C. Asphaltic Concrete: Construct in a minimum of 2 lifts in accordance with SSPWC Section 302-5.

1. The base course shall be a minimum of 1½" less than the full-specified thickness of the pavement.

2. The surface course shall be a minimum of 1½" in thickness.

3. Maximum thickness of any lift shall be 4".

D. Asphalt Tack Coat: Apply in accordance with SSPWC Section 302-5.4.

E. Header Boards: Install in accordance with provisions of SSPWC Section 302-5.5.

3.4 COMPACTION

A. General: Begin compaction as soon as placed hot-mix paving will bear roller weight without excessive displacement. Compact hot-mix paving with hot, hand tampers or vibratory-plate compactors in areas inaccessible to rollers.

1. Complete compaction before mix temperature cools to 185 deg F (85 deg C).

B. Breakdown Rolling: Complete breakdown or initial rolling immediately after rolling joints and outside edge. Examine surface immediately after breakdown rolling for indicated crown, grade, and smoothness. Correct laydown and rolling operations to comply with requirements.

C. Intermediate Rolling: Begin intermediate rolling immediately after breakdown rolling while hot-mix asphalt is still hot enough to achieve specified density. Continue rolling until hot-mix asphalt course has been uniformly compacted to the following density:

1. Minimum Density: 95 percent of reference laboratory density according to SSPWC Section 302-5.6.2, but not greater than 100 percent.

D. Finish Rolling: Finish roll paved surfaces to remove roller marks while hot-mix asphalt is still warm.

E. Edge Shaping: While surface is being compacted and finished, trim edges of pavement to proper alignment. Bevel edges while asphalt is still hot; compact thoroughly.

F. Repairs: Remove paved areas that are defective or contaminated with foreign materials and replace with fresh, hot-mix asphalt. Compact by rolling to specified density and surface smoothness.

3.5 INSTALLATION TOLERANCES

A. Thickness: Compact each course to produce the thickness indicated within the following tolerances:

1. Base Course: Plus or minus 1/2 inch.

2. Surface Course: Plus 1/4 inch, no minus.

B. Surface Smoothness: Compact each course to produce a surface smoothness within the following tolerances as determined by using a 10-foot straightedge applied transversely or longitudinally to paved areas:

1. Base Course: 1/4 inch.

2. Surface Course: 1/8 inch.

3. Crowned Surfaces: Test with crowned template centered and at right angle to crown.

4. Maximum allowable variance from template is 1/4 inch.

3.6 PATCHING

A. Cut out and fill with fresh, hot asphaltic concrete. Sawcut asphalt and remove deficient areas for full depth of surface and base course. Cut sides perpendicular and parallel and perpendicular to direction of traffic extent of failure. Apply tack coat to exposed surfaces before placing new pavement. Compact and finish to specification.

B. The subgrade shall be re-compacted as necessary and aggregate base constructed. Thickness of base and asphalt shall match existing. Asphalt shall be in minimum of 2 lifts, a base course and a finish course.

3.7 CLEANING

A. After completion of paving operations, thoroughly clean paved areas by sweeping or washing and remove defacements or stains. Exercise care to avoid soiling of adjacent construction. Remove such soiling prior to final acceptance of Work.

3.8 PROTECTION

A. Protect finished surfaces against blemishes and disfigurement.

B. Do not permit vehicular traffic on finished pavement until it has hardened sufficiently and in no case less than 36 hours after completion.

END OF SECTION

SECTION 32 1313
CONCRETE PAVING

PART 1 - GENERAL

1.1 DESCRIPTION

A. The work includes concrete paving and reinforcement.

B. Related Sections 31 2000, “Earth Moving”.

1.2 STANDARD SPECIFICATIONS

A. All work to be performed and materials to be used shall be in accordance with The “Greenbook” (2009) Standard Specifications for Public Works Construction and the latest edition supplements, including Standard Plans.

B. The Standard Specifications apply only to performance and materials and how they are to be incorporated into the Work. The legal/contractual relationship sections and the measurement and pavement sections do not apply to this document

1.3 SUBMITTALS

A. Product Data: For each type of manufactured material and product indicated.

B. Design Mixes: For each concrete mix. Submit proposed mix designs at least 15 days in advance of placing operations for each type of concrete. The submitted mix designs shall include the following:

1. Concrete Mix Design Submittal form: Fill out forms in their entirety.

2. Proportions of all ingredients, including all admixtures added either at time of batching or at job site. Aggregate weights shall be based upon saturated surface dry conditions.

3. Certification that all ingredients in each mix design are compatible.

4. Locations or intended use of each mix design.

5. Source of all materials.

6. Alternate mix designs when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.

C. Material Test Reports: From a qualified testing agency indicating test results comply with requirements of the specifications.

D. Material Certificates: Signed by the manufacturer certifying that the cementitious materials, steel reinforcement, ad mixtures, curing compounds, bonding agents and joint fillers meet specification requirements.

E. Submit proposed locations for all joints not specifically shown on the drawings.

F. Shop Drawings: For concrete exposed to view, show formwork construction including form-facing joints, rustications, all joints, form joint-sealant details, form tie location and patterns, inserts and embedments, cutouts, cleanout panels, and other items that visually affect cast-in-place architectural concrete

1.4 MOCK-UPS

A. Prepare 2 sets of architectural concrete samples for each concrete mix, approximately 48” by 48” by appropriate thickness (minimum 4"), of finishes, colors, joints and textures to match the design reference samples. Include Sample sets showing the full range of variations expected in these characteristics. Maintain and protect one full set

of approved samples at Agency's construction office throughout the period of the project. This set will be used to verify the color, finish, and texture of the completed construction.

1.5 PREINSTALLATION CONFERENCE

1.6 Conduct a conference at the Project site to comply with requirements in Section 01 3100, "Project Management and Coordination".

PART 2 - PRODUCTS

2.1 CONCRETE

A. Portland cement: ASTM C150, type II, low alkali.

B. Aggregate Base Course: SSPWC Section 200-2.2 Crushed Aggregate Base.

C. Water: Clean, fresh and potable.

D. Strength: Minimum ultimate compressive strength of 3,000 psi. For testing requirements see Division 1.

E. Maximum Water—Cementitious material ration at point of placement: 0.50.

F. Slump Limit—4" inches, plus or minus 1" inch

G. Concrete mixes:

1. Concrete Paving, Type 3: Agency standard concrete walkways

a. Mix to match typical light grey walkways existing on the medical campus.

2.2 FORM MATERIALS

A. Side Forms Douglas fir, construction grade or better, or metal forms.

B. Stakes: Douglas fir, construction grade or better, or metal stakes.

C. Use flexible or curved forms for curves with a radius of 100'or less.

D. 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 and surfaces.

2.3 REINFORCING: Use only where called for:

A. Bars: ASTM A615, grade 60 deformed

B. Wire: ASTM A82, 18 gauge minimum

C. Wire mesh: ASTM A185 6X6, 10X10, plain welded wire reinforcement.

D. Joint Dowel Bars: Plain steel bars, ASTM A615/A615M, Grade 60 cut bars true to length with ends square and free of burrs.

E. Bar Supports: Bolsters, chairs, spacers and devices for spacing, supporting and fastening reinforcing bars, welded wire reinforcement and dowels in place shall be manufactured from steel wire or plastic in accordance with CRSI's Manual of Standard Practices.

2.4 EXPANSION AND CONTROL JOINTS

A. Expansion Joint: Asphalt impregnated fiber filler material, 1/2 inch thick, ASTM D1572

B. Control joints for exterior concrete pavement: As shown on plan or details. Control joints shall be a formed joint. Tops of joints shall be installed flush with the concrete surface. Depth of joint shall be a minimum of 1/4 the

thickness of slab. Provide “Zip Strip” as distributed by S.C.A. Construction Supply, Santa Fe Springs, California or equal.

2.5 CURING MATERIALS

A. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. (305 g/sq. m) dry.

B. Clear Waterborne Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B.

1. Products:

a. Anti-Hydro International, Inc.; AH Curing Compound #2 DR WB.

b. Burke by Edoko; Aqua Resin Cure.

c. ChemMasters; Safe-Cure Clear.

d. or equal

C. White Waterborne Membrane-Forming Curing Compound: ASTM C 309, Type 2, Class B.

1. Products:

a. Anti-Hydro International, Inc.; AH Curing Compound #2 WP WB.

b. Burke by Edoco; Resin Emulsion White.

c. ChemMasters; Safe-Cure 2000.

d. or equal.

2.6 CONCRETE MIXING

A. Ready-Mixed Concrete: Measure, batch, and mix concrete materials and concrete according to ASTM C 94/C 94M. Furnish batch certificates for each batch discharged and used in the Work.

1. When air temperature is between 85 deg F 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.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine exposed subgrades and sub-base surfaces for compliance with requirements for dimensional, grading, and elevation tolerances.

B. Repair subgrades and sub-bases if necessary under provisions of Section 31 2000, “Earth Moving”.

C. Subgrade: The Cal Trans access road shall be prepared under provisions of Section 31 2000, “Earth Moving”.

D. Proceed with concrete pavement operations only after nonconforming conditions have been corrected and subgrade is ready to receive pavement.

3.2 PREPARATION

A. Remove loose material from compacted sub-base surface immediately before placing concrete.

B. Aggregate Base Course: Construct in accordance with SSPWC Section 301.2.

3.3 EDGE FORMS AND SCREED CONSTRUCTION

A. Set, brace, and secure edge forms, bulkheads, and intermediate screed guides for pavement to required lines, grades, and elevations. Install forms to allow continuous progress of work and so forms can remain in place at least 24 hours after concrete placement.

B. Clean forms after each use and coat with form-release agent to ensure separation from concrete without damage.

3.4 STEEL REINFORCEMENT

A. General: Comply with CRSI's "Manual of Standard Practice" for fabricating, placing, and supporting reinforcement.

B. Clean reinforcement of loose rust and mill scale, earth, ice, or other bond-reducing materials.

C. Arrange, space, and securely tie bars and bar supports to hold reinforcement in position during concrete placement. Maintain minimum cover to reinforcement.

D. Install welded wire reinforcement in lengths as long as practicable. Lap adjoining pieces at least one full mesh, and lace splices with wire. Offset laps of adjoining widths to prevent continuous laps in either direction.

E. Install fabricated bar mats in lengths as long as practicable. Handle units to keep them flat and free of distortions. Straighten bends, kinks, and other irregularities, or replace units as required before placement. Set mats for a minimum 2-inch overlap of adjacent mats.

3.5 JOINTS

A. General: Form construction, isolation, and contraction joints and tool edgings true to line with faces perpendicular to surface plane of concrete. Construct transverse joints at right angles to centerline, unless otherwise indicated.

1. When joining existing pavement, place transverse joints to align with previously placed joints, unless otherwise indicated.

B. Construction Joints: Set construction joints at side and end terminations of pavement and at locations where pavement operations are stopped for more than one-half hour unless pavement terminates at isolation joints.

1. Continue steel reinforcement across construction joints, unless otherwise indicated. Do not continue reinforcement through sides of pavement strips, unless otherwise indicated.

2. Provide tie bars at sides of pavement strips where indicated.

3. Butt Joints: Use bonding agent at joint locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.

4. Keyed Joints: Provide preformed keyway-section forms or bulkhead forms with keys, unless otherwise indicated. Embed keys at least 1-1/2 inches (38 mm) into concrete.

5. 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.

C. Isolation Joints: Form isolation joints of preformed joint-filler strips abutting concrete curbs, catch basins, manholes, inlets, structures, walks, other fixed objects, and where indicated.

1. Locate expansion joints at intervals not to exceed 20 feet each direction, unless otherwise indicated.

2. Extend joint fillers full width and depth of joint.

3. Place top of joint filler flush with finished concrete surface.

4. Furnish joint fillers in one-piece lengths. Where more than one length is required, lace or clip joint-filler sections together.

5. Protect top edge of joint filler during concrete placement with metal, plastic, or other temporary preformed cap. Remove protective cap after concrete has been placed on both sides of joint.

D. Weakened Plane Joints shall be sawed or otherwise constructed at intervals not to exceed 5'-0" in each direction. If constructed the joints shall be constructed in accordance with Section 303-5.4 of SSPWC.

E. Edging: Tool edges of pavement, gutters, curbs, and joints in concrete after initial floating with an edging tool to a 1/4-inch radius. Repeat tooling of edges after applying surface finishes. Eliminate tool marks on concrete surfaces.

3.6 CONCRETE PLACEMENT

A. Inspection: Before placing concrete, inspect and complete formwork installation, steel reinforcement, and items to be embedded or cast in. Notify other trades to permit installation of their work.

B. Moisten base to provide a uniform dampened condition at time concrete is placed. Do not place concrete around manholes or other structures until they are at required finish elevation and alignment.

C. Do not add water to concrete during delivery or at Project site, unless approved by the project representative.

D. Do not add water to fresh concrete after testing, unless approved by the project representative.

E. Deposit and spread concrete in a continuous operation between transverse joints. Do not push or drag concrete into place or use vibrators to move concrete into place.

F. Consolidate concrete according to ACI 301 by mechanical vibrating equipment supplemented by hand spading, rodding, or tamping.

1. Consolidate concrete along face of forms and adjacent to transverse joints with an internal vibrator. Keep vibrator away from joint assemblies, reinforcement, or side forms. Use only square-faced shovels for hand spreading and consolidation. Consolidate with care to prevent dislocating reinforcement, dowels, and joint devices.

G. Place concrete in two operations; strike off initial pour for entire width of placement and to the required depth below finish surface. Lay welded wire fabric or fabricated bar mats immediately in final position. Place top layer of concrete, strike off, and screed.

1. Remove and replace concrete that has been placed for more than 15 minutes without being covered by top layer, or use bonding agent if approved by Agency's Representative.

H. Screed pavement surfaces with a straightedge and strike off.

I. Commence initial floating using bull floats or darbies to impart an open textured and uniform surface plane before excess moisture or bleed water appears on the surface. Do not further disturb concrete surfaces before beginning finishing operations or spreading surface treatments.

J. Curbs and Gutters: When automatic machine placement is used for curb and gutter placement, submit revised mix design and laboratory test results that meet or exceed requirements. Produce curbs and gutters to required cross section, lines, grades, finish, and jointing as specified for formed concrete. If results are not approved, remove and replace with formed concrete.

K. Slip-Form Pavers: When automatic machine placement is used for pavement, submit revised mix design and laboratory test results that meet or exceed requirements. Produce pavement to required thickness, lines, grades, finish, and jointing as required for formed pavement.

1. Compact subbase and prepare subgrade of sufficient width to prevent displacement of paver machine during operations.

L. When adjoining pavement lanes are placed in separate pours, do not operate equipment on concrete until pavement has attained 85 percent of its 28-day compressive strength.

M. Hot-Weather Placement: Comply with ACI 301 and as follows when hot-weather conditions exist:

1. Cool ingredients before mixing to maintain concrete temperature below 90 deg F (32 deg C) 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 Design Builder's option.

2. Cover steel reinforcement with water-soaked burlap so steel temperature will not exceed ambient air temperature immediately before embedding in concrete.

3. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade moisture uniform without standing water, soft spots, or dry areas.

3.7 ON-SITE CONCRETE WORK

A. Construct all site concrete of 3,000 psi concrete unless otherwise indicated or specified. .

1. Light standard footings, fence footings and sign footings (below ground) and similar structures may be deposited directly to holes in the ground conforming to their required sizes.

B. Concrete Curb & Gutters: Provide 1/2" thick expansion joints at beginning and at end of curves, at all angle points and at maximum intervals of 20 feet. Set plumb, square, and to same profile as the curbs. Edge curb tops to radius indicated.

C. Concrete Walks: Provide ½" thick expansion joints as specified for curb and gutter and where walks abut rigid structures. Maximum interval of 20 feet both directions.

D. Control Joints: Use control joints on all curb & gutters, and cross gutters at maximum intervals of 5 feet on center, both ways. Sawed joints may be used in lieu of the above. Install tops of the joints flush with the concrete surface and depth of joint a minimum of 1/4 the thickness of concrete.

3.8 FINISH

A. Walks and Pavement:

1. Concrete Paving, Type 3

a. Pedestrian walkways: Medium brooms finish perpendicular to longitudinal direction of the walk.

b. Finishes along accessible path of travel shall be slip-resistant.

2. All other concrete paving areas: Medium brooms finish perpendicular to longitudinal direction of the walk. Score walks in direction and pattern indicated.

B. Gutters: Light broom finish with 3-inch wide steel trowel finish at flow-lines.

C. Curbs: Steel trowel finish, followed by fine hairbrush finish.

3.9 CURING

A. Concrete work shall be properly cured and protected against injury and defacement of any nature during construction operations. If weather is hot or surface has dried out, spray surface with fine mist of water, starting not later than 2 hours after final troweling. Surface of finish shall be kept continuously wet for at least 10 days. Wetting is considered emergency work and shall be performed on weekends and holidays if necessary.

B. In lieu of water curing, within 24 hours after finishing, the concrete may be cured with an approved clear liquid curing compound, applied in accordance with the manufacturer's recommendations.

3.10 PAVEMENT TOLERANCES

A. Comply with tolerances of ACI 117 and as follows:

1. Elevation: 1/4 inch (6 mm).

2. Thickness: Plus 3/8 inch (10 mm), minus 1/4 inch (6 mm).

3. Surface: Gap below 10-foot- (3-m-) long, unleveled straightedge not to exceed 1/4 inch (6 mm).

4. Lateral Alignment and Spacing of Tie Bars and Dowels: 1 inch (25 mm).

5. Vertical Alignment of Tie Bars and Dowels: 1/4 inch (6 mm).

6. Alignment of Tie-Bar End Relative to Line Perpendicular to Pavement Edge: 1/2 inch (13 mm).

7. Alignment of Dowel-Bar End Relative to Line Perpendicular to Pavement Edge: Length of dowel 1/4 inch per 12 inches (6 mm per 300 mm).

8. Joint Spacing: 3 inches (75 mm).

9. Contraction Joint Depth: Plus 1/4 inch (6 mm), no minus.

10. Joint Width: Plus 1/8 inch (3 mm), no minus.

3.11 FIELD QUALITY CONTROL

A. Testing Agency: Agency will engage qualified independent testing and inspecting agency to perform field tests and inspections and prepare test reports.

B. Testing Services: 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 at least 1 composite sample for each 100 cu. yd. or fraction thereof of each concrete mix 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.

2. 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 mix. Perform additional tests when concrete consistency appears to change.

3. Air Content: ASTM C 231, pressure method; one test for each composite sample, but not less than one test for each day's pour of each concrete mix.

4. Concrete Temperature: ASTM C 1064; one test hourly when air temperature is 40 deg F (4.4 deg C) and below and when 80 deg F (27 deg C) and above, and one test for each composite sample.

5. Compression Test Specimens: ASTM C 31/C 31M; cast and laboratory cure one set of three standard cylinder specimens for each composite sample.

6. Compressive-Strength Tests: ASTM C 39/C 39M; test 1 specimen at 7 days and 2 specimens at 28 days.

a. A compressive-strength test shall be the average compressive strength from 2 specimens obtained from same composite sample and tested at 28 days.

C. Strength of each concrete mix will be satisfactory if average of any 3 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 (3.4 MPa).

D. Test results shall be reported in writing to Agency's Representative, concrete manufacturer, and Design Builder 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.

E. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by Agency's Representative but will not be used as sole basis for approval or rejection of concrete.

F. 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 Agency's Representative.

G. Remove and replace concrete pavement where test results indicate that it does not comply with specified requirements.

H. Additional testing and inspecting, at Design Builder expense, will be performed to determine compliance of replaced or additional work with specified requirements.

I. Remove forms from front face of concrete curbs after initial concrete set such that face of curb can be finished. Other forms shall remain in place a minimum of 24 hours before removal.

3.12 REPAIRS AND PROTECTION

A. Remove and replace concrete pavement that is broken, damaged, or defective or that does not comply with requirements in this Section.

B. Drill test cores, where directed by Agency's Representative, when necessary to determine magnitude of cracks or defective areas. Fill drilled core holes in satisfactory pavement areas with Portland cement concrete bonded to pavement with epoxy adhesive.

C. Protect concrete from damage. Exclude traffic from pavement for at least 14 days after placement. When construction traffic is permitted, maintain pavement as clean as possible by removing surface stains and spillage of materials as they occur.

D. Maintain concrete pavement free of stains, discoloration, dirt, and other foreign material. Sweep concrete pavement not more than two days before date scheduled for Substantial Completion inspections.

3.13 FLOOD TEST

A. All concrete gutters and concrete pavement shall be given a flood test. All concrete work where water ponds and does not run off in a reasonable amount of time, shall be removed to the nearest score or joint line and replaced to provide proper drainage.

END OF SECTION

SECTION 32 1410
DETECTABLE WARNING PAVERS

PART 1 GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Access compliant detectable warning concrete pavers set in mortar setting beds.

1.2 RELATED REQUIREMENTS

A. Section 07 9000 - Joint Sealants

B. Section 32 1123 - Aggregate Base Course

C. Section 32 1215 - Asphalt Concrete Paving

D. Section 32 1315 - Architectural Site Concrete

E. Section 32 1316.15 - Architectural ConcretePaving

F. Section 32 1600 - Curbs, Gutters, Sidewalks

1.3 SUBMITTALS

A. Product Data: For the following:

1. ADA concrete pavers

2. Mortar and grout materials.

B. Samples for Initial Selection: Manufacturer's color charts consisting of units or sections of units showing the full range of colors, textures, and patterns available for each type of unit pavers indicated.

1. Each type of unit paver indicated.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: An experienced installer who has completed unit paver installations similar in material, design, and extent to that indicated for this Project and whose work has resulted in construction with a record of successful in-service performance.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Store pavers 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.

B. Store cementitious materials on elevated platforms, under cover, and in a dry location. Do not use cementitious materials that have become damp.

1.6 PROJECT CONDITIONS

A. Cold-Weather Protection: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen subgrade or setting beds. Remove and replace unit paver work damaged by frost or freezing.

B. Weather Limitations for Mortar and Grout: Comply with the following requirements:

1. Cold-Weather Requirements: Protect unit paver work against freezing when atmospheric temperature is 40 deg F (4 deg C) and falling. Heat materials to provide mortar and grout temperatures between 40 and 120

deg F (4 and 49 deg C). Provide the following protection for completed portions of work for 24 hours after installation when the mean daily air temperature is as indicated: below 40 deg F (4 deg C), cover with weather-resistant membrane; below 25 deg F (minus 4 deg C), cover with insulating blankets; below 20 deg F (minus 7 deg C), provide enclosure and temporary heat to maintain temperature above 32 deg F (0 deg C).

2. Hot-Weather Requirements: Protect unit paver work when temperature and humidity conditions produce excessive evaporation of setting beds and grout. Provide artificial shade and windbreaks and use cooled materials as required. Do not apply mortar to substrates with temperatures of 100 deg F (38 deg C) and higher.

PART 2 PRODUCTS

2.1 CONCRETE PAVERS

A. Access Compliant Detectable Warning Concrete Pavers:

1. General:

a. Pavers shall comply with the Americans with Disablities Act/California Building Code Chapter 11B, and to meet DISABLED ACCESS guidelines for application, design and installation.

b. Comply with CBC Section 11B-705.1.

2. Basis-of-Design: The design for detectable warning pavers is based on Wausau Tile or equal.

3. Material: Concrete

4. Thickness: 2 ¾ inches.

5. Face Size and Shape: 12 inches square.

6. Pattern: DISABLED ACCESS-3 Truncated Dome.

7. Color: To be selected by Architect. Conform to Federal Color No. FS 33538 of Federal Standard No. 595C. CBC Section 11B-705.1.1.3.

2.2 ACCESSORIES:

A. Job-Built Concrete Edge Restraints: Normal-weight, air-entrained, ready-mixed concrete with minimum 28-day compressive strength of 3000 psi.

B. Compressible Foam Filler: Preformed strips complying with ASTM D 1056, Grade 2A1.

2.3 MORTAR SETTING-BED MATERIALS

A. Portland Cement: ASTM C 150, Type I or II.

B. Hydrated Lime: ASTM C 207, Type S.

C. Sand: ASTM C 144.

D. Latex Additive: Manufacturer's standard 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 mortar bed, and not containing a retarder.

1. Manufacturer: Subject to compliance with requirements, provide latex additive by one of the following:

a. Bonsal, W. R. Company.

b. Custom Building Products.

c. DAP Inc.

d. Laticrete International, Inc.

E. Water: Potable.

2.4 GROUT MATERIALS

A. Sand-Portland Cement Grout: ANSI A108.10, composed of white or gray cement[, unfading mineral pigments] and white or colored sand as required to produce required color.

1. Latex Additive: Manufacturer's standard 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 sand-portland cement grout.

a. Manufacturer: Subject to compliance with requirements, provide latex additive by one of the following:

1) Bonsal, W. R. Company..

2) Custom Building Products.

3) DAP Inc.

4) Laticrete International, Inc.

5) MAPEI Corp.

6) Summitville Tiles, Inc.

7) TEC Incorporated; H. B. Fuller Company.

B. Grout Colors: As selected by Architect from manufacturer's full range.

C. Water: Potable.

PART 3 EXECUTION

3.1 EXAMINATION

A. Examine areas indicated to receive paving for compliance with requirements for installation tolerances and other conditions affecting performance. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Proof-roll prepared subgrade surface to check for unstable areas and areas requiring additional compaction. Proceed with unit paver installation only after deficient subgrades have been corrected and are ready to receive subbase for unit pavers.

3.3 INSTALLATION, GENERAL

A. Do not use unit pavers with chips, cracks, voids, discolorations, and other defects that might be visible or cause staining in finished work.

B. Cut unit pavers with motor-driven masonry saw equipment to provide clean, sharp, unchipped edges. Cut units to provide pattern indicated and to fit adjoining work neatly. Use full units without cutting where possible. Hammer cutting is not acceptable.

C. Tolerances: Do not exceed 1/16-inch unit-to-unit offset from flush (lippage) nor 1/8 inch in 24 inches and 1/4 inch in 10 feet from level, or indicated slope, for finished surface of paving.

D. Provide edge restraints as indicated. Install edge restraints before placing unit pavers.

1. Install job-built concrete edge restraints to comply with requirements in Division 3 Section "Cast-in-Place Concrete."

3.4 MORTAR SETTING-BED APPLICATIONS

A. Saturate concrete subbase with clean water several hours before placing setting bed. Remove surface water about one hour before placing setting bed.

B. Apply mortar-bed bond coat over surface of concrete subbase about 15 minutes before placing setting bed. Limit area of bond coat to avoid its drying out before placing setting bed. Do not exceed 1/16-inch (1.6-mm) thickness for bond coat.

C. Apply mortar bed over bond coat immediately after applying bond coat. Spread and screed setting bed to uniform thickness at subgrade elevations required for accurate setting of pavers to finished grades indicated.

D. Place reinforcing wire over concrete subbase, lapped at joints by at least one full mesh and supported so mesh becomes embedded in the middle of setting bed. Hold edges back from vertical surfaces approximately 1/2 inch (13 mm).

E. Mix and place only that amount of mortar bed that can be covered with pavers before initial set. Cut back, bevel edge, remove, and discard setting-bed material that has reached initial set before placing pavers.

F. Place pavers before initial set of cement occurs. Immediately before placing pavers on setting bed, apply uniform 1/16-inch- (1.5-mm-) thick, slurry bond coat to bed or to back of each paver with a flat trowel.

G. Tamp or beat pavers with a wooden block or rubber mallet to obtain full contact with setting bed and to bring finished surfaces within indicated tolerances. Set each paver in a single operation before initial set of mortar; do not return to areas already set or disturb pavers for purposes of realigning finished surfaces or adjusting joints.

H. Grout joints as soon as possible after initial set of setting bed.

1. Force grout into joints, taking care not to smear grout on adjoining surfaces.

2. Clean pavers as grouting progresses by dry brushing or rubbing with dry burlap to remove smears before tooling joints.

3. Tool exposed joints slightly concave when thumbprint hard, using a jointer larger than joint thickness, unless otherwise indicated.

4. If tooling squeezes grout from joints, remove excess grout and smears by dry brushing or rubbing with dry burlap and tool joints again to produce a uniform appearance.

I. Cure grout by maintaining in a damp condition for seven days, unless otherwise recommended by grout or liquid-latex manufacturer.

3.5 REPAIRING, POINTING, AND CLEANING

A. Remove and replace unit pavers that are loose, chipped, broken, stained, or otherwise damaged or that do not match adjoining units. Provide new units to match adjoining units and install in same manner as original units, with same joint treatment and with no evidence of replacement.

B. Pointing: During tooling of joints, enlarge voids or holes and completely fill with grout. Point up joints at sealant joints to provide a neat, uniform appearance, properly prepared for sealant application.

C. Cleaning: Remove excess grout from exposed paver surfaces; wash and scrub clean.

END OF SECTION

SECTION 32 1600
CURBS, GUTTERS, SIDEWALKS

PART 1 – GENERAL

1.1 SUMMARY

A. Concrete for curbs, gutters, sidewalks.

1.2 RELATED SECTIONS

A. Section 31 2000 – Earthwork

1.3 REFERENCES

A. Standard Specifications for Public Works Construction (SSPWC), latest edition.

B. Geotechnical Report.

C. ASTM Standards.

1.4 SUBMITTALS

A. Submit the following:

1. Product Data: Provide data on admixtures and curing compounds.

2. Concrete mix design(s).

3. Certificates from the batch plant.

1.5 QUALITY ASSURANCE

A. Perform Work in accordance with the SSPWC, latest edition; and ASTM Standards, latest edition.

B. Obtain cementitious materials from same source throughout.

1.6 ENVIRONMENTAL REQUIREMENTS

A. Do not place concrete when base surface temperature is less than 40 degrees F or surface is wet.

PART 2 – PRODUCTS

2.1 FORM MATERIALS

A. Form Materials: Section 303-5 of the SSPWC.

2.2 CONCRETE MATERIALS

A. Concrete Material for Curbs, Walk (Path of Travel), Pavement, and Cast-in-Place Catch Basin:

1. Class 560-C-3250 for cast-in-place catch basins, curbs, and gutters. Portland cement concrete per Standard Specifications for Public Works Construction Section 201-1.1.2.

2. Concrete reinforcements shall be constructed per the Project Plans and Specifications.

2.3 ACCESSORIES

A. Curing Compound shall conform to SSPWC Section 201-4. Pigmented compound shall not demonstrate any residual coloring of the concrete after one week.

2.4 CONCRETE MIX

A. Mix and deliver concrete in accordance with ASTM C94.

B. Use accelerating admixtures in cold weather only when approved by the District's Representative. Use of admixtures will not relax cold weather placement requirements.

C. Use calcium chloride only when approved by the District's Representative.

D. Use set retarding admixtures during hot weather only when approved by the District's Representative.

2.5 CONCRETE REINFORCEMENT

A. Concrete reinforcement shall conform to SSPWC Section 201-2.

2.6 SOURCE QUALITY CONTROL

A. Provide certificates of compliance from the batch plant.

PART 3 – EXECUTION

3.1 EXAMINATION

A. Verify compacted subgrade is acceptable and ready to support imposed loads.

B. Verify gradients and elevations of subgrade are correct.

3.2 PREPARATION

A. Moisten subgrade to minimize absorption of water from fresh concrete. Compact subgrade material to a depth of 12" beneath 4” of sand below concrete pavements to a minimum 92% of the maximum dry density. Refer to geotechnical report for site subgrade preparation recommendations.

B. Coat surfaces of catch basin frames with oil to prevent bond with concrete pavement.

C. Notify District’s Representative a minimum of 24 hours prior to commencement of concrete placement operations.

3.3 FORMING

A. Place and secure forms to correct location, dimension, and profile.

B. Assemble formwork to permit easy stripping and dismantling without damaging concrete.

C. Place joint filler vertical in position, in straight lines. Secure to formwork during concrete placement.

3.4 PLACING CONCRETE

A. Place concrete in accordance with SSPWC Section 303-5.

B. Install ½” thick fiberboard expansion joint and snap cap. Seal with Sikaflex self-leveling sealant after removal of snap cap (typical).

C. Construct weakened plane joints conforming to SSPWC Section 303-5.4.3, one inch deep, at intervals not exceeding 10 feet.

D. The top edges of curbs shall have 0.5" radius.

3.5 FINISHING

A. Concrete color & finishes to be per Architectural plans.

1. Concrete paving, smooth finish, natural color

2. Accent color concrete, charcoal gray – Color-Crete Charcoal CC150 or Dark Grey CC230/ Textured Finish by Increte Systems

3. Textured concrete - http://jmcontractors.com/sample-gallery/crushed-rock-collection/ - Crushed Stone Collection 12-189 by J&M Concrete

B. Concrete finishes shall be per SSPWC Section 303-5.5.

C. Portland cement concrete paving shall have a medium salted finish for slopes less than 6%, and slip-resistant at slopes of 6% or greater.

D. Walkway grades in excess of 5% shall conform to requirements of Section 1133B.7.3, California Building Code (2019 edition).

E. Place curing compound in accordance with SSPWC Section 303-5.6 on exposed concrete surfaces immediately after finishing. Apply in accordance with manufacturer's instructions.

3.6 FIELD QUALITY CONTROL

A. Inspection and testing shall be performed by the District's Testing Laboratory.

B. District 's Testing Laboratory will perform slump and compressive strength tests.

C. Contractor shall maintain records of placed concrete items. Record date, location of pour, quantity, air temperature, and test samples taken.

3.7 PROTECTION

A. Immediately after placement, protect pavement from premature drying, excessive hot or cold temperatures, vandalism and mechanical injury.

B. It is the Contractor's responsibility to replace all concrete work subject to vandalism and graffiti at no extra cost to the District.

END OF SECTION

SECTION 32 1723
PAVEMENT MARKINGS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes: Provide pavement paint marking and striping, complete.

B. Related Sections:

1. Painting of other surfaces: Section 099653, “Elastomeric Coatings.”

1.2 SUBMITTALS

A. Manufacturer's Data: Submit manufacturer's technical Product Data covering recommended preparation and application methods with paint coverage rates.

B. Submit certification of compliance with regulations required below.

1.3 WEATHER LIMITATIONS

A. Apply paint to clean, dry surfaces, and unless otherwise approved, only when air and pavement temperatures are above 40 degrees F and less than 95 degrees F. Maintain paint temperature within these same limits.

1.4 COMPLIANCE WITH REGULATIONS

A. All materials shall comply with the current rules and regulations of the local air quality management district, with the rules regarding volatile organic compounds, and with FDA rules and regulations for dangerous materials in paint.

1.5 STANDARD SPECIFICATIONS

A. Unless indicated otherwise, all work to be performed and materials to be provided in accordance with State of California Department of Transportation Standard Specifications, latest edition (Caltrans Manual).

PART 2 - PRODUCTS

2.1 TRAFFIC PAINT

A. Manufactured for pavement line markings, conforming to Fed Spec TT-P-1952B and bearing approval of SCAQMD:

1. Dunn-Edwards Stripe, Traffic marking Paint 1P-901 or Vinyl-Stripe, Vinyl Epoxy Paint, W-801

2. Sherwin-Williams Traffic Zone Paint B46 Series

3. Sinclair VX-25 Vinyl Traffic Lacquer

4. J.E. Bauer TTP-115P Type Traffic Paint

5. Or equal

PART 3 - EXECUTION

3.1 SURFACE PREPARATION

A. General: All surfaces to be marked shall be thoroughly cleaned before application of the paint. Dust, dirt, and other granular surface deposits shall be removed by sweeping, blowing with compressed air, rinsing with water or a combination of these methods as required.

B. Layout: Striping indicated on drawings is indicative of quantity and type required.

C. Existing Pavement: Rubber deposits, surface laitance, existing paint markings, and other coatings adhering to the pavement shall be completely removed with scrapers, wire brushes, sandblasting, approved chemicals, or mechanical abrasion as directed. Where oil or grease is present on old pavements to be marked, affected areas shall be scrubbed with several applications of trisodium phosphate solution or other approved detergent or degreaser, and rinsed thoroughly after each application. After cleaning, oil-soaked areas shall be sealed with cut shellac to prevent bleeding through the new paint.

3.2 APPLICATION

A. Paint shall be applied evenly to the pavement surface at manufacturer's recommended rate. Apply two coats minimum or more if required to obtain complete opacity. Dry film thickness shall be 15 mils minimum.

B. Paint shall be applied to clean, dry surfaces. Paint shall be applied pneumatically with approved equipment at rate of coverage specified herein. Provide guidelines and templates as necessary to control paint application. Special precautions shall be taken in marking numbers, letters, and symbols. Edges of markings shall be sharply outlined. Lines shall be straight, or curved as applicable, to within 1/4" in 15 feet. Greater deviations shall be removed or obliterated and lines reapplied.

1. Lines: Paint lines 4" wide unless otherwise indicated. Apply two or more coats as required to achieve complete opacity and minimum dry film thickness of 15 mils.

2. Markings: Provide directional arrows, numbering, and lettering in similar manner and with same paint, not necessarily the same color. Paint directional arrows with stencils or other approved method. Strokes of letters to be as indicated. Islands and "No Parking" areas shall have 4" strips as indicated on drawings. All markings shall be applied in compliance with Cal Trans standards unless shown otherwise on the drawings.

3. Provide approved blue colored painted handicapped parking symbols where indicated.

C. The maximum drying time requirements of the paint specifications will be strictly enforced, to prevent undue softening of bitumen, and pickup, displacement, or discoloration by tires of traffic. If there is a deficiency in drying of the markings, painting operations shall be discontinued until cause of the slow drying is determined and corrected.

D. Paint shall not be applied to concrete surfaces that have not cured for a minimum of 28 days.

E. Paint shall not be applied to hot-mix asphalt surfaces that have not cured for a minimum of 7 days.

F. All surfaces shall be dry prior to and during application markings.

3.3 COMPLETION

A. Remove paint droppings and overspray, and repair all injured or stained surfaces as directed by the Agency's Representative.

END OF SECTION

SECTION 32 3113
CHAIN LINK FENCING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes: chain link fencing improvements as shown on the Drawings including, but not necessarily limited to, the following:

1. Galvanized chain link fabric, posts, gates, and hardware.

a. Thermally fused and bonded PVC coated (“vinyl coated”) galvanized chain link fabric with painted posts, gates, hardware, and related appurtenances.

b. Chain link fence with integrally woven privacy plastic slats.

c. Concrete footings and edgebands.

2. Related Requirements:

a. Section 01 3000 – Administrative Requirements

b. Section 32 1313 – Concrete Paving

c. Section 32 3300 - Site Furnishings

d. Structural Drawings

1.2 REFERENCES (AS APPLICABLE)

A. American Society for Testing and Materials(ASTM):

1. A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.

2. A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.

3. A392 - Standard Specification for Zinc-Coated Steel Chain-Link Fence Fabric.

4. F567 - Standard Practice for Installation of Chain-Link Fence.”

5. F1043 - Standard Specification for Strength and Protective Coatings on Steel Industrial Chain Link Fence Framework.

6. F1083 - Standard Specification for Pipe, Steel, Hot-Dipped Zinc-Coated (Galvanized) Welded, for Fence Structures.

B. American Welding Society (AWS):

1. A2.4: "Symbols for Welding, Brazing and Nondestructive Examination.”

C. Chain Link Fence Manufacturers Institute (CLFMI): Product Manual CLF-PM0610.

D. Industrial Steel Guide for Fence, Rails, Posts, Gates, and Accessories.

E. State of California, Business and Transportation Agency, Department of Transportation (Caltrans) "Standard Specifications."

1.3 ADMINISTRATIVE REQUIREMENTS

A. Submittal Procedures: Action and Informational Submittals shall be submitted in accordance with Section 01 3000 – Administrative Requirements.

B. Sequence and Scheduling: Contractor shall coordinate construction timing of chain link fencing and related work with installation of concrete work specified in Section 32 1313 – Concrete Paving and all other work.

1.4 ACTION SUBMITTALS

A. Shop Drawings: To scale drawings showing all different types and sizes of gates and fencing systems.

1. Shop Drawings shall include, but may not be limited to:

a. All information regarding clearances, connections, components, and any miscellaneous related appurtenances (such as wood baseboards at backstops, locking mechanisms etc.).

b. Concrete footing and reinforcement information.

2. Indicate materials, dimensions, sizes, weights, and finishes of components. Include plans, elevations, sections and other required installation and operational clearances, connections, components, and miscellaneous related appurtenances and locking.

3. Show required field measurements and interface with work of other Sections. Provide details showing interface and anchorage of fencing and gates with adjacent construction.

4. Details showing post anchorage, attachment, and bracing. Provide setting drawings, templates, instructions, and directions for installation of anchorage devices.

5. Details of gates andhardware

6. Welds, both shop and field, shall be indicated by AWS "Symbols for Welding, Brazing and Nondestructive Examination," A2.4.

B. Product Data: Manufacturer's descriptive literature for materials and components of the chain link fencing system including coatings, fittings, and hardware.

1. Include the manufacturer's name and catalog number for each item where applicable.

2. Clearly identify which portions of the information on the printed literature are applicable if more than one product is shown.

C. Samples:

1. Chain-link fabric, approximately 12 inches square, if requested by Owner’s Representative.

2. Hardware and fittings Owner’s Representative.

3. Color selections for finishes of vinyl coated and powder coated fencing system.

4. Sample of privacy slat system.

5. Sample of Windscreen.

1.5 INFORMATIONAL SUBMITTALS

A. Installation Instructions and/or Drawings: Submit as applicable.

1.6 QUALITY ASSURANCE

A. Welding:

1. Qualifications: Certified and qualified in accordance with AWS D1.1.

2. Procedures and operations shall comply with AWS "Standard for Welding Procedure and Performance Qualifications," B2.1.

3. Comply with AWS publication "Welding Zinc Coated Steel" for galvanized products.

4. Welding inspector's qualifications shall be in accordance with AWS D1.1.

PART 2 - PRODUCTS

2.1 DESIGN AND PERFORMANCE CRITERIA

A. It is intended that all fencing, by area, receive the same finish coating wherever possible. Nuts, bolts, applicable moving portions of hinges etc. shall be painted to match with PVC touch-up paint in vinyl or powder coated systems.

B. Except as otherwise specified, comply with Chain Link Fence Manufacturers Institute (CLFMI) Product Manual.

C. Industry Standards: Materials and installation shall conform to the requirements of the Chain Link Fence Manufacturers Institute (CLFMI) "Product Manual."

D. Regulatory Requirements: Pedestrian gates and related hardware shall comply with applicable codes, including provisions for accessibility required by CBC Chapters 10 and 11B-404, Part 2; and the Americans with Disabilities Act (ADA) Standards for Accessible Design.

E. Bottom 10 inches of pedestrian gates shall have a smooth uninterrupted surface.

2.2 MATERIALS

A. Fabric: Galvanized steel wire complying with ASTM A392, Class 1, with not less than 1.2 ounce zinc coating per square foot.

1. Selvage: Knuckled finish top and bottom.

2. Steel Fabric: Comply with Chain Link Fence Manufacturers Institute (CLFMI) Product Manual. Furnish one-piece fabric widths for fencing up to 16 feet high. Wire sizes includes zinc coating.

3. Mesh Opening: 2 inches.

4. Wire Diameter: 9-gauge (0.148-inch diameter), unless noted otherwise.

5. Polymer Coating: Thermally fused and bonded polyvinyl chloride (PVC) complying with ASTM F668 Class 2b, 7mil (0.18 mm) thickness thermally fused over zinc-coated wire.

a. Color: Black and in compliance withF934.

B. Framework: Posts and rails shall be Schedule 40 pipe complying with conforming to ASTM F1083, Regular Grade, 30,000 psi Yield Strength, or ASTM F1043, Group 1-C, High Strength Grade 50,000 psi Yield Strength, galvanized with no less than 1.8 ounces of zinc coating per square foot of surface area complying with ASTM A123.

1. Strength requirements for posts and rails shall conform to ASTM F1043 or F1083 as noted below.

a. Pipe shall be straight, true to section, material, and sizes specified, and shall conform to the following weights per foot:

NPS in inches	Outside Diameter (OD) in inches	Type 1 Steel ASTM F1083 (30 KSI)	Type II Steel ASTM F1043 (50 KSI)

1	1.315	1.68	1.35
1.25	1.660	2.27	1.84

NPS in inches	Outside Diameter (OD) in inches	Type 1 Steel ASTM F1083 (30 KSI)	Type II Steel ASTM F1043 (50 KSI)
1.5	1.900	2.72	2.28
2	2.375	3.65	3.12
2.5	2.875	5.79	4.64
3	3.500	7.58	5.71
3.5	4.000	9.11	6.56
4	4.500	10.79	---
6	6.625	18.97	---
8	8.625	28.55	---

C. Fittings and Accessories:

1. Unless specified otherwise, steel fence fittings and accessories shall comply with ASTM F626 and be galvanized in accordance with ASTM A53, with zinc weights per Table 1 of ASTM A153.
2. Tension Wire: 7-gauge (0.177 inch diameter) coil spring steel with finish to match fabric.
3. Tie Wires: 9 gauge (0.148 inch diameter) steel with finish to match fabric.
4. Caps: Provide weather tight closure cap for each post and exposed ends of framing. Provide line post caps with loop to receive wire or top rail with finish to match fabric.
5. Tension Bars: Hot-dip galvanized steel with minimum length 2 inches less than full height of fabric, minimum cross-section of 3/16 inch by 3/4 inch and minimum of 1.2 ounce zinc coating per sq. ft. of surface area.
6. Tension Clips: Minimum 3/4 inch wide 12-gauge (.105 inch) thick with finish to match fabric.
7. Truss Rods: Hot dipped galvanized steel rods with a minimum diameter of 5/16 inch (7.9 mm).

D. Hardware for Swinging Gates:

1. General:
   a. Hardware shall be of adequate size and strength to provide proper operation of gates.
   b. Provide hinges, latching and locking devices, and other hardware as shown on the Drawings or required for a complete operable installation.
2. Hinges: Master Halco heavy duty, or acceptable equal.
3. Self-closing Hinges:
   a. For gates up to 330 lbs and 5-feet wide: Heavy-duty self-closing hinge with hydraulic damping, ADA compliant (requiring maximum 5 lbs of operating force per CBC 11B-309.4); Locinox Mammoth Heavy Duty “Mammoth180” or accepted equal.

b. For gates up to 440 lbs and 6 and ½ -feet wide: Heavy-duty self-closing hinge with hydraulic damping, ADA compliant (requiring maximum 5 lbs of operating force per CBC 11B-309.4); Locinox Mammoth Ultra Heavy Duty "Mammoth-HD" or accepted equal.

4. Panic Hardware:

a. Panic bar requiring maximum 5 lbs of operating force per CBC 11B-309.4; "Von Duprin 98/99 – AX series" push pads, strike plates, and receiver brackets" or accepted equal.

b. Pull Handle, Strike Plate, Guard Plate, and Mounting Plate shall be compatible with panic bar system, and be provided by Von Duprin, or accepted equal.

5. Accessible Pull Handle:

a. Operable parts shall be operable with one hand and shall not require tight grasping, pinching, or twisting of the wrist, requiring maximum 5 lbs of operating force per CBC 11B-309.4.

b. One of the following to be selected by District Representative:

1) Standard Operation: Von Duprin 996L

2) Night Latch: Von Duprin 966LNL

3) Blank Escutcheon: Von Duprin 996L-BE

4) Dummy Trim: Von Duprin 996L-DT

6. Gate Latch Hardware:

a. Gate latch hardware shall be sized to match receiving fence/gate post size.

b. Provide and attach welded accessible pull handle where specified.

1) Fulcrum gate latch, Model "#STRONG-ARM-SNG" by DAC Industries, available from Hoover Fence Co., (800) 355-2335.

2.3 ADDITIONAL MATERIALS AND COMPONENTS

A. Concrete: Minimum Class B, 28-day compressive strength of 3,000 psi as specified in Section 32 1313 – Concrete Paving.

B. Galvanizing-Repair Paint: Minimum 82 percent zinc-dust-content paint for regalvanizing welds in galvanized steel[, complying with FS DOD-P-21035a]; "Z.R.C. Cold Galvanizing Compound" by ZRC Worldwide, "Cold Galv Primer" by Valspar, or equal.

C. Wind Screen, Signage and all other Applicable Attachments:

1. Refer to Section 32 33 00, "Site Furnishings" for product information. Windscreen shall be affixed to chain- link fencing as indicated on Drawings with galvanized "hog rings" or acceptable equal. Install hog ring in each corner of windscreen and at 4 feet o.c. maximum spaced evenly along top and bottom of fence fabric. Other products shall be attached at each grommet location and per manufacturers recommendations. Grommets shall be located in thicker seamed areas. No attachment grommets in a single layer of fabric will be allowed.

2.4 FABRICATION

A. Welding: Welds shall be shop fabricated prior to galvanizing unless otherwise acceptable to Owner's Representative and were field welding is unavoidable.

B. Repair zinc coating damaged after fabrication with specified repair paint in accordance with ASTM A780, AHDGA publication, "Recommended Practice for Touch-up of Damaged Galvanized Coatings," and manufacturer's recommendations for application of repair paint.

C. Steel Framework: [System shall comply with the following minimum requirements.]

1. Posts, Rails, Braces, and Gate Frames: Type I galvanized steel pipe as specified.

2. End, Corner, and Pull Posts for the Following Fabric Heights: [As noted on the Drawings.]

a. Under 6 Feet: 2.375 inch outside diameter (2-3/8 inch outside diameter).

1) 6 Feet to 10 Feet: 2.875 inch outside diameter (2-7/8 inch outside diameter) (with privacy slats provide 4 inch outside diameter).

3. Line or Intermediate Posts for the Following Fabric Heights: [As noted on theDrawings.]

a. Under 6 Feet: 1.90 inch outside diameter (1-7/8 inch outside diameter).

1) 6 Feet to 8 Feet: 2.375 inch outside diameter (2-3/8 inch outside diameter) [with privacy slats provide 4 inch outside diameter].

b. 8 Feet to 15 Feet: 2.875 inch outside diameter (2-7/8 inch outsidediameter).

4. Top, Bottom and Horizontal Intermediate Rails: 1.66 inch outside diameter (1-5/8 inch outside diameter).

5. Gate Posts: Single gate leaf, and one leaf of a double gate installation, for nominal gate widths as follows:

a. [As noted on the Drawings.]

b. 6 Feet to 10 Feet: 3.5 inch outside diameter.

c. Under 6 Feet: 2-7/8 inch outside diameter.

6. Gate Frames: Single or double gate for nominal gate widths as follows:

a. 6 Feet to 10 Feet: 1.90 inch outside diameter (1-7/8 inch outside diameter).

b. Under 6 Feet: 1.66 inch outside diameter (1-5/8 inch outside diameter).

D. Finishing: At fencing with vinyl coated fabric, posts and railings shall be painted with exterior grade paint, System as specified in Section 09 9113 – Exterior Painting.

1. Color: To match vinyl.

PART 3 - EXECUTION

3.1 PREPARATION

A. Prior to excavation, layout all fencing locations for review and acceptance by Owner's Representative.

1. Do not begin installation and erection before final grading is completed, unless otherwise permitted.

3.2 ERECTION

A. General: Erect chain link fence and related items in accordance with ASTM F567, in strict conformance with reviewed and accepted shop drawings, and manufacturer's recommendations.

B. Set all posts straight, plumb, and true to line.

1. Set line posts at equal spacing not to exceed 10 feet on centers, in concrete footings not less than 10 inches around and 36 inches deep.

2. Set terminal posts at corners, ends, and gates, in concrete footings not less than 12 inches around and 36 inches deep.

3. Slope tops of concrete footings so as to provide drainage away from posts.

C. Excavation: Drill or hand-excavate holes for posts to diameter and spacing indicated in firm, undisturbed or compacted soil.

1. Unless noted otherwise, excavate holes for each post to minimum diameter recommended by fence manufacturer, but not less than 4 times largest cross section of post.

2. Unless noted otherwise, excavate hole depths approximately 3 inches lower than post bottom, with bottom of posts set not less than 36 inches below finish grade surface.

D. Setting Posts: Center and align posts in holes 3 inches above bottom of excavation. Space chain link posts maximum 8 feet on center unless noted otherwise. Surface mount posts with mounting plates where indicated. Fasten with lag bolts and shields.

E. Top Rails: Run rail continuously through line posts caps, bending to radius for curved runs and at other posts termination into rail end attached to posts or post caps fabricated to receive rail. Provide expansion couplings as recommended by fencing manufacturer.

F. Bottom Rails: Install bottom rails between posts with fittings and accessories as shown in Drawings, as applicable.

G. Brace Assemblies: Install braces so posts are plumb when diagonal rod is under proper tension.

H. Tension Wire: As applicable, install at bottom of fabric (and at top if top rail is not specified) as shown in Drawings. Install tension wire before stretching fabric and attach to each post with ties. Secure wire to fabric with 12.5 gauge hog rings at 24 inches on center maximum.

I. Fabric: Leave approximately 2 inches between finish grade and bottom selvages (1 inch at backstops) unless otherwise indicated. Pull fabric taut and tie to posts, rails, and tension wires. Install fabric on infield or primary use side of fence, unless noted otherwise, and anchor to framework so that fabric remains in tension after pulling force is released.

J. Tension Bars: Provide one bar for each gate and end post, and two for each corner and pull post, except where fabric integrally woven into post. Thread through fabric, and secure to end, corner, pull, and gate posts with tension clips spaced not over 15 inches on center.

K. Tie Wires: Use U-shaped wire of proper length to secure fabric firmly to posts and rails with ends twisted at least 2 full turns. Bend ends of wire to minimize hazard to persons or clothing. Tie fabric to line posts 12 inches maximum on center and to rails and braces 24 inches maximum on center.

L. Fasteners: Install nuts for tension clips and hardware bolts on side of fence opposite fabric side. Peen ends of bolts or score threads to prevent removal of nuts. Cut all bolts within three threads of nut or less.

M. Field Welding:

1. Field welds shall be completed by a Certified Structural Welder.

2. Comply with applicable AWS specification for procedures of manual shielded metal arc welding, for appearance and quality of welds, and for methods used in correctingwelding work.

3. Repair zinc coating damaged by field welding as specified for shop welding.

N. Bolts shall be cut back to within three threads of the nut.

3.3 GATE INSTALLATION

A. Install gates as shown on the Drawings in accordance with reviewed submittals.

B. Cut, drill, and fit as required for installation.

C. Set work accurately in location, alignment, and elevation; plumb, level, and true; and free of rack; measured from established lines and levels.

D. Adjust items prior to securing in place so as to ensure proper matching of components and correct alignment.

E. Field weld all gate hinges in place once gates are aligned and approved by owners representative.

3.4 ADJUSTMENT AND TOUCH-UP

A. Inspect installed work. Verify that gates, controls, and hardware operate properly. Correct deficiencies.

B. Restore products and finishes damaged during installation and construction period so that no evidence of correction work remains.

END OF SECTION

SECTION 32 3132
GATE HARDWARE

PART 1 GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

A. This Section includes gate hardware for the following:

1. Swinging gates.

B. Related Sections:

1. Section 32 3113 Chain Link Fences and Gates.

2. Section 32 3119 Ornamental Metal Fences and Gates.

C. Codes and References: Comply with the version year adopted by the Authority Having Jurisdiction.

1. ANSI A117.1 - Accessible and Usable Buildings and Facilities.

2. NFPA 70 - National Electrical Code.

3. NFPA 101 - Life Safety Code.

4. California Building Codes.

D. Standards: Hardware specified herein shall comply with the following industry standards:

1. ANSI/BHMA Certified Product Standards - A156 Series

2. UL10C – Positive Pressure Fire Tests of Door Assemblies

1.03 SUBMITTALS

A. Product Data: Manufacturer's product data sheets including installation details, material descriptions, dimensions of individual components and profiles, operational descriptions and finishes.

B. Gate Hardware Schedule: Prepared by or under the supervision of supplier, detailing fabrication and assembly of gate hardware, as well as procedures and diagrams. Coordinate the final Gate Hardware Schedule with related work to ensure proper size, hand, function, and finish of gate hardware.

1. Content: Include the following information:

a. Type, style, function, size, label, hand, and finish of each gate hardware item.

b. Manufacturer of each item.

c. Fastenings and other pertinent information.

d. Location of gate hardware set, cross-referenced to Drawings and schedule.

e. Explanation of abbreviations, symbols, and codes contained in schedule.

f. Mounting locations for gate hardware.

g. Gate sizes and materials.

h. Warranty information for each product.

C. Keying Schedule: After a keying meeting with the owner has taken place prepare a separate keying schedule detailing final instructions. Submit the keying schedule in electronic format. Include keying system explanation, door numbers, key set symbols, hardware set numbers and special instructions. Owner must approve submitted keying schedule prior to the ordering of permanent cylinders/cores.

D. Operating and Maintenance Manuals: Provide manufacturers operating and maintenance manuals for each item comprising the complete gate hardware installation in quantity as required in Division 01, Closeout Submittals.

1.04 REGULATORY REQUIREMENTS

Fences, gates and hardware:

A. Gates that are part of the accessible route shall meet all the requirements of an accessible door in compliance with CBC Section 11B-404.

B. The levers of lever actuated latches and locks for accessible gates shall be curved with a return to within 1/2" of the gate surfaces to prevent catching on clothing or persons. California Referenced Standards Code. T-24 Part 12, Section 12-10-202, Item (F).

C. Swing doors and gate surfaces within 10 inches of the finish floor or ground shall have a smooth surface on the push side extending the full width of the door or gate. Parts creating horizontal or vertical joints in these surfaces shall be within 1/16" of the same plane as the other and be free of sharp or abrasive edges. Cavities created by added kick plates shall be capped. CBC Section 11B-404.2.10.

1.05 QUALITY ASSURANCE

A. Manufacturers Qualifications: Engage qualified manufacturers with a minimum 5 years of documented experience in producing hardware and equipment similar to that indicated for this Project and that have a proven record of successful in-service performance.

B. Installer Qualifications: A minimum 3 years documented experience installing both standard and electrified gate hardware similar in material, design, and extent to that indicated for this Project and whose work has resulted in construction with a record of successful in-service performance.

C. Gate Hardware Supplier Qualifications: Experienced commercial gate hardware distributors with a minimum 5 years documented experience supplying both mechanical and electromechanical hardware installations comparable in material, design, and extent to that indicated for this Project. Supplier recognized as a factory direct distributor by the manufacturers of the primary materials with a warehousing facility in Project's vicinity. Supplier to have on staff a certified Architectural Hardware Consultant (AHC) available during the course of the Work to consult with Contractor, Architect, and Owner concerning both standard and electromechanical gate hardware and keying.

D. Source Limitations: Obtain each type and variety of gate hardware specified in this section from a single source unless otherwise indicated.

1. Electrified modifications or enhancements made to a source manufacturer's product line by a secondary or third party source will not be accepted.

E. Each unit to bear third party permanent label demonstrating compliance with the referenced standards.

F. Keying Conference: Conduct conference to comply with requirements in Division 01 Section "Project Meetings." Keying conference to incorporate the following criteria into the final keying schedule document:

1. Function of building, purpose of each area and degree of security required.
2. Plans for existing and future key system expansion.
3. Requirements for key control storage and software.
4. Installation of permanent keys, cylinder cores and software.
5. Address and requirements for delivery of keys.

G. At completion of installation, provide written documentation that components were applied to manufacturer's instructions and recommendations and according to approved schedule.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Deliver, as applicable, permanent keys, cylinders, cores, access control credentials, software and related accessories directly to Owner via registered mail or overnight package service. Instructions for delivery to the Owner shall be established at the "Keying Conference".

1.07 WARRANTY

A. Warranty Period: Written warranty, executed by manufacturer(s), agreeing to repair or replace components of standard and electrified gate hardware that fails in materials or workmanship within specified warranty period after final acceptance by the Owner. Failures include, but are not limited to, the following:

1. Structural failures including excessive deflection, cracking, or breakage.
2. Faulty operation of the hardware.
3. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
4. Electrical component defects and failures within the systems operation.

B. Standard Warranty Period: One year from date of Substantial Completion, unless otherwise indicated.

1.08 MAINTENANCE SERVICE

A. Maintenance Tools and Instructions: Furnish a complete set of specialized tools and maintenance instructions as needed for Owner's continued adjustment, maintenance, and removal and replacement of door hardware.

PART 2 PRODUCTS

2.01 SCHEDULED GATE HARDWARE

A. General: Provide gate hardware for each gate to comply with requirements in Gate Hardware Sets and each referenced section that products are to be supplied under.

B. Designations: Requirements for quantity, item, size, finish or color, grade, function, and other distinctive qualities of each type of gate hardware are indicated in the Gate Hardware Sets at the end of Part 3. Products are identified by using gate hardware designations, as follows:

1. Named Manufacturer's Products: Product designation and manufacturer are listed for each gate hardware type required for the purpose of establishing requirements. Manufacturers' names are abbreviated in the Gate Hardware Schedule.

2.02 HANGING DEVICES

A. Hinges: ANSI/BHMA A156.1 certified butt hinges with number of hinge knuckles as specified in the Door Hardware Sets.

1. Acceptable Manufacturers:

a. Assa Abbloy/Ameristar/Rixson (AA).

b. Or Equal

2.03 DOOR OPERATING TRIM

A. Flush Bolts and Surface Bolts: ANSI/BHMA A156.3 and A156.16, Grade 1, certified.

1. Flush bolts to be furnished with top rod of sufficient length to allow bolt retraction device location approximately six feet from the floor.

2. Furnish dust proof strikes for bottom bolts.

3. Surface bolts to be minimum 8" in length and U.L. listed for labeled fire doors and U.L. listed for windstorm components where applicable.

4. Provide related accessories (mounting brackets, strikes, coordinators, etc.) as required for appropriate installation and operation.

5. Acceptable Manufacturers:

a. Rockwood Products; ASSA ABLOY Architectural Door Accessories (RO).

b. Trimco (TC).

B. Coordinators: ANSI/BHMA A156.3 certified door coordinators consisting of active-leaf, hold-open lever and inactive-leaf release trigger. Model as indicated in hardware sets.

1. Acceptable Manufacturers:

a. Door Controls International (DC).

b. Rockwood Products; ASSA ABLOY Architectural Door Accessories (RO).

C. Door Push Plates and Pulls: ANSI/BHMA A156.6 certified door pushes and pulls of type and design specified in the Hardware Sets. Coordinate and provide proper width and height as required where conflicting hardware dictates.

1. Fasteners: Provide manufacturer's designated fastener type as indicated in Hardware Sets.

2. Acceptable Manufacturers:

a. Rockwood Products; ASSA ABLOY Architectural Door Accessories (RO).

b. Trimco (TC).

2.04 CYLINDERS AND KEYING

A. General: Cylinder manufacturer to have minimum (10) years experience designing secured master key systems and have on record a published security keying system policy.

B. Cylinders: Original manufacturer cylinders complying with the following:

1. Mortise Type: Threaded cylinders with rings and cams to suit hardware application.

2. Rim Type: Cylinders with back plate, flat-type vertical or horizontal tailpiece, and raised trim ring.

3. Bored-Lock Type: Cylinders with tailpieces to suit locks.

4. Mortise and rim cylinder collars to be solid and recessed to allow the cylinder face to be flush and be free spinning with matching finishes.

5. Keyway: Match Facility Standard.

C. Permanent Cores: Manufacturer's standard; finish face to match lockset; complying with the following:

1. Interchangeable Cores: Core insert, removable by use of a special key; usable with other manufacturers' cylinders.

D. Keying System: Each type of lock and cylinders to be factory keyed.

1. Conduct specified "Keying Conference" to define and document keying system instructions and requirements.

2. Furnish factory cut, nickel-silver large bow permanently inscribed with a visual key control number as directed by Owner.

3. Existing System: Key locks to Owner's existing system.

E. Key Quantity: Provide the following minimum number of keys:

1. Change Keys per Cylinder: Two (2)

2. Master Keys (per Master Key Level/Group): Five (5).

3. Construction Keys (where required): Ten (10).

F. Construction Keying: Provide construction master keyed cylinders.

G. Key Registration List (Bitting List):

1. Provide keying transcript list to Owner's representative in the proper format for importing into key control software.

2. Provide transcript list in writing or electronic file as directed by the Owner.

2.05 MECHANICAL LOCKS AND LATCHING DEVICES

A. Mortise Locksets, Grade 1 (Heavy Duty): ANSI/BHMA A156.13, Series 1000, Operational Grade 1 certified. Locksets are to be manufactured with a corrosion resistant steel case and be field-reversible for handing without disassembly of the lock body.

1. Acceptable Manufacturers:

a. Corbin Russwin Hardware (RU) – ML2000 Series.

b. Sargent Manufacturing (SA) – 8200 Series.

c. Yale Locks and Hardware (YA) – 8800FL Series.

2.06 LOCK AND LATCH STRIKES

A. Strikes: Provide manufacturer's standard strike with strike box for each latch or lock bolt, with curved lip extended to protect frame, finished to match door hardware set, unless otherwise indicated, and as follows:

1. Flat-Lip Strikes: For locks with three-piece antifriction latchbolts, as recommended by manufacturer.

2. Extra-Long-Lip Strikes: For locks used on frames with applied wood casing trim.

3. Aluminum-Frame Strike Box: Provide manufacturer's special strike box fabricated for aluminum framing.

4. Double-lipped strikes: For locks at double acting doors. Furnish with retractable stop for rescue hardware applications.

B. Standards: Comply with the following:

1. Strikes for Mortise Locks and Latches: BHMA A156.13.

2. Strikes for Bored Locks and Latches: BHMA A156.2.

3. Strikes for Auxiliary Deadlocks: BHMA A156.36.

4. Dustproof Strikes: BHMA A156.16.

2.07 CONVENTIONAL EXIT DEVICES

A. General Requirements: All exit devices specified herein shall meet or exceed the following criteria:

1. At doors not requiring a fire rating, provide devices complying with NFPA 101 and listed and labeled for "Panic Hardware" according to UL305. Provide proper fasteners as required by manufacturer including sex nuts and bolts at openings specified in the Hardware Sets.

2. Where exit devices are required on fire rated doors, provide devices complying with NFPA 80 and with UL labeling indicating "Fire Exit Hardware". Provide devices with the proper fasteners for installation as tested and listed by UL. Consult manufacturer's catalog and template book for specific requirements.

3. Except on fire rated doors, provide exit devices with hex key dogging device to hold the pushbar and latch in a retracted position. Provide optional keyed cylinder dogging on devices where specified in Hardware Sets.

4. Devices must fit flat against the door face with no gap that permits unauthorized dogging of the push bar. The addition of filler strips is required in any case where the door light extends behind the device as in a full glass configuration.

5. Lever Operating Trim: Where exit devices require lever trim, furnish manufacturer's heavy duty escutcheon trim with threaded studs for thru-bolts.

a. Lock Trim Design: As indicated in Hardware Sets, provide finishes and designs to match that of the specified locksets.

b. Where function of exit device requires a cylinder, provide a cylinder (Rim or Mortise) as specified in Hardware Sets.

6. Vertical Rod Exit Devices: Where surface or concealed vertical rod exit devices are used at interior openings, provide as less bottom rod (LBR) unless otherwise indicated. Provide dust proof strikes where thermal pins are required to project into the floor.

7. Narrow Stile Applications: At doors constructed with narrow stiles, or as specified in Hardware Sets, provide devices designed for maximum 2" wide stiles.

8. Dummy Push Bar: Nonfunctioning push bar matching functional push bar.

9. Rail Sizing: Provide exit device rails factory sized for proper door width application.

10. Through Bolt Installation: For exit devices and trim as indicated in Door Hardware Sets.

B. Conventional Push Rail Exit Devices (Heavy Duty): ANSI/BHMA A156.3, Grade 1 certified panic and fire exit hardware devices furnished in the functions specified in the Hardware Sets. Exit device latch to be stainless steel, pullman type, with deadlock feature.

1. Acceptable Manufacturers:

a. Corbin Russwin Hardware (RU) - ED4000 / ED5000 Series.

b. Detex (DE) - Advantex Series

2.08 GATE CLOSERS

A. All door closers specified herein shall meet or exceed the following criteria:

1. General: Door closers to be from one manufacturer, matching in design and style, with the same type door preparations and templates regardless of application or spring size. Closers to be non-handed with full sized covers including installation and adjusting information on inside of cover.

2. Cycle Testing: Provide closers which have surpassed 15 million cycles in a test witnessed and verified by UL.

3. Size of Units: Comply with manufacturer's written recommendations for sizing of gate closers depending on size of gate, exposure to weather, and anticipated frequency of use. Where closers are indicated for gates required to be accessible to the physically handicapped, provide units complying with ANSI ICC/A117.1.

4. Closer Accessories: Provide gate closer accessories including custom templates, special mounting brackets, spacers and drop plates as required for proper installation.

B. Door Closers, Surface Mounted (Heavy Duty): ANSI/BHMA A156.4, Grade 1 surface mounted, heavy duty door closers with complete spring power adjustment, sizes 1 thru 6; and fully operational adjustable according to door size, frequency of use, and opening force. Closers to be rack and pinion type, one piece cast iron or aluminum alloy body construction, with adjustable backcheck and separate non-critical valves for closing sweep and latch speed control. Provide non-handed units standard.

1. Acceptable Manufacturers:

a. Corbin Russwin Hardware (RU) – DC6000 Series.

b. Norton Door Controls (NO) - 7500 Series.

2.09 FINISHES

A. Standard: Designations used in the Hardware Sets and elsewhere indicate hardware finishes complying with ANSI/BHMA A156.18, including coordination with traditional U.S. finishes indicated by certain manufacturers for their products.

B. Provide quality of finish, including thickness of plating or coating (if any), composition, hardness, and other qualities complying with manufacturer's standards, but in no case less than specified by referenced standards for the applicable units of hardware

C. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

PART 3 EXECUTION

3.01 EXAMINATION

A. Notify architect of any discrepancies or conflicts between the gate schedule, types, drawings and scheduled hardware. Proceed only after such discrepancies or conflicts have been resolved in writing.

3.02 INSTALLATION

A. Install each item of mechanical and electromechanical hardware and access control equipment to comply with manufacturer's written instructions and according to specifications.

1. Installers are to be trained and certified by the manufacturer on the proper installation and adjustment of fire, life safety, and security products including: hanging devices; locking devices; closing devices; and seals.

B. Mounting Heights: Mount gate hardware units at heights indicated in following applicable publications, unless specifically indicated or required to comply with governing regulations:

1. Where indicated to comply with accessibility requirements, comply with ANSI A117.1 "Accessibility Guidelines for Buildings and Facilities."

3.03 FIELD QUALITY CONTROL

A. Field Inspection: Supplier will perform a final inspection of installed gate hardware and state in report whether work complies with or deviates from requirements, including whether gate hardware is properly installed, operating and adjusted.

3.04 ADJUSTING

A. Initial Adjustment: Adjust and check each operating item of gate hardware and each gate to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate as intended. Adjust gate control devices to comply with referenced accessibility requirements.

3.05 CLEANING AND PROTECTION

A. Clean adjacent surfaces soiled by gate hardware installation.

B. Clean operating items as necessary to restore proper finish. Provide final protection and maintain conditions that ensure door hardware is without damage or deterioration at time of owner occupancy.

3.06 DEMONSTRATION

A. Instruct Owner's maintenance personnel to adjust, operate, and maintain mechanical and electromechanical gate hardware.

3.07 GATE HARDWARE SETS

Hardware Sets

Set: 1A

Doors: GATE 1

1 Rim Exit Device	AX PA 99NL 693
1 WIRELESS LEVER TRIM	ETPDNS1G V99 26D
1 Cylinder	20-001-114
1 GATE HINGE/CLOSER	HINGE BY GATE MANUFACTURER
1 Vandal Resistant Trim	VRT26
1 Gate Box	K BX4152

Set: 1B

Doors: GATE 6

1 WIRELESS LEVER TRIM	PDL6300 26D
1 GATE HINGE/CLOSER	HINGE BY GATE MANUFACTURER

1 Vandal Resistant Trim	VRT26

Set: 1C

Doors: GATE 7

1 Night Latch	Von Duprin 996L-NL
1 Standard Operation	Von Duprin 996L
1 Cylinder	20-001-114
1 GATE HINGE/CLOSER	HINGE BY GATE MANUFACTURER
1 Vandal Resistant Trim	VRT26

SECTION 32 3600
LANDSCAPE DECORATIVE METAL

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. The following exterior ornamental metal work:

a. Guardrails and handrails including:

1) Site guardrails, vehicular barriers, and railings.

b. Fences and gates including:

1) Custom decorative ironwork fence components and gates.

2) Rolling and swing entry gates.

3) Manually operated swing gates.

4) Perimeter fencing.

c. Storage units.

2. Finish hardware for gates.

3. Shop applied coatings for decorative metal items.

B. Related Requirements:

1. Concrete Paving: Section 32 1313; foundations for decorative metal items.

2. Chain Link Fencing: Section 32 3113.

1.2 REFERENCES

A. American Institute of Steel Construction (AISC):

1. "Specifications for the Design, Fabrication, and Erection of Structural Steel for Buildings," including "Commentary on the AISC Specification."

B. American Society for Testing and Materials (ASTM):

1. A36/A36M: "Specification for Carbon Structural Steel."

2. A47/A47M-: "Specification for Ferritic Malleable Iron Castings."

3. A48/A48M: "Specification for Gray Iron Castings."

4. A53/A53M: "Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless."

5. A167: "Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate Sheet and Strip."

6. A176: "Specification for Stainless and Heat-Resisting Chromium Steel Plate, Sheet and Strip."

7. A240/A240M: “Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications.”

8. A276: "Specification for Stainless Steel Bars and Shapes."

9. A307: "Specification for Carbon Steel Bolts and Studs, 60,000 psi Tensile Strength."
10. A492: "Specification for Stainless and Heat-Resisting Steel Rope Wire."
11. A500/A500M: "Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes."
12. B26/B26M: “Standard Specification for Aluminum-Alloy Sand Castings.”
13. B247: “Standard Specification for Aluminum and Aluminum-Alloy Die Forgings, Hand Forgings, and Rolled Ring Forgings.”
14. C864: "Standard Specification for Dense Elastomeric Compression Seal Gaskets, Setting Blocks, and Spacers."
15. A1008/A1008M-09: “Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Solution Hardened, and Bake Hardenable.”
16. C1107/C1107M: "Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink)."
17. D6386-10: “Standard Practice for Preparation of Zinc (Hot-Dip Galvanized) Coated Iron and Steel Product and Hardware Surfaces for Painting.”
18. D7396-08: “Standard Guide for Preparation of New, Continuous Zinc-Coated (Galvanized) Steel Surfaces for Painting.”
19. E350-95(2005)e1: “Standard Test Methods for Chemical Analysis of Carbon Steel, Low-Alloy Steel, Silicon Electrical Steel, Ingot Iron, and Wrought Iron.”

C. American Architectural Manufacturers Associates (AAMA):
1. CW-12: Structural Properties of Glass.”
2. 2605: “Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing
3. Organic Coatings on Aluminum Extrusions and Panels.”

D. American National Standards Institute (ANSI) /American Welding Society (AWS):
1. ANSI/AWS D1.1/D1.1M: "Structural Welding Code."
2. ANSI/AWS D1.3/D1.3M: "Structural Welding Code - Sheet Steel."

E. Industrial Perforators Association (IPA):
1. “Designers, Specifiers and Buyers Handbook for Perforated Metals”

F. National Association of Architectural Metal Manufacturers (NAAMM)
1. Architectural Metal Products Division (AMP): AMP 500-06, “Metal Finishes Manual for Architectural and
2. Metal Products.”

G. SSPC: The Society for Protective Coatings (SSPC) "Painting Manual":
1. Surface Preparation Specifications:
   a. SSPC-SP 3: "Power Tool Cleaning."
   b. SSPC-SP 6: "Commercial Blast Cleaning."

1.3 ADMINISTRATIVE REQUIREMENTS

A. Submittal Procedures: Action and Informational Submittals shall be submitted in accordance with Section 01 3000 – Administrative Requirements.

B. Coordination:

1. Coordinate installation of anchorages. Furnish setting drawings, diagrams, templates, and directions for installing anchorages, including sleeves, inserts, anchor bolts, and items with integral anchors, to be embedded in concrete and masonry.

2. Coordinate with other Sections to ensure proper drainage and watertight interface with adjacent construction.

3. Coordinate sequence of installation with Sections whose work adjoins decorative metalwork.

1.4 DESIGN AND PERFORMANCE REQUIREMENTS

A. Industry Standards:

1. General: Decorative metal shall conform to the recommended practices of the Architectural Products Division (AMP) of the National Association of Architectural Metal Manufacturers (NAAMM), Section 10 of the AISC Code of Standard Practice, and the additional requirements of this Section.

2. Railings and guardrails shall comply with the "Metal Rail Manual" of National Ornamental and Miscellaneous Metals Association (NOMMA).

B. If modifications to designs indicated are proposed in order to meet code requirements, indicate them as such on shop drawing submittals. Work with Architect to arrive at an acceptable design that is sufficiently similar to the design indicated.

C. Design exterior decorative metal items to drain properly, to be watertight where appropriate, and for watertight connection to adjacent construction.

D. Structural Performance of Railing Assemblies, Handrails, and Guardrails:

1. General:

a. Stainless Steel: In engineering stainless steel railings to withstand structural loads indicated, determine allowable design working stresses of railing materials based on 60 percent of minimum yield strength.

b. Glass: 25 percent of mean modulus of rupture (50 percent probability of breakage), as listed in "Mechanical Properties" in AAMA's Aluminum Curtain Wall Series CW-12, "Structural Properties of Glass."

2. Handrails and Top Rails of Guardrails:

a. Uniform load of 50 lbf/ft applied in any direction.

b. Concentrated load of 200 lbf applied in any direction.

c. Uniform and concentrated loads need not be assumed to act concurrently.

3. Infill of Guardrails:

a. Concentrated load of 50 lbf applied horizontally on an area of 1 square foot.

b. Infill load and other loads need not be assumed to act concurrently.

E. Regulatory Requirements:

1. Comply with the Americans with Disabilities Act (ADA) Design Guidelines.

2. Comply with the CBC and other applicable State and local codes and regulations.

F. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes acting on exterior metal fabrications by preventing buckling, opening of joints, overstressing of components, failure of connections, and other detrimental effects.

G. Control of Corrosion: Prevent galvanic action and other forms of corrosion by insulating metals and other materials from direct contact with incompatible materials.

1.5 ACTION SUBMITTALS

A. Shop Drawings:

1. Prepare and submit large-scale drawings for fabrication and erection of assemblies not completely shown by manufacturer's product data.

a. Shop drawings are specifically required for the new areas of ornamental fence.

b. Include, as appropriate, plans, elevations, complete details, thicknesses, sizes, types, grades, classes of metal, connecting and joining methods, anchorages.

c. Show required field measurements and interface with work of other Sections.

d. Welds, both shop and field, shall be indicated by AWS "Symbols for Welding, Brazing and Nondestructive Examination," A2.4.

e. Indicate all required field measurements.

2. Provide setting drawings, templates, instructions, and directions for installation of base plates and anchorage devices.

3. Coordinate with shop drawing requirements of other Sections whose work adjoins exterior decorative metalwork.

B. Product Data: Manufacturer's specifications and installation instructions for manufactured products to be used in the fabrication of work, including gate operators, manufactured railings, shop-applied paint products, and hardware.

C. Samples:

1. Exposed metals in selected finishes, 12 inches or 12 inches long as applicable.

2. Each type of exposed fastener or hardware.

3. Samples of products involving selection of color, texture, or design including mechanical finishes.

4. For custom castings, submit finished samples showing ability to reproduce detail, cast-metal color, and quality of finish. Samples may be of similar previous work.

5. Additional samples as requested by the Owner’s Representative.

1.6 INFORMATIONAL SUBMITTALS

A. Qualifications as specified.

B. Welding:

1. Statement of qualifications for fabricator, installer, and welders.

2. Completed “Procedure Qualification Record” (PQR) and “Welding Procedures Specification” (WPS) forms for the welds to be performed under this Section.

C. Delegated-Design: Prepare and submit shop drawings railings, guardrails, and fencing to verify compliance with contract documents.

1. Indicate dimensions, profiles and framing member sizes, anchorage, size and type of fasteners.

2. Although all calculations shall be submitted, review of calculations by Owner's Representative will not relieve Contractor of any responsibilities for providing systems of required strength.

D. Galvanizing: Proposed methods of cleaning and profiling surfaces. Include methods for each decorative item.

1.7 QUALITY ASSURANCE

A. Fabricator/Installer Qualifications: Documented experience in fabrication and installation of decorative metal similar to that indicated for this Project, and with a record of successful in-service performance.

B. Powder Coating Applicator Qualifications: A firm experienced in successfully applying coatings of type indicated and employing competent control personnel to conduct continuing, effective quality-control program to ensure compliance with requirements.

C. Welder Qualifications: Certified and qualified in accordance with procedures specified in American Welding Society Standard in accordance with AWS D1.1, using procedures, materials, and equipment of the type required for the work.

D. Welding procedures and operations shall comply with AWS B2.1, "Standard for Welding Procedure and Performance Qualifications." Comply with AWS publication "Welding Zinc Coated Steel" for galvanized products.

E. Mockups: As requested by Owner's Representative Owner's Representative.

1. Provide a full-size mockup of each type or installation condition of the following items for review and approval by Owner's Representative:

a. Handrails: Assembled section of central and end post to include 12 inches of top rail and 12 inches of post.

b. Guardrails: One complete section, post to post.

c. Gates.

d. Fencing.

2. Include all required anchorages and fasteners.

3. Mockups shall not be fabricated until submittals, including metal samples, have been submitted and approved.

4. Each mockup shall consist of a typical assembly in specified finish, complete with mounting devices.

5. Specified sizes shall be increased if necessary to demonstrate workmanship, welding, and visual effect of completed assembly.

6. If requested by Owner's Representative, make modifications to mockups without additional charge to Owner.

7. If approved by Owner's Representative, install or leave mockup on Project as directed.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Store decorative metal in a protected location on site until ready for installation. Protect from uncured concrete and from soiling and abrasion.

1.9 FIELD CONDITIONS

A. Where decorative metal is indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication and indicate measurements on shop drawings.

PART 2 - PRODUCTS

2.1 METAL MATERIALS

A. General: Provide metals free from surface blemishes where exposed to view in finished unit. Exposed-to-view surfaces exhibiting pitting, seam marks, roller marks, stains, discolorations, or other imperfections on finished units are not acceptable.

B. Steel: Provide in form indicated, to comply with the following requirements:

1. Plate, Shapes, and Bars: ASTM A36.

2. Sheet: Commercial-quality, cold-rolled, stretcher-leveled, carbon-steel sheet complying with ASTM A1008, Class I, matte finish.

3. Tubing: Cold formed, ASTM A500.

4. Pipe: ASTM A53, Grade B [A], Schedule 40.

5. Gray-Iron Castings: ASTM A48, Class 30.

6. Malleable-Iron Castings: ASTM A47, grade as recommended by fabricator for type of use indicated.

7. Wrought Iron: Low carbon alloy (less than 0.035 percent), malleable iron with good tensile strength and suitable for shaping and hammering as required by fabricator for use indicated.

C. Weathering Steel: ASTM A588; USS “Cor-Ten” or equal.

D. Stainless Steel:

1. Alloy: Type 316, unless otherwise indicated or specified.

2. Sheet and Plate: ASTM A167 or A240.

3. Bars: ASTM A276.

4. Tubing for Railings and Guardrails: ASTM A554.

5. Finish: American Iron and Steel Institute (AISI) No. 4, satin directional brushed, unless otherwise noted.

E. Galvanized-Steel Sheet: Commercial Quality, ASTM A653.

1. Coating Designation: G90.

2. Thickness: As required by SMACNA for specific conditions and as indicated.

F. Aluminum:

1. Sheet: ASTM B209.

2. Pipe: Schedule 40.

3. Extrusions: ASTM B221, alloy 6063-T5. Provide high-strength 7000 Series alloy at locations required to meet specified performance criteria and where noted.

4. Die and Hand Forgings: ASTM B247/B247M, Alloy 6061-T6.

5. Castings: ASTM B26/B26M, Alloy A356.0-T6.

6. Finish: As scheduled and noted.

G. Bronze:

1. Extrusions: ASTM B455, Copper Development Association (CDA) Alloy 385 (Architectural Bronze).

2. Solid Fittings: Color matching casting alloy; CDA Alloy 865 meeting ASTM B584 for sand castings.

3. Sheet and Plate: As selected by fabricator; alloys suitable for fabrication and use of each item and for finish and appearance match.

4. Finish: Statuary conversion coating over satin finish, M31-C55, unless otherwise required to match Owner's

5. Representatives' control sample.

2.2 GATE HARDWARE

A. Swing Gates:

1. General:

a. Hardware shall be of adequate size and strength to provide proper operation of gates.

b. Provide hinges, latching and locking devices, and other hardware as shown on the Drawings or required for a complete operable installation.

2. Hinges: Master Halco heavy duty, or acceptable equal.

3. Self-closing Hinges:

a. For gates up to 330 lbs and 5-feet wide: Heavy-duty self-closing hinge with hydraulic damping, ADA compliant (requiring maximum 5 lbs of operating force per CBC 11B-309.4); Locinox Mammoth Heavy Duty "Mammoth180" or accepted equal.

b. For gates up to 440 lbs and 6 and ½ -feet wide: Heavy-duty self-closing hinge with hydraulic damping, ADA compliant (requiring maximum 5 lbs of operating force per CBC 11B-309.4); Locinox Mammoth Ultra Heavy Duty "Mammoth-HD" or accepted equal.

4. Panic Hardware:

a. Panic bar requiring maximum 5 lbs of operating force per CBC 11B-309.4; "Von Duprin 98/99 – AX

b. series" push pads, strike plates, and receiver brackets" or accepted equal.

c. Pull Handle, Strike Plate, Guard Plate, and Mounting Plate shall be compatible with panic bar system, and be provided by Von Duprin, or accepted equal.

5. Accessible Pull Handle:

a. Operable parts shall be operable with one hand and shall not require tight grasping, pinching, or twisting of the wrist, requiring maximum 5 lbs of operating force per CBC 11B-309.4.

b. One of the following to be selected by District Representative:

1) [Standard Operation: Von Duprin 996L]

2) [Night Latch: Von Duprin 996LNL]

3) [Blank Escutcheon: Von Duprin 996L-BE]

4) [Dummy Trim: Von Duprin 996L-DT]

2.3 ADDITIONAL MATERIALS AND COMPONENTS

A. Mesh Infill: To be selected by Owner's Representative.

B. Fasteners: As shown and as selected by fabricator. Indicate exposed fasteners on shop drawings.

1. Use fasteners of same basic metal as fastened metal, except as otherwise indicated or specified.

2. Do not use metals that are corrosive or incompatible with materials joined.

C. Nonshrink, Nonmetallic Grout: Premixed, factory-packaged, non-staining, noncorrosive, nongaseous; Sonneborn

D. "Sonogrout 10K" or equal complying with ASTM C1107.

E. Skateboard Fins: Eco-Friendly Laser series "Childress," by Skate Stoppers, Intellicept, CA, 609-447-6374, or equal.

1. Dimensions: 1 inch wide by 6 inches long, 1/8-inch radius.

2. Material: Recycled white tombasil.

3. Finish: Brush finish with clear coat seal.

4. Anchors: Two each, blind mount "Smart Pins Plus" anchor pins set with two-part epoxy as described in

5. manufacturer's written instructions.

F. Steel Edging: "Duraedge"; by J D Russell Company, Tucson, AZ. 800-888-7425, or equal.

1. Dimensions: 1/4 inch high by 5 inches high by 16 feet long.

2. Finish: None.

3. Corners shall be 90 degrees in accordance with manufacturer's instructions.

4. Modifications: As shown on the Drawings.

G. Manufactured Picket Fence: "Estate A" by Monumental Iron Works or equal.

1. Pickets: 3/4 x 3/4 inch, 16 gauge, with pointed picket tops, spaced as shown.

2. Horizontal Rails: 1-1/2 x 1-1/2 inch, 14-gage tube steel.

3. Posts: 2 x 2 inches, 11-gage tube steel, located as shown.

4. Factory Finish: Black powder coat.

5. Coordinate with Section 08 71 00, "Door Hardware," for operating hardware and for proper fit and operation of gate.

2.4 FABRICATION - GENERAL

A. Comply with AWS for recommended practices in shop welding and brazing.

B. Mill joints to a tight, hairline fit. Cope or miter corner joints. Form joints exposed to weather to exclude water penetration.

C. Mechanical field connections for railings, gates, and fencing shall be with countersunk screws, sleeves, or routed lapped members. Applied clips, angles, and non-flush fasteners are not acceptable.

D. Provide weep holes where water may accumulate. Locate weep holes in inconspicuous locations.

E. Finish exposed surfaces to smooth, sharp, well-defined lines and arris.

F. Welding and Brazing: Comply with AWS-recommended practices.

1. Exposed welds shall be continuous.

2. Welds, burrs, roller marks, seams, and rough surfaces shall be ground neat and smooth. Mill markings shall be completely removed.

3. Gouges, dents, and other surface abuse shall be filled and ground smooth.

4. Weld and braze behind finished surfaces without distorting or discoloring exposed side.

5. Remove flux from exposed welded and brazed joints. Dress exposed and contact surfaces.

2.5 GALVANIZING

A. Provide zinc coating for ferrous steel by the hot-dip process after fabrication.

1. Comply with ASTM A153 for galvanizing of iron and steel hardware.

2. Comply with ASTM A123 for galvanizing of assembled steel products and rolled, pressed, and forged-steel shapes, plates, bars, and strips 1/8 inch thick and heavier.

B. Minimum Cleaning Requirements Prior to Galvanizing: In accordance with SSPC Specification SP-10, "Near White Blast Cleaning."

C. Newly galvanized items shall not be water quenched or chromate quenched after galvanizing.

2.6 PROTECTIVE PAINT COATINGS

A. General:

1. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

2. Corrosion Control: Prevent galvanic action and other forms of corrosion by insulating metals from direct contact with incompatible materials.

3. Decorative metals shall be spray finished in shop to the greatest extent possible. Where not shop finished, field finish painting shall conform to requirements of Section 09 90 00, “Painting and Coating.”

4. Finish exposed fasteners to match adjacent metal.

B. Products:

1. Shop Primers and Finish Paints: As specified under each coating system.

2. Galvanizing-Repair Paint: Minimum 82 percent zinc-dust-content paint for regalvanizing welds in galvanized steel, complying with FS DOD-P-21035a; Z.R.C. Cold Galvanizing Compound by ZRC Worldwide, International Protective Coatings, or approved equal.

C. Galvanized Surfaces:

1. Surfaces shall be cleaned and profiled prior to receiving applied coatings.

a. Methods shall be selected based on age of galvanized coating, condition of surface and intended paint coating.

b. High spots and rough edges shall be smoothed out.

c. Care shall be taken not to damage the zinc coating.

2. Repair galvanized coating damaged after fabrication during handling, installation, or welding. Use specified repair paint in accordance with ASTM A780, AGA publication, "Recommended Practice for Touch-up of Damaged Galvanized Coatings," and manufacturer’s recommendations for application of repair paint.

3. Comply with the additional recommendations included in the AGA document “Duplex Systems: Painting Over Hot Dip Galvanized Steel,” and ASTM D6386.

D. Shop-prime work to the greatest extent possible, except surfaces and edges to be field welded.

E. High-Performance Powder Coating on Galvanized Steel: Shop spray-applied Commercial grade polyester resin-based thermosetting powder coat; Series 28 High Performance Architectural Coating by Tiger Drylac, or equal.

1. Prepare, treat, and coat galvanized metal to comply with resin manufacturer's written instructions and as follows:

a. Treat prepared metal with zinc-phosphate pretreatment, rinse, and seal surfaces.

b. Apply thermosetting polyester powder coating with cured-film thickness not less than 1.5 mils per coat.

c. Number of Coats: Two, to achieve a total DFT of 3.5 to 5.0 mils on edges and corners.

2. Color: Solid, standard or custom, as selected by Owner’s Representative.

3. Gloss: As scheduled or selected by Owner’s Representative.

F. Field-Applied Finish Coatings: As specified in Section 09 91 15 – Exterior Site Painting.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install metal work as shown on the Drawings in accordance with reviewed submittals.

B. Perform cutting, drilling, and fitting required for installation.

C. Set work accurately in location, alignment, and elevation; plumb, level, true, and free of rack; measured from established lines and levels.

D. Field Welding: Comply with applicable AWS specification for procedures of manual shielded metal arc welding, for appearance and quality of welds, and for methods used in correcting welding work. Grind exposed welded joints smooth.

E. Erection Tolerances:

1. Maximum Variation from Plumb: 1/4 inch.

2. Maximum Misalignment from True Position: 1/4 inch.

F. Repair galvanizing and shop-applied coatings to match finish of adjacent surfaces.

END OF SECTION

SECTION 32 8410
IRRIGATION SYSTEM

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Includes all labor, materials, equipment, and operations required to complete the Irrigation System in accordance with the SSPWC latest edition, and the applicable Drawings.

1.2 RELATED SECTIONS

A. Section 32 0190 – Landscape Maintenance

B. Section 32 9000 – Landscape Planting

1.3 REQUIREMENTS OF REGULATORY AGENCIES

A. Secure all permits and licenses necessary for the work. Give all notices and comply with all laws, ordinances, rules, and regulations concerning the installation of the sprinkler system as drawn and specified.

1.4 SITE CONDITIONS

A. Prior to beginning any work, the Contractor and the District Representative shall participate in a thorough irrigation system review of the project site. All remote-control valves shall be turned on and observed in operation by both the Contractor and District Representative. Any existing defects will be listed in detail identifying the specific valve station number and describing the exact broken or non-functioning irrigation component noted during the site review. At the conclusion of the irrigation review, the Contractor shall generate a summary of the items identified by both parties listing all remote-control valves operated, identifying if the valve performed without any defects or specifically identifying any observed defects or non-functioning components, such as broken heads, clogged nozzles, nonoperating valve solenoids, broken piping, or other noted defects. The completed summary of items noted shall be listed on a document called 'Existing Irrigation System Observations.' This document shall be signed by the Contractor and submitted to the District Representative for a confirming signature. The mutually signed 'Existing Irrigation System Observations' document shall be sent to the attention of the Landscape Architect for inspection purposes at the conclusion of the construction work. If requested by the District Representative, the Contractor shall provide a list of the existing defective irrigation components noted with a detailed written proposal to repair each item identified on the list. A copy of this proposal will be sent to the Landscape Architect. This additional work proposal must be reviewed and approved in writing by the District and formally presented to the General Contractor before the Landscape Subcontractor can begin any additional repair work. The mutually signed 'Existing Irrigation System Observation' document shall be used as a guide to identify any collateral damage caused to the existing irrigation system because of new construction performed on site by the Contractors. Any damage caused to the existing irrigation system not specifically identified on the 'Existing Irrigation System Observation' document shall be repaired or replaced at the Contractor's expense. If the Contractor does not participate or perform the existing irrigation site review, any existing irrigation equipment or components damaged on the project site noted by the Landscape Architect during the final irrigation system review shall be repaired or replaced by the Contractor at their expense to the satisfaction of the District.

B. Do not willfully install the sprinkler system as indicated on the drawing when it is obvious in the field that unknown obstructions or grade differences exist that might not have been considered in the engineering. Such obstructions or differences should be brought to the attention of the District Engineer.

C. Before excavating for sprinkler lines, locate all underground utility lines so that the proper precautions may be taken to avoid damage to such utilities. In the event of a conflict between underground lines, promptly notify the District Engineer who will arrange for the relocation of one or the other. Failure to follow this procedure places the responsibility upon the Contractor for making all repairs for damage of any kind at his own expense.

D. Provide necessary safeguards and exercise caution against injury or defacement of any existing site improvements. Contractor shall be responsible for any damage resulting from his operations and shall repair or replace such damage at his own expenses. No trucks or vehicles of any kind shall be allowed to pass over sidewalks, curbs, etc., unless adequate protection is provided.

E. Existing Trees

1. Exercise all possible care and precautions to avoid injury to tree roots, trunks, and branches. All excavating within drip line of trees shall be done very carefully and by hand pick and shovel if it appears that large roots are within trenching zones.

2. Alter alignment of pipe to avoid large tree roots, 2-inch and larger in diameter.

3. Wrap exposed and bridging tree roots with several layers of burlap and keep moist. Close all trenches within drip lines, within 24 hours.

4. All severed roots 1-inch and larger shall be hand pruned with sharp tools and painted with acceptable horticultural seal.

1.5 MATERIAL LIST

A. Submit to the District for acceptance, five (5) copies of all materials and equipment, including Manufacturer's names and catalog numbers, to be furnished and installed under this contract within 10 days after the award of the contract.

1.6 RECORD DRAWINGS

A. Provide and record daily a complete record set of prints on bond which shall be corrected to show changes from the original drawings and specifications and the exact installed locations, sizes, and kinds of equipment. Prints for this purpose may be obtained from the District. Keep this set of drawings on the site and use only as a record set.

B. Use these drawings as work progress sheets. Make neat and legible annotations thereon as the work proceeds, showing the work as actually installed. Keep these drawings available at all times for inspection and in a location designated by the District.

C. Before the date of the final inspection, transfer all information from the record prints to a clean set of prints procured from the District. Make work neat, in ink and subject to review and acceptance of the District. District will scan final drawings into a permanent electronic record document.

D. Dimension from two permanent points of reference such as building corners, sidewalks or road intersections, the location of:

1. Connection to existing water lines.

2. Connection to existing electrical power.

3. Gate valves.

4. Routing of sprinkler pressure lines and control wiring.

5. Electric control valves. 6. Quick coupling valves.

E. Other related equipment as directed by District.

1.7 CONTROLLER CHARTS

A. Record drawings shall be reviewed and accepted by the District before charts are prepared.

B. Provide one controller chart for each controller supplied.

C. The chart shall show the area controlled by automatic controller and shall be the maximum size controller door will allow.

D. The chart is to be reduced from the final record drawing set. However, in the event the controller sequence is not legible when the drawing is reduced, it shall be enlarged to a size that will be readable when reduced.

E. Chart shall be blackline print and a different color shall be used to show area of coverage for each station.

F. The chart shall be mounted using Velcro, or an approved equal type of tape.

G. When completed and approved, the chart shall be hermetically sealed between two pieces of plastic, each piece being a minimum 20 mils. thick.

H. These charts shall be completed and approved prior to final inspection of the irrigation system.

1.8 TESTS AND SITE OBSERVATIONS

A. All tests shall be made in the presence of the District; at least forty-eight (48) hours' notice shall be given for tests.

B. Record drawings must be current and shall be verified by the District at the time of all observations.

C. Site observations for all items pertaining to the work of this Section shall be performed by the District.

D. Specific site observations for valve assemblies, sprinkler coverage, control wires and splices and any other observations deemed necessary by the District shall be performed by the District.

E. An open trench main line check for pipe quality and depths shall be performed by the District.

F. Head Layout - using flag marker layout all drip emitter, tree flood bubblers, and spray heads in field prior to trenching. Review head layout with District and Landscape Architect and adjust in field as directed prior to installing irrigation.

G. Center load pipe with small amount of backfill to prevent arching and whipping under pressure. Leave joints exposed for observation during pressure test. No water shall be permitted in the pipe until the above has been accomplished and a period of at least 24 hours has elapsed for solvent weld setting and curing.

H. Main lines to be tested up to valve at 125 pounds pressure and there shall be no leaks. Furnish force pump and pressure gauge. Lateral lines of system to be tested at line pressure with risers capped. Tests to be for 2-hour period and verified by the District.

I. Backfill quality and compaction of trenches shall be verified by the District. Do not backfill trenches until all tests have been completed and accepted.

J. The new auto controller shall be Rainmaster 'Eagle Plus' Series auto controller capable of direct connection to the internet via cell phone connection. Unit shall be housed in a factory stainless steel wall mounted enclosure. The auto controller will be able to measure remote control valve flow on actual site weather conditions. Rainmaster Model EGP-16-i-S. Field verify the exact location desired for wall mounted auto controller with District Representative.

K. Perform a coverage test in the presence of the District to determine if the water coverage for planting areas is complete and adequate. Furnish materials and perform all work required to correct any inadequacies of coverage due to deviations from drawings, 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 District.

L. The coverage test shall be completed, and the irrigation system modified if necessary and accepted, prior to the start of the planting operations.

M. The entire system shall be checked out thoroughly and completely by the Contractor, five (5) days prior to the final observation. All heads shall be properly aligned and adjusted for coverage and cleared of any foreign materials. All valves shall be properly adjusted. Sprinkler controller valve chart shall be checked for accuracy.

N. At the end of the Maintenance Period, a final observation shall be made by the Contractor and District to check out the entire system.

O. Final inspection prior to acceptance:

1. Operate each system in its entirety for the District at time of final inspection. Rework any items deemed not acceptable to the District.

2. Deliver to the District all accessories, charts, record drawings, and equipment as required before final inspection.

1.9 GUARANTEE

A. The entire sprinkler system shall be guaranteed for a period of one (1) year from date of final acceptance.

B. Should any portion of the irrigation system malfunction due to poor workmanship or defective materials, corrections shall be promptly made by the Contractor at his own expense.

C. Any damage to paving, plating, or other developments due to the settlements of improperly compacted trench soil, shall also be promptly repaired at the Contractor's expense, to the satisfaction of the District.

PART 2 PRODUCTS

2.1 GENERAL

A. Irrigation materials shall be in accordance with Subsection 212-2 in the SSPWC “Greenbook” and as specified herein.

B. The irrigation products specified on the drawings in these specifications are selected to match existing products in use. Substitutions are permitted only when product name is followed by or equal.

C. Use only new materials of brands and types as noted on the drawings and as specified.

2.2 MATERIALS

A. Electrical conductors - 24-volt conductors shall be U.F. type, solid wire, U.L. approved for direct burial. Minimum size shall be 14-gauge or as noted on drawings. Acceptable products for 14-gauge wires splice connections shall be 3M Model DBR-Y6, Rainmaster Model TW-SPLICE, Spears Model DS-400 Dri-Splice, or King Innovation Dryconn Dry-Splice wire connectors. Use only 3M Model DBR-Y6 or Rainmaster Model TW-SPLICE wire connectors for Rainmaster EV-CAB-SEN sensor cable splice connections. No known equal. B. Fittings - galvanized malleable steel, Schedule 40.

B. PVC primer and solvents - as recommended by Manufacturer. John-Manville, Lasco, or Pacific Western.

C. Main Line Fittings for Mainline Piping - Schedule 80, PVC Type 1, Grade 1, Cell Classification 12454-B, side gated, Lasco Spears, or approved equal.

D. Lateral non-pressure line fittings - Schedule 40, PVC Type 1, Grade 1, Cell Classification 12454-B, side gated, Lasco or approved equal.

E. Ball valve shall be Schedule 80 PVC manufactured by Spears, Tru-Union-Series, line size, or approved equal.

F. Pop up turf rotors shall be 6” pop up height furnished with built in check valves and stainless steel riser. Hunter Model i20-06-SS, with 35’ MPR Series nozzles, Rain Bird Model 5006+PCSAMSS and 5006+FCSAMSS with 35’ MPR Series nozzles.

G. Nipples and Risers - PVC Schedule 80.

H. Irrigation Mainline

1. Mainline piping sized 2 ½" to 4" shall be Class 315 PVC, solvent weld pipe in conformance with ASTM D-1785 and ASTM D-1784. JM Eagle, Pacific Plastics, or approved equal.

2. Mainline piping sized 1 ½" or less shall be Schedule 40 PVC, solvent weld pipe in conformance with ASTM D1785 and ASTM D-1784. JM Eagle, Pacific Plastics, or approved equal.

I. Pipe, Lateral Non-Pressure Lines shall be PVC Schedule 40, solvent weld in conformance with ASTM D-1785, D1784. JM Eagle, Pacific Plastics, or approved equal.

J. Thread Sealant shall be smooth, non-hardening sealant, compatible with the pipe materials specified. Do not use Teflon tape.

K. Valve Boxes

1. Schedule 80 PVC ball valves shall be housed in a Carson Model 1220-12-4B with bolt down lid, NDS Model 218BCB, or approved equal.

2. Remote Control Valves shall be housed in a Carson Model 1220-12-4B with bolt down lid, NDS Model 218BCB, or approved equal.

3. Quick coupling valves shall be housed in a Carson Model 910-4B Series, NDS Model 212BCB, or approved equal.

4. Wire pull boxes, master valve and flow sensor shall be Carson Model 1419-12-4B Series, NDS Model 214BCB, or approved equal.

L. Irrigation Mainlines 1 ½" size or less shall be furnished with concrete thrust blocks. Concrete sidewalks to access controller and controller pads shall be hardrock concrete with minimum compressive strength at 28 days of 2,500 PSI and conform to ASTM L-94. Finish for walks shall be medium broom finish.

M. Mainline fittings and transition couplers for existing asbestos cement mainline shall be manufactured by Romac, Smith-Blair or approved equal.

N. Furnish and install 8'-0" copper clad lightning ground rod and install in a standard rectangular valve box for Rain Master Irrigation Systems auto controllers. Install ground rod with copper clamp and #8 copper wire as per Rain Master specifications. House exposed copper grounding wire in a 1" Sch. 40 PVC electrical conduit from base of wall mounted auto controller to valve box housing ground rod and clamp a minimum distance of 8'-0" from controller location.

O. PVC flange fittings shall be PVC Schedule 80, Type 1, Grade 1, loose ringer, ANSI Class 150 flange, Lasco Series 954 or approved equal with full face 1/8" thick elastomeric gasket, 5-70 Shore A hardness.

P. Irrigation wire shall be 14-gauge, solid, polyethylene coated, colors as per irrigation plan. Paige Wire Spec 'P7079D' or approved equal.

Q. Auto controller shall be Rain Bird Model ESP-16XMEF, housed in a factory plastic box enclosure, 16 stations and flow sensing module. No known equal.

R. Wireless Rain Shut Off Device shall be Rain Bird Model WR2. Provide all required batteries. No known equal.

S. Flow Sensor shall be Rain Bird Model FS-150P, plastic solvent weld body, 1 ½" size. No known equal.

T. Drip Remote Control Vales shall be Rain Bird PESB Series, 1" size, in an assembly with a Rain Bird pressure regulating drip filter model PRB-QKCHK-100 or Hunter 1" ICV-FS Series remote control valve with a 1" x ¾" Hunter drip filter Model HY-100-075 with Hunter ¾" pressure regulator Model (30 PSI) PRLV30MF3F3FV. V. Remote Control Valves shall be Rain Bird PESB Series or Hunter Model ICV-FS-Series.

U. Pop Up Lawn Spray Bodies shall be manufactured by Rain Bird, built-in 30 PSI pressure regulator, built-in check valve, 6" plastic riser, Model No. RD-06-S-P30 furnished with Rain Bird high efficiency adjustable nozzles Model No. HE-VAN series or Hunter Model PROS-06-PRS30-CV-PRO adjustable nozzle series.

V. Tree and flood bubblers with PVC Flexible Hose shall be manufactured by GPH Irrigation. Flood bubblers shall be pressure compensating with built-in check valves and an FPT plastic body. Flood bubbler nozzle shall be Model GPCBCV1 for 1.0 gallon per minute flood bubbler. PVC Flexible Hose shall be 3/8" IPS size, algae resistant, UVR treated, hose Model No. GPVCSSAR050IRR with matching 3/8" x ½" PVC black colored male adapters Model No. G436073B or Hunter Model IH-250 brown PVC flexible hose with brown male adapters Model IH-FIT-3850 and a tree flood bubbler nozzle Model PCB-10.

W. Dripline tubing shall be 0.56" x 0.66" wall thickness (17 MM) tubing with 0.9 GPH emitters spaced 12" O.C. with matching 17 MM barbed fittings. Manufactured by NDS, Model No. SFCV-BR-6412-025S. Tubing system will be furnished with dripline air relief valve NDS Model No. AVRV, installed on highest elevation on tubing system installed in a 6" round valve box or Netafim Techline CV Series, Model TLCV9-1210 with 17 mm fittings Model TLAVRV or approved equal.

X. Sand backfill for irrigation mainline trench shall be angular plaster sand. Provide sample for approval by the District.

2.3 SPARE EQUIPMENT

A. Furnish to the District the following spare equipment:

1. Five (5) 1-gallon per hour tree bubblers

2. One (1) Rainmaster Pro-Max remote control transmitter

PART 3 EXECUTION

3.1 GENERAL

A. Irrigation materials shall be in accordance with Subsection 308-5 in the SSPWC "Greenbook" and as specified herein.

3.2 WORKMANSHIP AND INSTALLATION.

A. Layout and Adjustments

1. The drawings are diagrammatic to the extent that many offsets, special fittings, and exact locations of the equipment are not shown. The locations of all valves, heads, lines, etc., shall be installed, however, as accurately as possible to the locations that are indicated on the drawings.

2. The locations of main lines are indicated as bordering walks, curbs and fences shall be placed as close as possible. Locate lines within planting areas wherever possible.

3. All indicated locations of heads and equipment are placed with careful consideration to overlap, protection of the premises, lights, proposed tree locations and general layout. Coordinate installation of sprinkler irrigation materials, including pipe, so there is no interference with utilities, other construction, or difficulty in planting trees and shrubs. Layout sprinkler heads and make any minor adjustments required due to differences between site and drawings. Adjustments shall be accomplished, maintaining proper sprinkler head coverage and overlap of sprinkler throws.

B. Connections

1. All connections shall be made into existing lines as indicated on the drawings.

2. Field verify existing line types in the field.

C. Cutting and Patching

1. When piping crosses concrete paving and asphalt paving, saw cutting is required. Cut AC paving and/or concrete with concrete saw cutting tools straight and, in those locations, approved by the District.

2. Remove concrete and/or AC, base, and soil to the required depth for mainlines.

3. Concrete walks shall be backfilled entirely with compacted plaster sand. Compact to 95% and patched with new concrete.

4. AC paving shall be backfilled entirely with a 2-sac sand slurry mix. Compact to 95% and patch with new AC paving.

5. Concrete paving shall be received medium broom finish.

6. Remove from site any excavated soil.

D. Trenching and Backfilling

1. Trench and excavate as necessary to install the system. Excavated material shall be neatly arranged to cause a minimum of inconvenience to pedestrian and vehicular traffic. No soil shall be placed on concrete paving without an adequate moisture proof membrane to protect paving.

2. Trenches for all pipes shall be open vertical construction with firm level bottom and sufficiently wide to provide free working space around the work installed and to provide ample space for backfilling and tamping. Provide a 6" deep layer of plaster sand between bottom of excavated trench and bottom of irrigation mainline piping.

3. Depth of trenches shall be sufficient to provide a minimum cover above the top of the pipe as follows:

   a. Mains and control wires: 24-inches minimum cover.

   b. PVC laterals: 12-inches minimum cover.

4. When two (2) pipes are to be placed in the same trench, provide a minimum of 3-inch horizontal clearance. Place pipe side by side; do not install one pipe on top of another.

5. After the installation is complete and the required tests and inspections have been made and approved, the excavations and trenches shall be backfilled with plaster sand until the irrigation mainline and wire conduit have a minimum cover from top of mainline of a 6" layer of sand. The remainder of the trench can be backfilled with native soil.

E. Plastic Pipe

1. Do not install multiple assemblies on plastic lines. Provide each assembly with its own outlet.

2. Install assemblies specified herein in accordance with respective detail. In absence of detail drawings or specifications pertaining to specific items required to complete work, perform such work in accordance with best standard practice.

3. Clean PVC pipe and fittings before installation. For solvent weld pipe use installation and solvent welding methods as recommended by the pipe and fitting manufacturer. For gasketed pipe installation follow detailed assembly instructions furnished by the manufacturer.

4. On PVC to metal connections, work the metal connections first. Use non-hardening sealant on all threaded joints. Screw hand tight and ½ turn by wrench. Where threaded PVC connections are required, use threaded PVC adapters into which the pipe may be welded.

5. Pipe shall have a firm, uniform bearing, for the entire length of each pipeline, to prevent uneven settlement. Pipe shall be snaked from side to side of trench bottom to allow for expansion and contraction. One additional

foot per 100 feet of pipe is the minimum allowance for snaking. Never lay PVC pipe when there is water in the trench or when the temperature is 32¡ F or below.

6. Use 45¡ fittings at all changes in depth of pipe. Coupling to be of same materials and wall thickness as pipe.

F. Concrete Thrust Blocks – for mainline 1 ½" and less. Install concrete thrust blocks at all directional changes.

G. Rainmaster handheld auto controller remote control transmitter – Pro-Max Series. The new transmitter shall be immediately turned over to the District upon delivery to the site.

H. Control Wiring

1. Control wires and mains shall be installed in common trenches wherever possible housed in Schedule 40 PVC electrical conduits. All wires shall be 14-gauge size.

2. Control wires shall be installed at least 24-inches below finish grade within Schedule 40 PVC electrical conduits equipped with sch. 40 PVC sweep elbows into and out of all valve boxes. Wire conduits shall be kept to the side of the main line where possible. Wire conduits shall be a minimum of 3" from any pipe or fittings except at terminal points. Provide looped 3'-0" hand loop slack at valves and pull boxes. Tie wires in bundles within conduits at 10' intervals.

3. Control wire splices allowed only on runs more than 500 feet. Splice as follows:

a. Strip off minimum of 2 ½" inches of insulation from each wire and twist wires together 4 complete twists.

b. Make splices with 3M model DBR-Y6, or Spears model DS-400 Dri-Splice, or King Innovation model Dry Conn Dry-Splice wire connectors. Use one splice per connector sealing pack. All wire splices shall be housed in either a remote-control valve box or separate wire splice box. Do not make field splices outside of any valve box.

4. Wire conduits passing under future or existing paving, construction, etc., shall be encased in a PVC sleeve, size, and pipe material as per Irrigation Plan, extending at least 12-inches beyond edges of paving or construction.

5. Identify all control wires at valve boxes and controller with "wire marker tags" manufactured by Christy, 3M or equal.

6. Pull one extra common (white with red stripe) and one spare (red) to all valve locations.

I. Valves:

1. Piping systems shall be supplied with valves at all points shown on the drawings or specified herein and shall be arranged to give complete regulating control throughout.

2. Valves shall be the full size of the line in which they are installed unless otherwise indicated.

3. Valves shall be installed in accordance with the drawings and Manufacturer's specifications, so all parts are easily accessible and maintained. Valves near walk, curbs, etc., shall be set with 12-inches and parallel to same. Remote control valves shall be installed in groundcover or shrub areas wherever feasible.

4. Remote control valves shall be adjusted so that the sprinkler heads operate at pressure recommended by the head manufacturer. Remote control valves shall be adjusted so that a uniform distribution of water is applied by the sprinkler heads to the planting areas from each individual valve system.

5. Valve boxes shall be set ½-inch above the designated finish grade at each valve.

J. Sprinkler Heads

1. Prior to installing heads, flush laterals, and risers with full line pressure. Repeat whenever system is opened for repairs or replacements. Start flushing operation at the highest point of delivery and work to the lowest.

2. Align all part circle heads so that no spray shall hit building walls or concrete paving.

3. Adjust all spray nozzles so that there will be no amount of overspray, and so that the entire set will be as evenly balanced as possible.

4. Install with each lawn area sprinkler head, a “Triple Swing” joint with Schedule 80 PVC nipples and threaded ells.

5. Install all tree bubblers on PVC flexible hose with two (2) solvent weld male adapters. Install two (2) bubbler assemblies per each tree planted on project.

3.3 FIELD QUALITY CONTROL

A. Adjustment to System

1. Flush and adjust all sprinkler heads for optimum performance and to prevent overspray onto walk, roadways, and buildings wherever possible.

2. Select the best degree of arc to fit existing site conditions.

3. Set all sprinkler heads perpendicular to finished grades unless other designated on the drawings.

3.4 TESTING AND INSPECTION

A. Do not allow or cause any work of this section to be covered up or enclosed until it has been inspected, tested, and approved by the District. Before backfilling the main line, and with all control valves in place, but before lateral pipes are connected, completely flush and test the mainline, and repair all leaks. Flush out each section of lateral pipe before emitters are attached.

B. Make all necessary provisions for thoroughly bleeding the line of air and debris. Before testing, fill the line with water for a period of at least 24 hours.

C. After valves have been installed, test all pressure main lines for leaks at a pressure of 150 PSI for a period of two hours, with all couplings exposed, and all pipe sections carefully center-loaded. Furnish all necessary testing equipment and personnel. Correct all leaks, and retest until accepted by the Engineer.

3.5 FINAL INSPECTION

A. Thoroughly clean, adjust and balance all systems. Demonstrate the entire system to the District proving that all remote control valves are properly balanced, that all emitters are properly flowing, and that the entire system is installed and is workable, clean, and efficient.

END OF SECTION

SECTION 32 9000
LANDSCAPE PLANTING

PART 1 GENERAL

1.1 SECTION INCLUDES

A. This section includes requirements and specifications for the landscape planting.

1.2 RELATED WORK

A. Section 32 8410 – Irrigation System

B. Section 32 0190 – Landscape Maintenance

1.3 REQUIREMENT OF REGULATORY AGENCIES

A. Any required spraying Work shall be done in accordance with governing agencies.

1.4 SUBMITTALS

A. Furnish material invoices indicating the quantities of fertilizers, soil amendments, and all materials delivered to the job site. Material invoices must be approved by the Landscape Architect prior to incorporating soil amendments and applying hydroseed materials.

B. Certificates shall be prepared by the supplier or distributor and shall indicate the quantities and qualities of materials used.

C. Plant Material – Submit clear photos of all plant material specified taken at the source. Indicate plant material height and spread measured at the source. Photos must clearly show the plant quality and size. The Landscape Architect will determine if the photos meet the specifications and if further site inspection at the nursery is required or if another source is required to produce the specified plant material.

D. Contractor shall take (3) soil samples of graded landscape areas at different areas within the project scope. Send the soil samples to an approved soil testing laboratory for analysis to determine recommended quantities and types of fertilizer and organic amendments required to sustain the new planting areas. Send the soil test results to the Landscape Architect. All recommended soil fertilizers and organic amendments identified in the soil report shall be incorporated into the landscape soil planting areas within the site. The fertilizer and organic amendments identified in the specifications shall be used to generate a budget to cover the fertilizer and organic amendments required for the project base bid.

1.5 PROTECTION

A. Contractor shall check or locate existing structures, electric cables or conduits, utility lines and other existing features or conditions above or below ground level that might be damaged as a result of the operation. Questions or conflicts arising out of such examination prior to or during operation shall be immediately directed to the attention of the Landscape Architect for necessary action or decisions before resuming operation. Contractor shall be responsible for repair or replacement at no cost to the Owner for features or conditions damaged through failure to comply with the above procedures.

B. Protect existing trees and tree roots from any damage that may be caused as a result of any planting or irrigation operations.

1.6 ALTERNATES

A. Alternates will not be permitted, except where indicated, and as approved by the Landscape Architect.

1.7 MAINTENANCE

A. Includes continual maintenance of all landscape Work included in the Contract for a period of ninety (90) days from the time all Work is completed and approved.

1.8 LANDSCAPE ON-SITE OBSERVATIONS

A. The Contractor shall notify the Landscape Architect forty-eight (48) hours in advance for all required On-Site Observations. The final On-Site Observation shall require seven (7) days advance notice.

B. The Contractor shall submit for approval a complete work schedule indicating tentative dates for On-Site Observations.

C. Record drawings shall be current and present at the time of On-Site Observations and shall be updated on a weekly basis.

D. Landscape On-Site Observations shall be required for the following phases of Work:

1. Job start meeting.

2. Finish grading - When all fine grading work is complete, notify the Landscape Architect for approval prior to proceeding with the planting.

3. Soil Preparation - furnish certificates for soil amendments at this time. Quantities must be reviewed by the Landscape Architect prior to incorporating into soil. When all soil preparation work is complete notify the Landscape Architect for approval prior to proceeding with the work.

4. Irrigation System Review - See Irrigation Section.

5. Review plant material for quality prior to planting. The Landscape Architect has the right to reject any plant material that it deems unacceptable at time of delivery.

6. Review planting during the planting process.

7. Review planting after installation.

8. Pre-maintenance - When all Work has been completed a pre-maintenance walk thru shall be conducted and the contractor must receive approval from the Landscape Architect prior to starting the maintenance period.

9. Maintenance - Notify the Landscape Architect after the maintenance period has progressed for thirty days for a review of all work and make all corrections that are deemed necessary.

10. Final Review - After the ninety-day (90) maintenance period is complete notify the Landscape Architect for a final review of all work. All work must receive approval from the Landscape Architect prior to being deemed complete and or filing a notice of completion.

E. GUARANTEE

1. All plant material shall be guaranteed for one year. This guarantee is in addition to, and not a limitation of, other rights the District may have under the Contract Document

PART 2 PRODUCTS

2.1 ORGANIC AMENDMENT

A. Nitrogen stabilized organic amendments as derived from wood residual.

2.2 FERTILIZER

A. Soil preparation – shall be ‘Turf Supreme’ 16-6-8.

B. Maintenance – shall be 'Turf Supreme' 16-6-8.

2.3 SOIL

A. Soil shall be existing site soil as approved by the District Inspector.

2.4 MIXES (FOR BIDDING PURPOSES ONLY) – ACTUAL SOIL TEST RESULTS SHALL SUPERCEDE THESE BASIC SOIL PREP MIXES

A. Backfill Mix for all plant material shall be:

1. 1/3 organic amendment
2. 2/3 amended topsoil
3. Commercial Fertilizer (15-15-15), 1 lb./cu. yd.
4. Iron, Zinc, Manganese, 1 oz. /cu. yd.

B. Soil preparation materials shall be the following per 1,000 sq. ft

1. Three cubic yards organic amendments
2. Two pounds of nitrogen
3. Two pounds of phosphorus
4. Two pounds of potassium

2.5 PLAY FIELD TURF

A. Shall be the lawn seed mix specified in the hydroseed section.

2.6 PLANT MATERIAL

A. Plant Quality - Plants shall be fresh, well established, vigorous, of normal habit of growth, free of disease, insects, insect eggs, and larvae. Plants shall have healthy, normal root system, well filling their containers, but not to the point of being root-bound.

B. Plant Sizes - The height and spread of all plant material shall be measured with branches in their normal position when plant is installed.

C. Multi-branched trees as noted on the Drawings shall mean trees with three or more trunks and all trunks shall be equal in caliper.

D. Trees shall have a central leader with good taper and branches well distributed along the leader. Foliage must be well distributed throughout the tree with no more than one third of the foliage on one single branch.

E. Plant Quantities - Plant materials shall be furnished in size, quantities, species and in the spacing as indicated or noted on the Drawings. Symbols shall take precedence over plant counts, in case of discrepancy.

2.7 MULCH

A. Mulch shall be Agromin "ES-2", clean chipped, dimensional lumber, free from all nails or other harmful materials and shall have 90% 2" size and 10% less than 2" size.

2.8 TREE STAKES

A. Tree stakes shall be 2-inch diameter lodgepole Pine, pressure treated with Chemonite (ACZA) @ 0.40 pounds per cubic feet for inground staking. Stakes shall be twelve (12) feet long.

2.9 TREE TIES

A. Tree ties shall be virgin flexible vinyl meeting ASTM D-412, with UV inhibitor, 24 inches long.

2.10 MAINTENANCE

A. Maintenance Materials used in conjunction with the maintenance Work shall conform to the material requirements originally specified for the Work.

2.11 PRE-EMERGENT

A. Pre-emergent shall be Ronstar or approved equal.

PART 3 EXECUTION

3.1 SITE CONDITIONS

A. No plant materials shall be planted until all operations in conjunction with the installation of the irrigation system is complete and approved by the Landscape Architect. Final grades shall be established, and the planting areas shall be properly prepared and graded.

3.2 GROUND PREPARATION – ALL AREAS

A. After the Site Clearance and Preparation has been approved by the District planted areas shall be thoroughly cultivated to a depth of six inches to reduce any compaction, which occurs as a result of construction. Protect existing tree roots.

B. Stones or rocks over 1” in size, construction refuse, and other deleterious material shall be removed from the site, safely and legally disposed of.

C. Apply soil preparation materials, as per approved soil test result, to all planting areas and thoroughly incorporate into the top six inches of soil.

D. Wet soil thoroughly and allow to settle. Repeat this compaction procedure until soil is stable enough to permit aeration and drainage for plant material.

E. Finish grade all planting areas to a smooth, uniform surface ready for planting. Finish grade shall be one inch below finish grade of adjacent paved surfaces unless otherwise noted on Drawings.

3.3 PLANTING – TREES AND SHRUBS

A. Trees and shrub planting shall comply with details on Drawings.

B. Make necessary adjustments and excavate pits of square outline and vertical sides foe all plants. Scarify sides and bottoms of all plant pits.

C. Protect roots or ball of plants at all times from sun and drying winds.

D. If directed by the Landscape Architect, the Contractor shall prune in accordance with standard horticultural practice.

E. Wet soil thoroughly and allow to settle. Repeat this compaction procedure until soil is stable enough to permit aeration and drainage of plant material.

3.4 MULCH

A. Install three-inch layer of mulch throughout shrub areas. Finish grade shrub areas to a smooth uniform surface to receive mulch. Keep mulch away from tree and shrub crown. Dress mulch areas to present a clean uniform appearance when complete.

3.5 MAINTENANCE

A. After all Work indicated on the Drawings or herein specified including all planting has been completed, and approved by the Landscape Architect, the ninety day (90) day Maintenance Period shall begin.

B. Maintain all planted areas by means of continuous watering, weeding, mowing, re-seeding, cultivating, spraying, mulching, trimming, edging, and any operation necessary for their care and upkeep.

C. Immediately replace any and all plant materials, which, for any reason die or are damaged while under his car. Replacement plants shall be of the same quality as the originally specified plants.

D. Repair immediately any damage to planting areas.

E. Depressions caused by vehicles, equipment and foot traffic will be filled with soil, leveled and replanted.

F. Exterminate gophers and moles, repair damage as above.

G. Clean-up all planted areas shall be kept free of debris and shall be cultivated and weeded at not more than ten day intervals.

H. At completion of the maintenance period, all areas included in the Work shall be clean and free of debris and weeds; all plant materials shall be live, healthy, and free of infestation.

I. Fertilizing shall be applied at twenty-five pounds per 1,000-sq. ft. to all planting areas thirty, sixty, and ninety days after the maintenance period is initiated.

END OF SECTION

SECTION 32 9110
HERBICIDE SPRAYING

PART 1 GENERAL

1.1 SECTION INCLUDES

A. This section includes requirements for the spraying of the any existing grasses to be removed and weeds.

1.2 QUALITY ASSURANCE

A. Contractor shall have a valid Applicators License issued by the State of California.

B. Contractor shall comply with the California Department of Pesticide Regulation as required for the application of herbicide at school sites.

C. Comply with all District Rules and Requirements.

PART 2 PRODUCTS

2.1 TARGET SPECIES

A. The weed species (target species) scheduled for removal include existing lawn areas identified on the Drawings as new shrub planting areas.

2.2 HERBICIDE

A. For this work use either `Reward' or `Finale' as per the District approved list. These contact herbicides will need to be applied a minimum of (3) times to sufficiently kill the vegetation.

PART 3 EXECUTION

3.1 EXAMINATION OF SITE

A. The Contractor shall examine the site and observe the conditions under which the work shall be done and note any circumstances which will affect the work.

B. Prior to application of herbicide, the Contractor shall walk the site with the Landscape Architect and District Inspector for the purpose of identifying the work area and the target species.

3.2 SITE POSTING

A. Comply with all State and School District requirements for posting notifications on site.

3.3 MANUFACTURER'S PRODUCT LABEL

A. Contractor shall have all current product labels and Material Safety Data Sheets on the job site when the work is in progress.

B. Submit to the District, prior to the start of work, written recommendations for all product, rates of application, and copies of labels and M.S.D.S.

3.4 APPLICATION

A. Apply three (3) separate applications of herbicide with recommended kill time between applications.

3.5 TURF REMOVALS

A. After turf kill is approved by the District Inspector, scrape and remove from the site lawn areas to become shrub planting areas.

3.6 DISPOSAL

A. Dispose dead turf in a legal manner.

END OF SECTION

SECTION 32 9219
HYDROSEED

PART 1 GENERAL

1.1 SECTION INCLUDES

A. This section includes requirements for the installation of the hydroseed.

1.2 SUBMITTALS

A. Submit for approval, Supplier's material invoices indicating all quantities of fertilizers, seed, fiber, mulch and all materials used to complete the hydroseeding.

1.3 PROTECTION

A. Protect adjacent planting areas and building surfaces from overspray.

PART 2 PRODUCTS

2.1 SEED

A. Seed shall be clearly tagged and labeled showing type of seed, test date, name of supplier and percentage of the following: crop seed, inert matter, weed seed, noxious weeds, and total germination content.

2.2 WOOD FIBER

A. Wood fiber shall be derived from cellulose such as wood pulp or similar organic material. when used in the applied mixture, an absorptive or porous mat will result on the surface of the ground. add green dye to mix.

2.3 HYDROSEED MIX – LAWN

A. Hydroseed mix of the following at the rate of twelve pounds per 1,000 square feet (percent by weight):

1. Seed - Stover "Pro-Sportsfield Elite” seed mix at the rate of 12 pounds per 1,000 square feet.
2. Fertilizer – (12-12-12) at the rate of 400 pounds per acre.
3. Soil stabilizer (ecology controls m-binder) at the rate of 160 pounds per acre.
4. Fiber at the rate of 2,000 pounds per acre.

2.4 WATER

A. Water shall be clean, fresh, suitable for domestic consumption and free from such amounts of mineral and organic substances that would inhibit seed germination or growth.

2.5 EQUIPMENT

A. Mixing shall be performed in a tank with a built-in continuous agitation and recirculation system of sufficient operating capacity to produce a homogeneous slurry of fiber, soil stabilizer, seed, and water in the specified proportions.

B. The discharge system shall be capable of applying the slurry to the ground surface at a continuous and uniform rate.

2.6 SITE CONDITIONS

A. Hydroseeding shall not begin prior to approval of irrigation and fine grading.

2.7 MIXING

A. Seed, fiber, soil stabilizer, and water shall be thoroughly mixed into a homogeneous slurry of the proper consistency to adhere to the ground surface without lumping or running. Slurry must be applied within four (4) hours after mixing or it shall be rejected and removed from the site and replaced at the Contractor's expense.

2.8 CLEAN UP

A. Any slurry, which is sprayed on adjacent building or paved surfaces, shall be thoroughly washed and removed from the site.

END OF SECTION

SECTION 33 1000
WATER UTILITIES

PART 1 – GENERAL

1.1 SUMMARY

A. Pipe and fittings for site water lines.

B. Valves.

C. Fire hydrant.

D. Water meter

E. Backflow preventer.

1.2 RELATED SECTIONS

A. Section 31 2000 Earthwork.

B. Section 31 2333 Trenching and Backfilling.

1.3 REFERENCES

A. American Water Works Association Standards (AWWA).

B. Ventura County Water Works Districts - Design Standards.

C. Standard Specifications for Public Works Construction (Green Book), latest edition.

1.4 SUBMITTALS

A. Submit the following:

1. Product Data: Provide data on pipe materials, pipe fittings, valves, and accessories.

2. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

3. Project Record Documents: Record actual locations of piping mains, valves, connections, thrust restraints, and invert elevations. Turn over to the project manager one set of drawings with all deviations from the plans shown in neat, clean and readable red ink.

4. Identify and describe unexpected variations to subsoil conditions or discovery of uncharted utilities.

5. Disinfection Report:

a. Type and form of disinfectant used.

b. Date and time of disinfectant injection start and time of completion.

c. Test locations.

d. Name of person collecting samples.

e. Initial and 24-hour disinfectant residuals in treated water in ppm for each outlet tested.

f. Date and time of flushing start and completion.

g. Disinfectant residual after flushing in ppm for each outlet tested.

6. Bacteriological Report:

a. Date issued, project name, and testing laboratory name, address, and telephone number.

b. Time and date of water sample collection.

c. Name of person collecting samples.

d. Test locations.

e. Initial and 24-hour disinfectant residuals in ppm for each outlet tested.

f. Coliform bacteria test results for each outlet tested.

g. Certify water conforms, or fails to conform, to bacterial standards of AWWA C651 Section 7.1 Standard Conditions

7. Water Quality Certificate: Certify water conforms to quality standards of City of Camarillo, suitable for human consumption.

1.5 PROJECT RECORD DOCUMENTS

A. Accurately record actual locations of piping mains, valves, connections, fire hydrant, and invert elevations.

B. Identify and describe unexpected variations to subsoil conditions or discovery of uncharted utilities.

1.6 QUALITY ASSURANCE

A. A. Perform work in accordance with County of Ventura Standards, AWWA, Standard Specifications for Public Works Construction California Fire Code Chapters 5 & 33 and NFPA 24.

B. Valves: Manufacturer's name and pressure rating marked on valve body.

1.7 QUALIFICATIONS

A. Water Treatment Firm: Company specializing in disinfecting potable water systems specified in this section with minimum three years experience.

B. Testing Firm: Company specializing in testing potable water systems, certified by State of California.

C. Submit bacteriologist's signature and authority associated with testing.

1.8 DELIVERY AND STORAGE

A. Deliver and store valves in shipping containers with labeling in place.

PART 2 – PRODUCTS

2.1 GENERAL

A. A. All water lines shall be designed for a minimum working pressure of 250 psi. All fittings appurtenant piping materials shall be designed for a minimum working pressure of 250 psi unless otherwise indicated.

2.2 PIPE

A. Joints: Mechanical joints shall be used for the waterline construction unless otherwise shown on plans and standard details. Gaskets for mechanical joints shall be rubber conforming to ANSI A21.11 and AWWA C111.

B. Fittings: Fittings shall be ductile iron rated for 250 psi working pressure. Mechanical joint fittings shall conform to ANSI A21.10 or AWWA C110 (short short body style, not approved). Lining for fittings shall be Plastic Engineering P.E.I. 100 epoxy to a minimum thickness of 10 mils. Fittings shall be wrapped with 6 mil. polyethylene sheet. Grease all underground nuts and bolts before wrapped with the polyethylene sheet.

C. Polyvinyl Chloride (PVC) potable water pipe: Pipe material shall be (Polyvinyl chloride (PVC) pressured pipe shall be manufactured in accordance with AWWA Standard Specification C-900).

2.3 GATE VALVES

A. Conform to AWWA C-509-01.

B. Gate valves shall be iron body, NRS valves with O-ring seals, and shall open when the stem is rotated counterclockwise. The valves shall be designed for a minimum working pressure of 250 psig, have a bronze stem, and have a cast iron wedge with styrene butadiene rubber permanently bonded to the wedge. The valves shall have full port openings for unobstructed flow, be designed for underground service, and be in full compliance with the latest revision of AWWA C509. The valve linings and coatings shall be in accordance with AWWA C210-84. Linings and coatings shall be factory applied. Valves shall be furnished with 2-inch square operating nut. Valve shall be wrapped with 6 mil. polyethylene sheet. Grease all underground nuts and bolts before wrapping with the polyethylene sheet.

2.4 FIRE HYDRANT

2.5 A. Not Applicable

2.6 WATER METER

A. Not Applicable.

2.7 BACKFLOW PREVENTER

A. Per County of Ventura Plans & Specifications.

B. Backflow preventer shall be lead free and USC approved.

2.8 ACCESSORIES

A. Concrete for Thrust Blocks: Contractor shall construct concrete thrust block per County of Ventura Standards.

B. Thrust blocks shall be constructed to bear against undisturbed earth and shall not bear against adjacent pipe, fittings, or valves. Where concrete must be poured around adjacent pipe, a block out or a short pipe length shall be used such that a flexible joint exists within 12 inches of each side of thrust block, unless indicated otherwise on the plans. Concrete shall not be allowed to set in contact with pipe surfaces or to enter or come in contact with any joint.

C. Valve Appurtenances: The Contractor shall furnish and install all valve appurtenances. Provide two galvanized T-handled operating wrenches, 4 feet total length or as required to easily access valve from grade.

D. Valve box body shall be unreinforced concrete 8 ¾" inside diameter traffic box with cast iron ring. The valve box cover shall be cast iron. Both valve body and cover shall be Christy G3 or equal. The cover shall be marked "water." The cover of each valve box shall be provided with a 2" diameter bronze disc and the Contractor shall stamp the valve number on the disc per the Architect's instructions. The disc shall be mounted to the valve box cover or higher using stainless steel screws. The extension piece shall be 8" in diameter, Class 150 P.V.C. water line conforming to the requirements of AWWA C-900.

E. Appropriate warning detector tape shall be placed over all utilities.

1. Underground detectable warning tape shall be placed over all non-metallic underground utilities.

2. 12-gauge copper continuous location wire shall be placed on all water mains.

F. Corrosion-Protection Encasement for Piping

1. 1. Encasement for Underground Metal Piping and Fittings: AWWA C105, Polyethylene film, 10 mil minimum thickness, tube or sheet. Plastic wrap shall be clear or black. Purple wrap shall not be used.

PART 3 – EXECUTION

3.1 EXAMINATION

A. Maintenance records in accordance with NFPA 25.

B. Verify the existing water main sizes, class of pipes, and locations as indicated.

C. Verify piping system has been cleaned, inspected, and pressure tested.

D. Perform scheduling and disinfecting activity with start-up, water pressure testing, adjusting and balancing, demonstration procedures, including coordination with related systems.

3.2 PREPARATION

A. Remove scale and dirt, on inside and outside, before assembly.

B. Prepare pipe connections to equipment with flanges or unions.

3.3 BEDDING

A. Excavate pipe trench in accordance with Specification Section 31 23 33 for work of this section. Hand trim excavation for accurate placement of pipe to elevations indicated.

B. Place bedding material at trench bottom, level fill materials in one continuous layer not exceeding 6 inches compacted depth, compact to a minimum of 95 percent relative compaction.

C. The compaction of the backfill material along the sides and one foot above the pipe shall be done with hand tampers to protect the pipe. Jetting is not permitted to obtain required compaction.

D. Maintain optimum moisture content of bedding material to attain required compaction density.

3.4 INSTALLATION - PIPE

A. Route pipe in straight line.

B. Install pipe to allow for expansion and contraction without stressing pipe or joints.

C. Install access fittings to permit disinfection of water system.

D. Form and place concrete for thrust blocks at each elbow or change of direction of pipe main in accordance with County of Ventura Standard Plans & Specifications.

E. Protect metal restrained joint components against corrosion by applying a bituminous coating by coating with non-oxide corrosion resistant greased 10 mil plastic wrap.

F. Establish elevations of buried piping to ensure cover conforming to District Standards. The minimum cover from the finish grade to the top of pipe is 36 inches for potable and fire waterline, any shallower cover to clear with the existing utility crossings shall be reviewed and approved by the District's Representative.

G. Install 12 gauge copper continuous location wire over top of pipe.

H. Backfill trench in accordance with Specification Section 31 2333.

I. Maintain separation of water main from sewer piping in accordance with the State Department of Health Services, Criteria for the Separation of Water Mains and Sanitary Sewers (Section 64630, Title 22 California Administrative Code), and State Regional Water Quality Control Board.

J. All pipe laid in trench which is to be left for further extension (i.e., end of work day) shall have its open end covered to protect from possible rodent intrusion.

3.5 INSTALLATION - VALVES

A. Set valves on solid bearing per County of Ventura Standard Plans & Specifications.

B. Center and plumb valve box over valve. Set box cover flush with finished grade.

C. Install brass valve 1 ½" diameter tags and imprint valve number per District.

3.6 SERVICE CONNECTIONS

A. Install service connections in accordance with County of Ventura Standard Plans & Specifications.

3.7 PRESSURE TEST OF WATER PIPING SYSTEM

A. Water piping system shall be pressure tested for 2 hours at 200 psi, with no allowable drop in water pressure.

B. All leakage tests shall be completed and approved prior to placing of permanent resurfacing.

C. Pressure test shall be witnessed by District's inspector.

3.8 DISINFECTION AND BACTERIA TESTING OF WATER PIPING SYSTEM

A. Water piping system shall be disinfected and flushed per AAWA Section C651.

B. Upon completion of retention period required for disinfection, flush pipeline until chlorine concentration in water leaving pipeline is no higher than that generally prevailing in existing system or is acceptable for domestic use.

C. Legally dispose of chlorinated water. When chlorinated discharge may cause damage to environment, apply neutralizing chemical to chlorinated water to neutralize chlorine residual remaining in water.

D. After final flushing and before pipeline is connected to existing system, or placed in service, employ an approved independent testing laboratory to sample, test and certify water quality suitable for human consumption.

3.9 TEST RECORDS

A. A. Records shall be in accordance with NFPA 13 & 24. Records shall be made of each piping system installation during the test. These records shall include:

1. Date of test.
2. Description and identification of piping tested.
3. Test fluid.
4. Test pressure.
5. Remarks to include such items as:
    a. Leaks (type, location).
    b. Repairs made on leaks.
6. Certification by Contractor and signed acknowledgment by the District's Representative.

3.10 FIELD QUALITY CONTROL

A. Inspection and testing shall be performed by District's Representative.

B. Perform pressure test on potable water distribution system in accordance with County of Ventura Standard Plans & Specifications except that there is no allowable leakage for the duration of the test.

1. Slowly bring piping to test pressure and allow system to stabilize prior to conducting leakage test. Do not open or close valves at differential pressures above rated pressure.

2. Examine exposed piping, fittings, valves, hydrants, and joints carefully during hydrostatic pressure test. Repair or replace damage or defective pipe, fittings, valves, hydrants, or joints discovered, following pressure test.

END OF SECTION

SECTION 33 3000
SANITARY SEWERAGE UTILITIES

PART 1 - GENERAL

1.1 SUMMARY

A. Site sanitary sewerage piping, fittings, accessories and bedding.

B. Cleanouts.

1.2 RELATED SECTIONS

A. Section 31 2000 Earthwork.

B. Section 31 2333 Trenching and Backfilling.

1.3 REFERENCES

A. Standard Specifications for Public Works Construction SSPWC (Green Book), latest edition.

B. ASTM Standards.

1.4 SUBMITTALS

A. Submit:

1. Product Data: Provide data indicating pipe, pipe accessories and appurtenances, and manhole covers.

2. Manufacturer's Installation Instructions: Indicate special procedures required to install products specified.

3. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

4. Manufacturer’s Certificate: Certify that installers are certified for installing plastic pipe.

1.5 PROJECT RECORD DOCUMENTS

A. Submit Record Drawings: Record location of pipe runs, connections, manholes, cleanouts, and invert elevations.

B. Identify and describe unexpected variations to subsoil conditions or discovery of uncharted

1. utilities.

1.6 REGULATORY REQUIREMENTS

A. Conform to California Title 24 (CCR) Part 5, latest edition, for installation of the Work of this section.

B. Minimum separation distance and requirements between water, reclaimed water and sewer pipes per the State of California, Department of Health Services shall be established.

PART 2 – PRODUCTS

2.1 SEWER PIPE MATERIALS AND ACCESSORIES

A. A. Polyvinyl Chloride (PVC) Pipe for Gravity Sewer: ASTM 3034-SDR35 Ring-Tite Polyvinyl Chloride (PVC) gravity sewer pipe and fittings; inside nominal diameter as indicated on Drawings. PVC pipe shall use “locked-in” rubber sealing ring conforming to ASTM D-3212. Joints using flexible Elastomeric Seals. Minimum pipe stiffness at 5% deflection shall be 46 psi for all sizes when tested in accordance with ASTM Method of Test D2412.

2.2 CLEANOUTS

A. Form and cast-in-place, Class 618-CLE-4000 P concrete base pad, with provisions for sewer pipe end section.

B. Frame and cover shall be Christy G3 or equal, lettered “sewer”.

2.3 BEDDING MATERIALS

A. Refer to Specification Section 31 2333 Trenching and Backfilling for Bedding Material.

PART 3 – EXECUTION

3.1 EXAMINATION

A. A. Verify that trench cut and/or excavation base is ready to receive work and excavations, dimensions, and elevations are as indicated on drawings.

3.2 PREPARATION

A. Hand trim excavations to required elevations. Correct over excavation with granular fill.

B. Remove large stones or other hard matter which could damage pipe or impede consistent backfilling or compaction.

3.3 BEDDING

A. Excavate pipe trench in accordance with Specification Section 31 23 33. Hand trim excavation for accurate placement of pipe to elevations indicated on drawings.

B. Place bedding material at trench bottom, level materials in continuous layer not exceeding 6 inches compacted depth, compact to minimum of 95 percent of maximum dry density.

C. Maintain optimum moisture content of bedding material to attain required compaction density.

3.4 INSTALLATION - PIPE

A. Install pipe, fittings and accessories in accordance with manufacturer's instructions.

B. Sewer pipeline shall be placed from downstream to upstream beginning at the downstream connection to the existing sewers.

C. Lay pipe to slope gradients noted on drawings; with maximum variation from true slope of 1/8 inch in 10 feet.

D. Install bedding along sides and over top of pipe to minimum compacted thickness of 12 inches; compacted to a minimum of 95 percent of maximum dry density.

E. Refer to Specification Section 31 2333 for Trenching Requirements. Do not displace or damage pipe when compacting.

F. Install continuous trace wire over top of pipe.

G. Connect to building sanitary sewer lateral at 5’ outside of edge of building.

H. The compaction of the backfill material along the sides and one foot above the pipe shall be done with hand tampers to protect the pipe.

3.5 INSTALLATION – CLEANOUTS

A. From bottom of excavation clean and smooth to correct elevation.

B. Establish elevations and pipe inverts for inlets and outlets as indicated on drawings.

C. Mount lid and frame level in grout, secured to cone section to elevation indicated on drawings.

3.6 FIELD QUALITY CONTROL

A. Preliminary Tests: The Contractor may perform any tests desired which are not harmful to the lines before backfilling is completed.

B. Cleaning: Before final tests are performed for acceptance of any sewer pipe, clean the pipe by inflatable rubber ball method.

C. Perform air pressure test per SSPWC Section 7.8.2.4.

D. Repairs, if necessary: If the leakage or infiltration is greater than the amount specified, the pipe shall be overhauled and re-laid if necessary by the Contractor, at its own expense, until the joints will hold satisfactorily.

E. Regardless of the results of the above tests, any visible evidence of individual leaks shall be corrected by the Contractor to the satisfaction of the District's Representative.

F. Cleaning Sewer: After all backfilling, compaction testing and paving is completed, sewer lines shall be cleaned by Inflatable Rubber Ball Method, flushed and cleaned, before acceptance by the District's Representative and connection to their sewer system is made.

G. The Contractor shall furnish all sewer line plugs necessary for blocking off all lines as required by the District's Representative until final acceptance.

3.7 PROTECTION

A. Protect finished installation.

B. Protect pipe and aggregate cover from damage or displacement until backfilling operation is in progress.

END OF SECTION

SECTION 33 4000
STORM DRAINAGE

PART 1 - GENERAL

1.1 DESCRIPTION

1.2 The work includes constructing drainage pipe and drainage structures.

1.3 STANDARD SPECIFICATION

A. All work shall be performed and materials to be used shall be in accordance with City of San Buenaventura Water Department and APWA requirements and standards. In those cases where neither of these standards or requirements cover the requirements the Standard Specifications for Public Works Construction (SSPWC), latest edition and supplements, shall be used.

B. The Standard Specifications apply, where applicable, only to performance and materials and how they are to be incorporated into the work. The legal contractual relationship sections and the measurement and payment sections do not apply to this document.

1.4 SUBMITTALS

A. Submittals for the following shall be submitted in compliance with Section 013300 “Submittal Procedures.”

1. Shop Drawings for each type of manhole.

2. Shop Drawings for catch basins.

3. Concrete mix designs to be used.

4. Manufacturer’s catalog data for clean-outs.

5. Laboratory tests for bedding material.

6. Field quality test reports.

1.5 PREINSTALLATION CONFERENCE

A. Conduct a conference at the Project site to comply with requirements in Section 01 3100, “Project Management and Coordination”.

1.6 PROJECT CONDITIONS

A. Interruption of Existing Storm Drainage Service: Do not interrupt service to facilities occupied by Agency or others unless permitted under the following conditions and then only after arranging to provide temporary service according to requirements indicated:

1. Notify Agency’s Representative no fewer than 14 days in advance of proposed interruption of service.

2. Do not proceed with interruption of service without Agency Representative’s written permission.

1.7 COORDINATION

A. Coordinate connection to existing storm drainage main with Agency’s Representatives.

PART 2 - PRODUCTS

2.1 PIPE

A. Drainage pipe shall have flexible, gasketed, push-on joints and be PVC (polyvinyl chloride) SDR 35 conforming to ASTM D3034 for diameters 4" to 15", and ASTM F679 for 18" to 24", with integral-bell gasketed joints. Rubber gaskets shall be factory installed and conform to ASTM F477. Pipe joints shall conform to ASTM D3212. Fittings shall be factory molded of PVC. Pipe shall be made of PVC plastic and have an SDR of 35 and minimum pipe stiffness of 46 psi according to ASTM D2412. All pipe and fittings shall be legibly and permanently marked with type and class.

2.2 CATCH BASINS

A. Catch basins shall be sized as indicated on the drawings.

2.3 CLEANOUTS

A. Gray-Iron Cleanouts: ASME A112.36.2M, round, gray-iron housing with clamping device and round, secured, scoriated, gray-iron cover. Include gray-ron ferrule with inside calk or spigot connection and countersunk, tapered-thread, brass closure plug.

1. Manufacturers:

a. Josam Company

b. Watts Industries, Inc.

c. Watts Industries, Inc.; Enpoco, Inc., Div.

d. Zurn Industries, Inc.; Zurn Specification Drainage Operation

e. Or equal

2. Top-Loading Classification(s):

a. Light duty in earth or grass foot-traffic areas.

b. Medium duty in paved foot-traffic areas.

c. Heavy duty in vehicle-traffic service areas.

d. Extra Heavy duty in roads.

3. Sewer Pipe Fitting and Riser to Cleanout: ASTM A 74, Service class, cast-iron soil pipe and fittings.

B. PVC Cleanouts: PVC body with PVC threaded plug. Include PVC sewer pipe fitting and riser to cleanout of same material as sewer piping.

1. Manufacturers:

a. Canplas Inc.

b. IPS Corporation.

c. Sioux Chief Manufacturing Company, Inc.

d. Zurn Industries, Inc.; Zurn Light Commercial Specialty Plumbing Products.

e. Or equal.

2. Top Loading Classification(s):

a. Light duty in earth or grass foot traffic areas.

1) Medium duty in paved foot traffic areas.

2) Heavy duty in vehicle-traffic service areas.

3) Extra heavy duty in roads.

2.4 DRAINS

A. Gray-Iron Area Drains: ASME A112.21.1M, round body with anchor flange and round secured grate. Include bottom outlet with inside calk or spigot connection, of sizes indicated.

1. Manufacturers:

a. Josam Company.

b. Watts Industries, Inc.

c. Watts Industries, Inc.; Enpoco, Inc. Div.

d. Zurn Industries, Inc.; Zurn Specification Drainage Operation.

e. Or equal.

2. Top-Loading Classification(s):

a. Light duty in earth or grass foot traffic areas.

b. Medium duty in paved foot traffic areas.

c. Heavy duty in vehicle-traffic service areas.

d. Extra heavy duty in roads.

B. Gray-Iron Trench Drains: ASME A112.21.1M, 6-inch- wide top surface, rectangular body with anchor flange or other anchoring device, and rectangular secured grate. Include units of total length indicated and number of bottom outlets with inside calk or spigot connections, of sizes indicated.

1. Manufacturers:

a. Josam Company.

b. Watts Industries, Inc.

c. Watts Industries, Inc.; Enpoco, Inc. Div.

d. Zurn Industries, Inc.; Zurn Specification Drainage Operation.

e. Or equal.

2. Top-Loading Classification(s):

a. Light duty in earth or grass foot traffic areas.

b. Medium duty in paved foot traffic areas.

c. Heavy duty in vehicle-traffic service areas.

d. Extra heavy duty in roads.

2.5 MANHOLES

A. Standard Precast Concrete Manholes: ASTM C 478, precast, reinforced concrete, of depth indicated, with provision for sealant joints.

1. Diameter: 48 inches minimum, unless otherwise indicated.

2. Ballast: Increase thickness of precast concrete sections or add concrete to base section, as required to prevent flotation.

3. Base Section: 6-inch minimum thickness for floor slab and 4-inch minimum thickness for walls and base riser section, and having separate base slab or base section with integral floor.

4. Riser Sections: 4-inch minimum thickness, and lengths to provide required depth approved by Agency's Representative.

5. Top Section: Eccentric-cone type unless concentric-cone or flat-slab-top type is indicated. Top of cone of size that matches grade rings.

6. Joint Sealant: ASTM C 990, bitumen or butyl rubber.

7. Resilient Pipe Connectors: ASTM C 923 cast or fitted into manhole walls, for each pipe connection.

8. Grade Rings: Reinforced-concrete rings, 6- to 9-inch total thickness, to match diameter of manhole frame and cover.

9. Manhole Frames and Covers: Ferrous; 24-inch ID by 7- to 9-inch riser with 4- inch- minimum width flange and 26-inch- diameter cover. Include indented top design with lettering cast into cover, using wording equivalent to "CITY STORM SEWER," and matching the wording used by City of San Buenaventura for similar covers.

a. Material: ASTM A 536, Grade 60-40-18 ductile iron, unless otherwise indicated.

b. Protective Coating: Foundry-applied, SSPC-Paint 16, coal-tar, epoxy- polyamide paint; 10-mil minimum thickness applied to all surfaces, unless otherwise indicated.

B. Designed Precast Concrete Manholes: ASTM C 913; designed according to ASTM C 890 for A-16 (ASSHTO HS20-44), heavy-traffic, structural loading; of depth, shape, and dimensions indicated required, with provision for sealant joints.

1. Ballast: Increase thickness of one or more precast concrete sections or add concrete to manhole, as required to prevent flotation.

2. Joint Sealant: ASTM C 990, bitumen or butyl rubber.

3. Resilient Pipe Connectors: ASTM C 923, cast or fitted into manhole walls, for each pipe connection.

4. Grade Rings: Reinforced-concrete rings, 6- to 9-inch total thickness, to match diameter of manhole frame and cover.

5. Manhole Frames and Covers: Ferrous; 24-inch ID by 7- to 9-inch riser with 4- inch- minimum width flange and 26-inch- diameter cover. Include indented top design with lettering cast into cover, using wording equivalent to "CITY STORM SEWER," and matching the wording used by City of San Buenaventura for similar covers.

a. Material: ASTM A 536, Grade 60-40-18 ductile iron, unless otherwise indicated.

b. Protective Coating: Foundry-applied, SSPC-Paint 16, coal-tar, epoxy- polyamide paint; 10-mil minimum thickness applied to all surfaces.

2.6 CONCRETE

A. General: Cast-in-place concrete according to ACI 318/318R, ACI 350R, and the following:

1. Cement: ASTM C 150, Type II.
2. Fine Aggregate: ASTM C 33, sand.
3. Coarse Aggregate: ASTM C 33, crushed gravel.
4. Water: Potable.

B. Portland Cement Design Mix: 4000 psi minimum, with 0.45 maximum water- cementitious materials ratio.

1. Reinforcement Fabric: ASTM A 185, steel, welded wire fabric, plain, 10 x 10, 6 x 6.
2. Reinforcement Bars: ASTM A 615/A 615M, Grade 60, deformed steel.

2.7 CATCH BASINS

A. Standard Precast Concrete Catch Basins: ASTM C 478, precast, reinforced concrete, of depth indicated, with provision for sealant joints.

1. Base Section: 6-inch minimum thickness for floor slab and 4-inch minimum thickness for walls and base riser section, and having separate base slab or base section with integral floor.
2. Riser Sections: 4-inch minimum thickness, 48-inch diameter and lengths to provide depth indicated.
3. Top Section: Eccentric-cone type unless concentric-cone or flat-slab-top type is indicated. Top of cone of size that matches grade rings.
4. Joint Sealant: ASTM C 990, bitumen or butyl rubber.
5. Grade Rings: Include 2 or 3 reinforced-concrete rings, of 6- to 9 inch total thickness, that match 24-inch-diameter frame and grate.
6. Steps: ASTM A 615/A 615M, deformed, ½-inch steel reinforcing rods encased in ASTM D 4101, PP, wide enough to allow worker to place both feet on 1 step and designed to prevent lateral slippage off of step. Cast or anchor steps into sidewalls at 12- to 16-inch intervals. Omit steps if total depth from floor of catch basin to finished grade is less than 30 inches.
7. Pipe Connectors: ASTM C 923, resilient, of size required, for each pipe connecting to base section.

B. Designed Precast Concrete Catch Basins: ASTM C 913, precast, reinforced concrete; designed according to ASTM C 890 for A-16 (ASSHTO HS20-44) heavy-traffic, structural loading; of depth, shape, and dimensions indicated, with provision for sealant joints.

1. Joint Sealants: ASTM C 990, bitumen or butyl rubber.
2. Grade Rings: Include 2 or 3 reinforced-concrete rings, of 6- to 9-inch total thickness, that match 24-inch-diameter frame and grate.
3. Steps: ASTM A 615/A 615M, deformed, ½-inch steel reinforcing rods encased in ASTM D 4101, PP wide enough to allow worker to place both feet on 1 step and designed to prevent lateral slippage off of step. Cast or anchor steps into sidewalls at 12- to 16-inch intervals. Omit steps if total depth from floor of catch basin to finished grade is less than 30 inches.

C. Cast-in-Place Concrete, Catch Basins: Construct of reinforced concrete; designed according to ASTM C 890 for structural loading; of depth, shape, dimensions, and appurtenances indicated.

1. Bottom, Walls, and Top: Reinforced concrete.
2. Channels and Benches: Concrete.

3. Steps: ASTM A 615/A 615M, deformed, ½-inch steel reinforcing rods encased in ASTM D 4101, PP, wide enough to allow worker to place both feet on 1 step and designed to prevent lateral slippage off of step. Cast or anchor steps into sidewalls at 12- to 16-inch intervals. Omit steps if total depth from floor of catch basin to finished grade is less than 30 inches.

D. Frames and Grates: ASTM A 536, Grade 60-40-18, ductile iron designed for A-16, structural loading. Include flat grate with small square or short-slotted drainage openings.

1. Size: 24 by 24 inches minimum, unless otherwise indicated.

2. Grate Free Area: Approximately 50 percent, unless otherwise indicated.

3. Grates in bicycle pathway shall be suitable for bike tires.

4. Grates in walkways shall have heel proof option.

E. Frames and Grates: ASTM A 536, Grade 60-40-18, ductile iron designed for A-16, structural loading. Include 24 inch ID by 7- to 9-inch riser with 4-inch minimum width flange, and 26-inch-diameter flat grate with small square and short-slotted drainage openings.

1. Grate Free Area: Approximately 50 percent, unless otherwise indicated.

2. Grates in bicycle pathways shall be suitable for bike tires.

3. Grates in walkways shall have heel proof option.

2.8 STORM WATER INLETS

A. Curb Inlets: Made with vertical curb opening, of materials and dimensions according to City of San Buenaventura standards.

B. Gutter Inlets: Made with horizontal gutter opening, of materials and dimensions according to City of San Buenaventura standards. Include heavy-duty frames and grates.

C. Combination Inlets: Made with vertical curb and horizontal gutter openings, of materials and dimensions according to City of San Buenaventura standards. Include heavy-duty frames and grates.

D. Frames and Grates: Heavy-duty frames and grates according to City of San Buenaventura standards, except openings shall not affect bike tires.

PART 3 - EXECUTION

3.1 TRENCHING

A. Trench Excavation: Excavate to depths required in conformance with Section 306-1 of the SSPWC. Confine excavation to work limits.

B. Unclassified Excavation: Remove and dispose of material encountered including rock, shale, earth, fill, pavements foundations, curbs, piping, and debris.

C. The width of the trench at and below the top of the pipe shall be such that the clear space between the barrel of the pipe and the trench wall shall not exceed 9 inches on either side of the pipe. The width of the trench above that level may be as wide as necessary for sheeting and bracing and the proper performance of the work. The pipe bedding shall rest firmly thereon for as nearly the full length of the barrel as proper jointing operations will permit.

D. Excavation for Appurtenances: Excavation for manholes and similar structures shall be sufficient to leave at least 12 inches clear between their outer surfaces and the embankment or timber which may be used to hold and protect the banks. Any over depth excavation below such appurtenances that has not been directed, shall be filled with sand, gravel or concrete as directed, at Design Builder's expense.

E. Refer to Section 31 2000 “Earth Moving” for additional information

3.2 PIPE INSTALLATION

A. Construct pipe accurately to line and grade indicated. Immediately remove and replace pipe not conforming to line and grade.

B. Install piping beginning at low point. Place ball ends of piping upstream.

C. Install gaskets, seals, sleeves and couplings according to manufacturer’s written instructions.

D. Install to manufacturer's recommendations, continuously upgrade. Bell ends face upgrade. Prior to making joints, clean and dry surfaces. Use lubricants in conformance with manufacturer's recommendations for insertion of pipe in joint. Set pipe in position and check line and grade. Keep dirt from entering exposed pipe ends. Make joints watertight.

E. Pipe shall be installed in compliance with ASTM D2321. Bedding material shall provide adequate and uniform support under the pipe. Bedding material shall be as specified in Section 312000, “Earth Moving”.

F. Install manholes for changes in direction unless 12 inch or smaller pipe size. Use fittings for branch connections unless direct tap into existing storm drain and pipe is twice the size of the branch or larger.

G. Install proper size increasers, decreasers and couplings where different sizes or materials of pipes and fittings are connected. Reducing sizes of piping in direction of flow is prohibited.

H. Install corrosion-protection piping encasement over ductile iron pipe and fittings according to ASTM A674 or AWWA C105.

3.3 CLEANOUT INSTALLATION

A. Use cast-iron soil pipe or PVC pipe fittings in pipes at branches for cleanouts and cast iron soil pipe or PVC pipe for riser extensions to cleanouts to match main lines.

1. Provide top-loading classifications as indicated in paragraph 2.3 A 2 above.

2. Set cleanout frames and covers in earth in cast-in-place concrete block, 18 by 18 by 12 inches deep. Set with tops 1 inch above surrounding earth grade.

3. Set cleanout frames and covers in concrete pavement with tops flush with pavement surface.

3.4 DRAIN INSTALLATION

A. Install type of drains in locations indicated.

1. Provide top-loading classification as indicated in paragraph 2.4 A 2 above.

2. Embed drains in 4-inch minimum depth of concrete around bottom and sides.

3. Fasten grates to drains if indicated.

4. Set drain frames and covers with tops flush with pavement surface.

5. Assemble trench sections with flanged joints.

6. Embed trench sections in 4-inch minimum concrete around bottom and sides.

3.5 MANHOLE INSTALLATION

A. General: Install manholes, complete with appurtenances and accessories indicated.

B. Install precast concrete manhole sections according to ASTMC C 891.

C. Construct cast-in-place manholes as indicated.

D. Install PE sheeting on earth where cast-in-place-concrete manholes are to be built.

E. Set tops of frames and covers flush with finished surface of manholes that occur in pavements. Set tops 3 inches above finished surface elsewhere, unless otherwise indicated.

3.6 CATCH BASIN INSTALLATION

A. Construct catch basins to sizes and shapes as indicated or required.

B. Set frames and frates to elevations as indicated or required.

3.7 STORM WATER INLET AND OUTLET INSTALLATION

A. Construct inlet head walls, aprongs, and sides of reinforced concrete.

B. Construct riprap of broken stone.

C. Install outlets that spill onto grade, with flared end sections that match pipe.

D. Construct energy dissipaters at outlets.

3.8 CONCRETE PLACEMENT

A. Place cast-in-place concrete according to ACI 318/318R

3.9 BACKFILL

A. General: Do not backfill until required tests are performed and the piping systems conform to requirements specified herein.

B. One Foot Over Pipe: For pipe bedding material see Section 312000 “Earth Moving”. Backfill material shall be clean soil, free from debris or other unsuitable material. Place and compact bedding material starting at the trench bottom and extending upwards to a distance of 1 foot above top of pipe. Place cover material in 6 inch maximum

1. (compacted) lifts and compact to achieve a minimum of 90% or 95% of maximum density in accordance with ASTM 1557, as required by the geotechnical investigations and report prepared by Geobase, Inc. for this project. Demonstrate method of construction on first section of pipe backfill.

C. Refer to Section 31 2000 “Earthwork” for additional information concerning backfill.

3.10 IDENTIFICATION

A. Install a continuous warning tape 6” above all storm sewer drain lines during backfilling of trenches.

B. In addition, install a continuous tracer wire strapped to all non-ferrous storm sewer system piping. Terminate ends above ground at all applicable structures.

1. Refer to Section 31 2000, “Earth Moving” for warning tape and tracer wire.

3.11 FIELD QUALITY CONTROL

A. Inspect interior of piping to determine whether line displacement or other damage has occurred. Inspect after approximately 24 inches of backfill is in place, and again at completion of Project.

1. Submit separate reports for each system inspection.

2. Defects requiring correction include the following.

a. Alignment: Less than full diameter of inside of pipe is visible between structures.

b. Deflection: Flexible piping with deflection that prevents passage of ball or cylinder of size not less than 92.5 percent of piping diameter.

c. Crushed, broken, cracked, or otherwise damaged piping.

d. Infiltration: Water leakage into piping.

e. Exfiltration: Water leakage from or around piping.

3. Replace defective piping using new materials, and repeat inspections until defects are within allowances specified.

4. Reinspect and repeat procedure until results are satisfactory.

5. Agency will run a camera through completed piping to determine if all work is satisfactory. Replace any defective piping using new materials.

B. Test new piping systems, and parts of existing systems that have been altered, extended, or repaired, for leaks and defects.

1. Do not enclose, cover, or put into service before inspection and approval.

2. Test completed piping systems.

3. Schedule tests and inspections by Agency's Representative with at least 48 hours' advance notice.

4. Submit separate report for each test.

5. Gravity-Flow Storm Drainage Piping: Test according to requirements of Agency's Representative, UNI-B-6, and the following:

a. Exception: Piping with soiltight joints unless required by authorities having jurisdiction.

b. Option: Test plastic piping according to ASTM F 1417.

c. Option: Test concrete piping according to ASTM C 924.

C. Leaks and loss in test pressure constitute defects that must be repaired.

D. Replace leaking piping using new materials, and repeat testing until leakage is within allowances specified.

3.12 CLEANING

A. Clean interior of piping of dirt and superfluous materials. Flush piping with potable water.

END OF SECTION

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IMPORTANT: This form is only a summary list of structural tests and some of the special inspections required for the project. Generally, the structural tests and special inspections noted on this form are those that will be performed by the Geotechnical Engineer of Record, Laboratory of Record, or Special Inspector. The actual complete test and inspection program must be performed as detailed on the DSA approved documents. The appendix at the bottom of this form identifies work NOT subject to DSA requirements for special inspection or structural testing. The project inspector is responsible for providing inspection of all facets of construction, including but not limited to, special inspections not listed on this form such as structural wood framing, high-load wood diaphragms, cold-formed steel framing, anchorage of non-structural components, etc., per Title 24, Part 2, Chapter 17A (2019 CBC).

****NOTE:** Undefined section and table references found in this document are from the CBC, or California Building Code.

KEY TO COLUMNS

1. TYPE	2. PERFORMED BY
Continuous – Indicates that a continuous special inspection is required **Periodic** – Indicates that a periodic special inspection is required **Test** – Indicates that a test is required	**GE** – Indicates that the special inspection shall be performed by a registered geotechnical engineer or his or her authorized representative. **LOR** – Indicates that the test or special inspection shall be performed by a testing laboratory accepted in the DSA Laboratory Evaluation and Acceptance (LEA) Program. See CAC Section 4-335. **PI –** Indicates that the special inspection may be performed by a project inspector when specifically approved by DSA. **SI** – Indicates that the special inspection shall be performed by an appropriately qualified/approved special inspector.

DSA 103-19: LISTING OF STRUCTURAL TESTS & SPECIAL INSPECTIONS (SOILS), 2019 CBC

Table 1705A.6, Table 1705A.7, Table 1705A.8

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Geotechnical Reports: Project has a geotechnical report, or CDs indicate soils special inspection is required by GE

	S1. GENERAL:			
	Test or Special Inspection	**Type**	**Performed By**	**Code References and Notes**
☑	**a.** Verify that: • Site has been prepared properly prior to placement of controlled fill and/or excavations for foundations. • Foundation excavations are extended to proper depth and have reached proper material. • Materials below footings are adequate to achieve the design bearing capacity.	**Periodic**	**GE***	* By geotechnical engineer or his or her qualified representative. (See Appendix for exemptions.)

	S2. SOIL COMPACTION AND FILL:			
	Test or Special Inspection	**Type**	**Performed By**	**Code References and Notes**
☑	**a.** Perform classification and testing of fill materials.	**Test**	**LOR***	* Under the supervision of the geotechnical engineer.
☑	**b.** Verify use of proper materials, densities and inspect lift thicknesses, placement and compaction during placement of fill.	**Continuous**	**GE***	* By geotechnical engineer or his or her qualified representative. (Refer to specific items identified in the Appendix for exemptions where soils SI and testing may be conducted under the supervision of a geotechnical engineer or LOR's engineering manager. In such cases, the LOR's form DSA 291 shall satisfy the soil SI and test reporting requirements for the exempt items.)
☑	**c.** Compaction testing.	**Test**	**LOR***	* Under the supervision of the geotechnical engineer. (Refer to specific items identified in the Appendix for exemptions where soils testing may be conducted under the supervision of a geotechnical engineer or LOR's engineering manager. In such cases, the LOR's form DSA 291 shall satisfy the soil test reporting requirements for the exempt items.)

DSA 103-19: LISTING OF STRUCTURAL TESTS & SPECIAL INSPECTIONS (SOILS), 2019 CBC

Table 1705A.6, Table 1705A.7, Table 1705A.8

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	S3. DRIVEN DEEP FOUNDATIONS (PILES):			
	Test or Special Inspection	**Type**	**Performed By**	**Code References and Notes**
☐	**a.** Verify pile materials, sizes and lengths comply with the requirements.	**Continuous**	**GE***	* By geotechnical engineer or his or her qualified representative.
☐	**b.** Determine capacities of test piles and conduct additional load tests as required.	**Test**	**LOR***	* Under the supervision of the geotechnical engineer.
☐	**c.** Inspect driving operations and maintain complete and accurate records for each pile.	**Continuous**	**GE***	* By geotechnical engineer or his or her qualified representative.
☐	**d.** Verify locations of piles and their plumbness, confirm type and size of hammer, record number of blows per foot of penetration, determine required penetrations to achieve design capacity, record tip and butt elevations and record any pile damage.	**Continuous**	**GE***	* By geotechnical engineer or his or her qualified representative.
☐	**e.** Steel piles.	Provide tests and inspections per STEEL section below.		
☐	**f.** Concrete piles and concrete filled piles.	Provide tests and inspections per CONCRETE section below.		
☐	**g.** For specialty piles, perform additional inspections as determined by the registered design professional in responsible charge.	*	*	* As defined on drawings or specifications.

	S4. CAST-IN-PLACE DEEP FOUNDATIONS (PIERS):			
	Test or Special Inspection	**Type**	**Performed By**	**Code References and Note**
☑	**a.** Inspect drilling operations and maintain complete and accurate records for each pier.	**Continuous**	**GE***	* By geotechnical engineer or his or her qualified representative. (See Appendix for exemptions.)

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Table 1705A.6, Table 1705A.7, Table 1705A.8

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	Test or Special Inspection	**Type**	**Performed By**	**Code References and Note**
☑	**b.** Verify pier locations, diameters, plumbness, bell diameters (if applicable), lengths and embedment into bedrock (if applicable); record concrete or grout volumes.	**Continuous**	**GE***	* By geotechnical engineer or his or her qualified representative. (See Appendix for exemptions.)
☑	**c.** Confirm adequate end strata bearing capacity.	**Continuous**	**GE***	* By geotechnical engineer or his or her qualified representative. (See Appendix for exemptions.)
☑	**d.** Concrete piers.	Provide tests and inspections per CONCRETE section below.		

	S5. RETAINING WALLS:			
	Test or Special Inspection	**Type**	**Performed By**	**Code References and Notes**
☐	**a.** Placement, compaction and inspection of backfill.	**Continuous**	**GE***	**1705A.6.1.** * By geotechnical engineer or his or her qualified representative. (See S2 above).
☐	**b.** Placement of soil reinforcement and/or drainage devices.	**Continuous**	**GE***	* By geotechnical engineer or his or her qualified representative.
☐	**c.** Segmental retaining walls; inspect placement of units, dowels, connectors, etc.	**Continuous**	**GE***	* By geotechnical engineer or his or her qualified representative. See DSA IR 16-3.
☐	**d.** Concrete retaining walls.	Provide tests and inspections per CONCRETE section below.		
☐	**e.** Masonry retaining walls.	Provide tests and inspections per MASONRY section below.		

DSA 103-19: LISTING OF STRUCTURAL TESTS & SPECIAL INSPECTIONS (SOILS), 2019 CBC

Table 1705A.6, Table 1705A.7, Table 1705A.8

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	S6. OTHER SOILS:			
	Test or Special Inspection	**Type**	**Performed By**	**Code References and Notes**
☐	**a.** Soil Improvements	**Test**	**GE***	Submit a comprehensive report documenting final soil improvements constructed, construction observation and the results of the confirmation testing and analysis to CGS for final acceptance. * By geotechnical engineer or his or her qualified representative.
☐	**b.** Inspection of Soil Improvements	**Continuous**	**GE***	* By geotechnical engineer or his or her qualified representative.
☐	**c.**			

DSA 103-19: LISTING OF STRUCTURAL TESTS & SPECIAL INSPECTIONS (CONCRETE), 2019 CBC

Table 1705A.3; ACI 318-14 Sections 26.12 & 26.13

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	C1. CAST-IN-PLACE CONCRETE			
	Test or Special Inspection	**Type**	**Performed By**	**Code References and Notes**
☑	**a.** Verify use of required design mix.	**Periodic**	**SI**	**Table 1705A.3 Item 5, 1910A.1.**
☑	**b.** Identifiy, sample, and test reinforcing steel.	**Test**	**LOR**	**1910A.2;** ACI 318-14 Section 26.6.1.2; DSA IR 17-10. (See Appendix for exemptions.)
☑	**c.** During concrete placement, fabricate specimens for strength tests, perform slump and air content tests, and determine the temperature of the concrete.	**Test**	**LOR**	**Table 1705A.3 Item 6**; ACI 318-14 Sections 26.5 & 26.12.
☑	**d.** Test concrete (f'_c).	**Test**	**LOR**	**1905A.1.15;** ACI 318-14 Section 26.12.
☑	**e.** Batch plant inspection: **Continuous**	**See Notes**	**SI**	Default of **'Continuous'** per **1705A.3.3**. If approved by DSA, batch plant inspection may be reduced to **'Periodic'** subject to requirements in Section **1705A.3.3.1,** or eliminated per **1705A.3.3.2.** See IR 17-13. (See Appendix for exemptions.)
☐	**f.** Welding of reinforcing steel.	Provide special inspection per STEEL, Category S/A4(d) & (e) and/or S/A5(g) & (h) below.		

	C2. PRESTRESSED / POST-TENSIONED CONCRETE (IN ADDITION TO SECTION C1):			
	Test or Special Inspection	**Type**	**Performed By**	**Code References and Notes**
☐	**a.** Sample and test prestressing tendons and anchorages.	**Test**	**LOR**	**1705A.3.4, 1910A.3**
☐	**b.** Inspect placement of prestressing tendons.	**Periodic**	**SI**	**1705A.3.4, Table 1705A.3 Items 1 & 9.**

	Test or Special Inspection	Type	Performed By	Code References and Notes
☐	**c.** Verify in-situ concrete strength prior to stressing of post-tensioning tendons.	**Periodic**	**SI**	**Table 1705A.3 Item 11.** Special inspector to verify specified concrete strength test prior to stressing.
☐	**d.** Inspect application of post-tensioning or prestressing forces and grouting of bonded prestressing tendons.	**Continuous**	**SI**	**1705A.3.4, Table 1705A.3 Item 9;** ACI 318-14 Section 26.13

	C3. PRECAST CONCRETE (IN ADDITION TO SECTION C1):			
	Test or Special Inspection	**Type**	**Performed By**	**Code References and Notes**
☐	**a.** Inspect fabrication of precast concrete members.	**Continuous**	**SI**	ACI 318-14 Section 26.13.
☐	**b.** Inspect erection of precast concrete members.	**Periodic**	**SI***	**Table 1705A.3 Item 10.** * May be performed by PI when specifically approved by DSA.

	C4. SHOTCRETE (IN ADDITION TO SECTION C1):			
	Test or Special Inspection	**Type**	**Performed By**	**Code References and Notes**
☐	**a.** Inspect shotcrete placement for proper application techniques.	**Continuous**	**SI**	**1705A.19, Table 1705A.3 Item 7, 1908A.6, 1908A.7, 1908A.8, 1908A.9, 1908A.11, 1908A.12.** See ACI 506.2-13 Section 3.4, ACI 506R-16.
☐	**b.** Sample and test shotcrete (f'_c).	**Test**	**LOR**	**1908A.5, 1908A.10.**

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Table 1705A.3; ACI 318-14 Sections 26.12 & 26.13

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	C5. POST-INSTALLED ANCHORS:			
	Test or Special Inspection	**Type**	**Performed By**	**Code References and Notes**
☑	**a.** Inspect installation of post-installed anchors	**See Notes**	**SI***	**1617A.1.19, Table 1705A.3 Item 4a (Continuous) & 4b (Periodic), 1705A.3.8** (See Appendix for exemptions). ACI 318-14 Sections 17.8 & 26.13. * May be performed by the project inspector when specifically approved by DSA.
☑	**b.** Test post-installed anchors.	**Test**	**LOR**	**1910A.5.** (See Appendix for exemptions.)

	C6. OTHER CONCRETE:			
	Test or Special Inspection	**Type**	**Performed By**	**Code References and Notes**
☐	**a.**			

DSA 103-19: LISTING OF STRUCTURAL TESTS & SPECIAL INSPECTIONS (MASONRY), 2019 CBC

1705A.4; TMS 602-16, Tables 3 and 4.

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	M1. STRUCTURAL MASONRY: **(f'm = 2000 psi)**			
	Test or Special Inspection	**Type**	**Performed By**	**Code References and Notes**
☑	**a.** Mill certificate indicates compliance with requirements for reinforcement, anchors, ties, fasteners and metal accessories. See item C1(b) for identification, sampling and testing of reinforcing steel.	**Periodic**	**SI***	**2103A.4**; TMS 602-13 Article 1.5B.2 & 2.4. * To be performed by qualified LOR representative. Applicable testing by LOR. See IR 17-10.16 for unidentified reinforcing steel.
☑	**b.** Producer's certificate of compliance for masonry units, mortar and grout materials.	**Test**	**LOR**	**1705A.4, 2103A.2.1, 2103A.3, 2103A.5;** TMS 602-16 Articles 1.5B.2 2.1, 2.2, 2.6A and 2.6B, and Table 6 footnote 3.
☑	**c.** Test masonry (f'_m).	**Test**	**LOR**	**1705A.4. For Unit Strength: 2105A.3** (2114.6.1+); TMS 602-16 Articles 1.4B.2 ,1.5B.1 & 1.5B.2. **For Prism (required when f'_m > 2000 psi):2105A.2;** TMS 602-16 Articles 1.4B.3, 1.4B.4, 1.5B.1 & 1.5B.2.
☑	**d.** Verify proportions or properties of site-prepared, premixed or preblended mortar.	**Periodic**	**SI**	TMS 602-16, Table 3 Item 5, Table 4 Item 1a. DSA PR 20-01.
☑	**e.** Verify proportions or properties of site-prepared, premixed or preblended grout.	**Periodic**	**SI**	TMS 602-16, Table 3 Item 5, Table 4 Item 2d.
☐	**f.** Batch plant inspection:	**See Notes**	**SI**	Default of **'Continuous'** per **1705A.3.3**. If approved by DSA, batch plant inspection may be reduced to **'Periodic'** subject to requirements in Section **1705A.3.3.1,** or eliminated per **1705A.3.3.2.** See IR 17-13. (See Appendix for exemptions.)
☑	**g.** Test core-drilled samples.	**Test**	**LOR**	**2105A.4**. (See Appendix for exemptions.)
☑	**h.** Inspect preparation of prisms.	**Continuous**	**SI**	TMS 602-16 Articles 1.4.B.3 & 1.4.B.4 & Table 4 Item 4.
☑	**i.** Verify size, location and condition of all dowels, construction supporting masonry, etc.	**Periodic**	**SI**	
☑	**j.** Verify size, grade and type of reinforcement, connectors, and anchor bolts. Verify size and location of structural members.	**Periodic**	**SI**	TMS 602-16 Table 4, Items 1c & 3c.

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1705A.4; TMS 602-16, Tables 3 and 4.

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	Test or Special Inspection	**Type**	**Performed By**	**Code References and Notes**
☑	**k.** Inspect placement of reinforcement, anchor bolts, and connectors.	**Continuous**	**SI**	TMS 602-16 Table 4 Item 2c.
☑	l. Placement, consolidation, and reconsolidation of grout.	**Continuous**	**SI**	TMS 602-16 Table 4 Item 3h.
☑	**m.** Inspect placement of masonry units and construction of mortar joints.	**Periodic**	**SI**	TMS 602-16 Table 4 Item 3b.
☑	**n.** Verify preparation, construction and protection of masonry during cold weather (temperature below 40° F) or hot weather (temperature above 90° F).	**Periodic**	**SI***	TMS 602-16 Table 4 Item 3f. * May be performed by the project inspector when specifically approved by DSA.
☑	**o.** Inspect type, size and location of anchors and all other items to be embedded in masonry including other details of anchorage of masonry to structural members, frames and other construction.	**Continuous**	**SI**	TMS 602-16 Table 4 Item 3d.
☑	**p.** Inspect grout space, including mortar protrusions, prior to placement of grout.	**Continuous**	**SI**	TMS 602-16 Table 4 Item 2a.
☐	**q.** Welding of reinforcing steel.	TMS 602-16 Table 4 Item 3e. Provide special inspection per STEEL, Category S/A4(d) & (e) and/or S/A5(g) & (h) below.		

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1705A.4; TMS 602-16, Tables 3 and 4.

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	Test or Special Inspection	**Type**	**Performed By**	**Code References and Notes**
	M2. VENEER OR GLASS BLOCK PARTITIONS:			
	Test or Special Inspection	**Type**	**Performed By**	**Code References and Notes**
☐	**a.** Verify proportions of siteprepared mortar and grout and/or verify certification of premixed mortar.	**Periodic**	**SI**	TMS 602-16 Table 3 Item 5 and Table 4 Items 1a & 2d.
☐	**b.** Inspect placement of units and construction of mortar joints.	**Periodic**	**SI**	TMS 602-16 Table 4 Item 3b.
☐	**c.** Inspect placement of wire, connectors and anchors	**Periodic**	**SI**	TMS 602-16 Table 4 Item 2c.
☐	**d.** Inspect type, size and location of anchors and all other items to be embedded in masonry veneer including details of anchorage of masonry to veneer backing, frames and other construction.	**Periodic**	**SI**	TMS 602-16 Table 4 Item 3d.
☐	**e.** Verify preparation, construction and protection of masonry during cold weather (temperature below 40° F) or hot weather (above 90° F).	**Periodic**	**SI***	TMS 602-16 Table 4 Item 3f. * May be performed by the project inspector when specifically approved by DSA.
☐	**f.** Test adhered veneer bond strength.	**Test**	**LOR**	**1410.2.1**; TMS 402 Article 12.3.2.4. **(Field constructed mock-up laboratory tested in accordance with ASTM C482).**

	M3. POST-INSTALLED ANCHORS IN MASONRY:			
	Test or Special Inspection	**Type**	**Performed By**	**Code References and Notes**
☑	**a.** Inspect installation of postinstalled anchors	**See Notes**	**SI***	**1617A.1.19, 1705A.4, Table 1705A.3 Item 4a (Continuous) & 4b (Periodic);** ACI 318-14 Sections 17.8 & 26.13. * May be performed by the project inspector when specifically approved by DSA. (See Appendix for exemptions.)

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1705A.4; TMS 602-16, Tables 3 and 4.

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	Test or Special Inspection	**Type**	**Performed By**	**Code References and Notes**
☑	**b.** Test post-installed anchors.	**Test**	**LOR**	**1705A.4, 1910A.5.** (See Appendix for exemptions.)

	M4. OTHER MASONRY:			
	Test or Special Inspection	**Type**	**Performed By**	**Code References and Notes**
☐	**a.**			

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1705A.2.1, Table 1705A.2.1; AISC 303-16, AISC 341-16, AISC 358-16, AISC 360-16; AISI S100-16; RCSC 2014; AWS D1.1, AWS D1.2, AWS D1.3, AWS D1.4, AWS D1.8

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	S/A1. STRUCTURAL STEEL, COLD-FORMED STEEL AND ALUMINUM USED FOR STRUCTURAL PURPOSES			
	Test or Special Inspection	**Type**	**Performed By**	**Code References and Notes**
☑	**a.** Verify identification of all materials and: • Mill certificates indicate material properties that comply with requirements. • Material sizes, types and grades comply with requirements.	**Periodic**	*	**Table 1705A.2.1 Item 3a–3c.** 2202A.1**;** AISI S100-16 Section A3.1 & A3.2, AISI S240-15 Section A3 & A5, AISI S220-15 Sections A4 & A6. * By special inspector or qualified technician when performed off-site.
☑	**b.** Test unidentified materials	**Test**	**LOR**	**2202A.1.**
☑	**c.** Examine seam welds of HSS shapes	**Periodic**	**SI**	DSA IR 17-3.
☑	**d.** Verify and document steel fabrication per DSA-approved construction documents.	**Periodic**	**SI**	Not applicable to cold-formed steel light-frame construction, except for trusses (**1705A.2.4**).
☐	**e.** Buckling restrained braces.	**Test**	**LOR**	Testing and special inspections in accordance with IR 22-4.

	S/A2. HIGH-STRENGTH BOLTS:			
	Test or Special Inspection	**Type**	**Performed By**	**Code References and Notes**
☑	**a.** Verify identification markings and manufacturer's certificates of compliance conform to ASTM standards specified in the DSA-approved documents.	**Periodic**	**SI**	**Table 1705A.2.1 Items 1a & 1b, 2202A.1;** AISC 360-16 Section A3.3, J3.1, and N3.2; RCSC 2014 Section 1.5 & 2.1; DSA IR 17-8 & DSA IR 17-9.
☑	**b.** Test high-strength bolts, nuts and washers.	**Test**	**LOR**	**Table 1705A.2.1 Item 1c, 2213A.1**; RCSC 2014 Section 7.2; DSA IR 17-8.
☐	**c.** Bearing-type ("snug tight") connections.	**Periodic**	**SI**	**Table 1705A.2.1 Item 2a, 1705A.2.6, 2204A.2**; AISC 360-16 J3.1, J3.2, M2.5 & N5.6; RCSC 2014 Section 9.1; DSA IR 17-9.
☑	**d.** Pretensioned and slip-critical connections.	*	**SI**	**Table 1705A.2.1 Items 2b & 2c, 1705A.2.6, 2204A.2;** AISC 360-16 J3.1, J3.2, M2.5 & N5.6; RCSC 2014 Sections 9.2 & 9.3; DSA IR 17-9. * "Continuous" or "Periodic" depends on the tightening method used.

	S/A3. WELDING:			
	Test or Special Inspection	**Type**	**Performed By**	**Code References and Notes**
☑	**a.** Verify weld filler material identification markings per AWS designation listed on the DSA-approved documents and the WPS.	**Periodic**	**SI**	**1705A.2.5, Table 1705A.2.1 Items 4 & 5**; AWS D1.1 and AWS D1.8 for structural steel; AWS D1.2 for Aluminum; AWS D1.3 for cold-formed steel; AWS D1.4 for reinforcing steel; DSA IR 17-3.
☑	**b.** Verify weld filler material manufacturer's certificate of compliance.	**Periodic**	**SI**	DSA IR 17-3.
☑	**c.** Verify WPS, welder qualifications and equipment.	**Periodic**	**SI**	DSA IR 17-3.

	S/A4. SHOP WELDING (IN ADDITION TO SECTION S/A3):			
	Test or Special Inspection	**Type**	**Performed By**	**Code References and Notes**
☑	**a.** Inspect groove welds, multi-pass fillet welds, single pass fillet welds > 5/16", plug and slot welds.	**Continuous**	**SI**	**Table 1705A.2.1 Items 5a.1–4;** AISC 360-16 (and AISC 341-16 as applicable); DSA IR 17-3.
☑	**b.** Inspect single-pass fillet welds ≤ 5/16", floor and roof deck welds.	**Periodic**	**SI**	**1705A.2.2, Table 1705A.2.1 Items 5a.5 & 5a.6;** AISC 360-16 (and AISC 341-16 as applicable); DSA IR 17-3.
☐	**c.** Inspect welding of stairs and railing systems.	**Periodic**	**SI**	**1705A.2.1**; AISC 360-16 (and AISC 341-16 as applicable); AWS D1.1 & D1.3; DSA IR 17-3.
☐	**d.** Verification of reinforcing steel weldability other than ASTM A706.	**Periodic**	**SI**	**1705A.3.1**; AWS D1.4; DSA IR 17-3. Verify carbon equivalent reported on mill certificates.
☐	**e.** Inspect welding of reinforcing steel.	**Continuous**	**SI**	**Table 1705A.2.1 Item 5b, 1705A.3.1, Table 1705A.3 Item 2, 1903A.8;** AWS D1.4; DSA IR 17-3.

	Test or Special Inspection	Type	Performed By	Code References and Notes
	S/A5. FIELD WELDING (IN ADDITION TO SECTION S/A3):			
	Test or Special Inspection	**Type**	**Performed By**	**Code References and Notes**
☑	**a.** Inspect groove welds, multi-pass fillet welds, single pass fillet welds > 5/16", plug and slot welds.	**Continuous**	**SI**	**Table 1705A.2.1 Items 5a.1–4;** AISC 360-16 (AISC 341-16 as applicable); DSA IR 17-3.
☑	**b.** Inspect single-pass fillet welds ≤ 5/16".	**Periodic**	**SI**	**Table 1705A.2.1 Item 5a.5;** AISC 360-16 (AISC 341-16 as applicable); DSA IR 17-3.
☐	**c.** Inspect end-welded studs (ASTM A-108) installation (including bend test).	**Periodic**	**SI**	**2213A.2**; AISC 360-16 (AISC 341-16 as applicable); AWS D1.1; DSA IR 17-3.
☐	**d.** Inspect floor and roof deck welds.	**Periodic**	**SI**	**1705A.2.2, Table 1705A.2.1 Item 5a.6;** AISC 360-16 (AISC 341-16 as applicable); AWS D1.3; DSA IR 17-3.
☐	**e.** Inspect welding of structural cold-formed steel.	**Periodic**	**SI***	**1705A.2.5; AWS D1.3; DSA IR 17-3.** The quality control provisions of AISI S240-15 Chapter D shall also apply. * May be performed by the project inspector when specifically approved by DSA.
☐	**f.** Inspect welding of stairs and railing systems.	**Periodic**	**SI***	**1705A.2.1;** AISC 360-16 (AISC 341-16 as applicable); AWS D1.1 & D1.3; DSA IR 17-3. * May be performed by the project inspector when specifically approved by DSA.
☐	**g.** Verification of reinforcing steel weldability.	**Periodic**	**SI**	**1705A.3.1**; AWS D1.4; DSA IR 17-3. Verify carbon equivalent reported on mill certificates.
☐	**h.** Inspect welding of reinforcing steel.	**Continuous**	**SI**	**Table 1705A.2.1 Item 5b, 1705A.3.1, Table 1705A.3 Item 2, 1903A.8;** AWS D1.4; DSA IR 17-3.

DSA 103-19: LISTING OF STRUCTURAL TESTS & SPECIAL INSPECTIONS (STEEL AND ALUMNINUM), 2019 CBC

1705A.2.1, Table 1705A.2.1; AISC 303-16, AISC 341-16, AISC 358-16, AISC 360-16; AISI S100-16; RCSC 2014; AWS D1.1, AWS D1.2, AWS D1.3, AWS D1.4, AWS D1.8

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	Test or Special Inspection	Type	Performed By	Code References and Notes
	S/A6. NONDESTRUCTIVE TESTING:			
	Test or Special Inspection	**Type**	**Performed By**	**Code References and Notes**
☐	**a.** Ultrasonic	**Test**	**LOR**	**1705A.2.1, 1705A.2.5;** AISC 341-16 J6.2, AISC 360-16 N5.5; ANSI/ASNT CP-189, SNT-TC-1A; AWS D1.1, AWS D1.8; DSA IR 17-2.
☐	**b.** Magnetic Particle	**Test**	**LOR**	**1705A.2.1, 1705A.2.5;** AISC 341-16 J6.2, AISC 360-16 N5.5; ANSI/ASNT CP-189, SNT-TC-1A; AWS D1.1, AWS D1.8; DSA IR 17-2.
☐	**c.**	**Test**	**LOR**	

	S/A7. STEEL JOISTS AND TRUSSES:			
	Test or Special Inspection	**Type**	**Performed By**	**Code References and Notes**
☐	**a.** Verify size, type and grade for all chord and web members as well as connectors and weld filler material; verify joist profile, dimensions and camber (if applicable); verify all weld locations, lengths and profiles; mark or tag each joist.	**Continuous**	**SI**	**1705A.2.3, Table 1705A.2.3;** AWS D1.1; DSA IR 22-3 for steel joists only. **1705A.2.4;** AWS D1.3 for cold-formed steel trusses.

	Test or Special Inspection	Type	Performed By	Code References and Notes
	S/A8. SPRAY APPLIED FIRE-PROOFING:			
	Test or Special Inspection	**Type**	**Performed By**	**Code References and Notes**
☐	**a.** Examine structural steel surface conditions, inspect application, take samples, measure thickness and verify compliance of all aspects of application with DSA-approved documents.	**Periodic**	**SI**	**1705A.14.**
☐	**b.** Test bond strength.	**Test**	**LOR**	**1705A.14.6.**
☐	**c.** Test density.	**Test**	**LOR**	**1705A.14.5.**

	Test or Special Inspection	Type	Performed By	Code References and Notes
	S/A9. ANCHOR BOLTS AND ANCHOR RODS:			
	Test or Special Inspection	**Type**	**Performed By**	**Code References and Notes**
☑	**a.** Anchor Bolts and Anchor Rods	**Test**	**LOR**	Sample and test anchor bolts and anchor rods not readily identifiable per procedures noted in DSA IR 17-11.
☐	**b.** Threaded rod not used for foundation anchorage.	**Test**	**LOR**	Sample and test threaded rods not readily identifiable per procedures noted in DSA IR 17-11.

	Test or Special Inspection	Type	Performed By	Code References and Notes
	S/A10. Other Steel			
	Test or Special Inspection	**Type**	**Performed By**	**Code References and Notes**
☐	**a.**			

DSA 103-19: LISTING OF STRUCTURAL TESTS & SPECIAL INSPECTIONS (WOOD), 2019 CBC

1705A.5, Table 1705A.5.7

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	W1. PREFABRICATED WOOD TRUSSES:			
	Test or Special Inspection	**Type**	**Performed By**	**Code References and Notes**
☐	**a.** Inspect fabrication of manufactured open-web trusses.	**Continuous**	**SI**	**1705A.5.5;** DSA IR 23-8.
☑	**b.** Inspect fabrication of manufactured metal-plate-connected trusses.	**Continuous**	**SI**	**1705A.5, 1705A.5.2;** DSA IR 23-4.

	W2. MANUFACTURED WOOD STRUCTURAL ELEMENTS:			
	Test or Special Inspection	**Type**	**Performed By**	**Code References and Notes**
☑	**a.** Inspect fabrication of structural glued-laminated timber.*	**Continuous**	**SI**	* See **1705A.5.4** for exceptions
☐	**b.** Inspect fabrication of cross-laminated timber.	**Continuous**	**SI**	**1705A.5.4**
☐	**c.** Inspect erection of mass timber.	**Peridodic**	**SI**	**Table 1705A.5.7**, Item 2
☐	**d.** Inspect mass timber connections with threaded fasteners, bolts, and/or adhesive anchors other than described in item e below. Inspect concealed mass timber connections.	**Peridodic**	**SI**	**Table 1705A.5.7**, Items 3.1, 3.3, 3.4, 3.5. For threaded fasteners: Verify use of proper installation equipment. Verify use of pre-drilled holes where required. Inspect screws, including diameter, length, head type, spacing, installation angle, and depth.
☐	**e.** Inspect mass timber connections with adhesive anchors installed in a horizontal or upward orientation.	**Continuous**	**SI**	**Table 1705A.5.7**, Item 3.2
☐	**f.** Inspect sealing of mass timber sealants or adhesives.	**Peridodic**	**SI**	**1705A.20, 703.9**

DSA 103-19: LISTING OF STRUCTURAL TESTS & SPECIAL INSPECTIONS (WOOD), 2019 CBC

1705A.5, Table 1705A.5.7

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	W3. OTHER Wood:			
	Test or Special Inspection	**Type**	**Performed By**	**Code References and Notes**
☐	**a.**			

Appendix: Work Exempt from DSA Requirements for Structural Tests / Special Inspections

Application Number:	**School Name:**	**School District:**
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Exempt items given in DSA IR A-22 or the 2019 CBC (including DSA amendments) and those items identified below with a check mark by the design professional are NOT subject to DSA requirements for the structural tests **/** special inspections noted. **Items marked as exempt shall be identified on the approved construction documents**. The project inspector shall verify all construction complies with the approved construction documents.

	SOILS:
☐	1. Deep foundations acting as a cantilever footing designed based on minimum allowable pressures per CBC Table 1806A.2 and having no geotechnical report for the following cases: A) free standing sign or scoreboard, B) cell or antenna towers and poles less than 35'-0" tall (e.g., lighting poles, flag poles, poles supporting open mesh fences, etc.), C) single-story structure with dead load less than 5 psf (e.g., open fabric shade structure), or D) covered walkway structure with an apex height less than 10'-0" above adjacent grade.
☐	2. Shallow foundations, etc. are exempt from special inspections and testing by a Geotechnical Engineer for the following cases: A) buildings without a geotechnical report and meeting the exception item #1 criteria in CBC Section 1803A.2 supported by native soil (any excavation depth) or fill soil (not exceeding 12" depth per CBC Section 1804A.6), B) soil scarification/recompaction not exceeding 12" depth, C) native or fill soil supporting exterior non-structural flatwork (e.g., sidewalks, site concrete ramps, site stairs, parking lots, driveways, etc.), D) unpaved landscaping and playground areas, or E) utility trench backfill.

	CONCRETE/MASONRY:
☐	1. Post-installed anchors for the following: A) exempt non-structural components (e.g., mechanical, electrical, plumbing equipment - see item 7 for "Welding" in the Appendix below) given in CBC Section 1617A.1.18 (which replaces ASCE 7-16, Section 13.1.4) or B) interior nonstructural wall partitions meeting criteria listed in exempt item 3 for "Welding."
☐	2. Concrete batch plant inspection is not required for items given in CBC Section 1705A.3.3.2 subject to the requirements and limitations in that section.
☐	3. Non-bearing non-shear masonry walls may be exempt from certain DSA masonry testing and special inspection items as allowed per DSA IR 21-1.16. Refer to construction documents for specific exemptions accordingly for each applicable wall condition.
☐	4. Epoxy shear dowels in site flatwork and/or other non-structural concrete.

Appendix: Work Exempt from DSA Requirements for Structural Tests / Special Inspections

Application Number:	**School Name:**	**School District:**
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	CONCRETE/MASONRY:
☐	5. Testing of reinforcing bars is not required for items given in CBC Section 1910A.2 subject to the requirements and limitations in that section.

	WELDING:
☐	1. Solid-clad and open-mesh fences, gates with maximum leaf span of 10', and gates with a maximum rolling section of 10' all having an apex height less than 8'-0" above lowest adjacent grade. When located above circulation or occupied space below, these gates/fences are not located within 1.5x gate/fence height (max 8'-0") to the edge of floor or roof.
☐	2. Handrails, guardrails, and modular or relocatable ramps associated with walking surfaces less than 30" above adjacent grade (excluding post base connections per the 'Exception' language in Section 1705A.2.1); fillet welds shall not be ground flush.
☐	3. Non-structural interior cold-formed steel framing spanning less than 15'-0", such as in interior partitions, interior soffits, etc. supporting only self weight and light-weight finishes or adhered tile, masonry, stone, or terra cotta veneer no more than 5/8" thickness and apex less than 20'-0" in height and not over an exit way. Maximum tributary load to a member shall not exceed the equivalent of that occurring from a 10'x10' opening in a 15' tall wall for a header or king stud.
☐	4. Manufactured support frames and curbs using hot rolled or cold-formed steel (i.e., light gauge) for mechanical, electrical, or plumbing equipment weighing less than 2000# (equipment only) (connections of such frames to superstructure elements using welding will require special inspection as noted in selected item(s) for Sections S/A3, S/A4 and/or S/A5 of listing above).
☐	5. Manufactured components (e.g., Tolco, B-Line, Afcon, etc.) for mechanical, electrical, or plumbing hanger support and bracing (connections of such components to superstructure elements using welding will require special inspection as noted in selected item(s) for Sections S/A3, S/A4 and/or S/A5 of listing above).
☐	6. TV Brackets, projector mounts with a valid listing (see DSA IR A-5) and recreational equipment (e.g., playground structures, basketball backstops, etc.) (connections of such elements to superstructure elements using welding will require special inspection as noted in selected item(s) for sections S/A3, S/A4 and/or S/A5 located in the Steel/Aluminum category).
☐	7. Any support for exempt non-structural components given in CBC Section 1617A.1.18 (which replaces ASCE 7-16, Section 13.1.4) meeting the following: A) when supported on a floor/roof, <400# and resulting composite center of mass (including component's center of mass) ≤4' above supporting floor/roof, B) when hung from a wall or roof/floor, <20# for discrete units or <5 plf for distributed systems.

DSA 103-19: LISTING OF STRUCTURAL TESTS & SPECIAL INSPECTIONS(SIGNATURE), 2019 CBC

Application Number:
03-122398

School Name:
Gateway Community School South Annex

School District:
Ventura County office of education

DSA File Number:

Increment Number:

Date Created:
2022-10-28 10:44:21

Name of Architect or Engineer in general responsible charge:

Name of Structural Engineer (When structural design has been delegated):

PETER SARKIS

Signature of Architect or Structural Engineer:

Date:
10-28-2022

Note: To facilitate DSA electronic mark-ups and identification stamp application, DSA recommends against using secured electronic or digital signatures.

DSA STAMP

IDENTIFICATION STAMP
DIV. OF THE STATE ARCHITECT
APP: 03-122398 INC:
REVIEWED FOR
SS ☑ FLS ☑ ACS ☑
DATE: 02/21/2023

DSA 103-19: LIST OF REQUIRED VERIFIED REPORTS, CBC 2019

Application Number:	School Name:	School District:
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1. Soils Testing and Inspection: Geotechnical Verified Report Form DSA 293
2. Structural Testing and Inspection: Laboratory Verified Report Form DSA 291
3. Concrete Batch Plant Inspection: Laboratory Verified Report Form DSA 291
4. Post-installed Anchors: Laboratory Verified Report Form DSA 291, or, for independently contracting SI, Special Inspection Verified Report Form DSA 292
5. Masonry Inspection: Laboratory Verified Report Form DSA 291, or, for independently contracting SI, Special Inspection Verified Report Form DSA 292
6. Shop Welding Inspection: Laboratory Verified Report Form DSA 291, or, for independently contracting SI, Special Inspection Verified Report Form DSA 292
7. Field Welding Inspection: Laboratory Verified Report Form DSA 291, or, for independently contracting SI, Special Inspection Verified Report Form DSA 292
8. High-Strength Bolt Installation Inspection: Laboratory Verified Report Form DSA 291, or, for independently contracting SI, Special Inspection Verified Report Form DSA 292
9. Mass Timber Inspection: Laboratory Verified Report Form DSA 291 , or, for independently contracting SI, Special Inspection Verified Report Form DSA 292
10. Wood Truss Fabrication Inspection: Laboratory Verified Report Form DSA 291 , or, for independently contracting SI, Special Inspection Verified Report Form DSA 292

GEOTECHNICAL ENGINEERING REPORT
GATEWAY COMMUNITY SCHOOL
NEW SOUTH ANNEX
AND EXISTING CAMPUS MODERNIZATION
CAMARILLO, CALIFORNIA

Project No.: 300852-003
September 3, 2021
(Revised May 18, 2022)

PREPARED FOR

Ventura County Office of Education
5189 Verdugo Way
Camarillo, California 93012

BY

EARTH SYSTEMS PACIFIC
1731-A WALTER STREET
VENTURA, CALIFORNIA

Earth Systems
1731 Walter Street, Suite A | Ventura, CA 93003 | Ph: 805.642.6727 | www.earthsystems.com

September 3, 2021
Revised May 18, 2022

Project No.: 300852-003
Report No.: 21-9-24

Ventura County Office of Education
Attention: David Fateh
5189 Verdugo Way
Camarillo, California 93012

Project: Gateway Community School
New South Annex and Existing Campus Modernization
Camarillo, California
Subject: Engineering Geology and Geotechnical Engineering Report

As authorized, Earth Systems Pacific (Earth Systems) has performed an engineering geology and geotechnical engineering study for the Gateway Community School in Camarillo, Ventura County, California. Construction includes a proposed a new south annex at 550 Airport Way consisting of an 8-classroom building and new shade shelters, and a modernization of the existing campus at 200 Horizon Drive consisting of a proposed modular shade shelter. The accompanying Engineering Geology and Geotechnical Engineering Report presents the results of our site exploration and testing, research of existing geotechnical data, and our conclusions and recommendations pertaining to geological and geotechnical aspects of project design. This report completes our scope of services presented in our proposal July 13, 2021 and authorized by you on August 13, 2021.

We have appreciated the opportunity to be of service to you on this project. Please call if you have any questions, or if we can be of further service.

Respectfully submitted,
EARTH SYSTEMS PACIFIC

Richard M. Beard
Geotechnical Engineer

REGISTERED PROFESSIONAL ENGINEER
RICHARD MICHAEL BEARD
GE 128
EXP. 12-31-23
GEOTECHNICAL
STATE OF CALIFORNIA
18 May 2022

Patrick Boales
Engineering Geologist
5-18-22

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Copies: 4 - Ventura County Office of Education (3 mail, 1 email)
1 - Project File

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INTRODUCTION

Project Description

This project consists of constructing a Gateway Community School South Annex consisting of an 8-classroom building and two shade shelters at 550 Airport Way, and a Gateway Community School Modernization consisting of a modular shade shelter at 200 Horizon Drive, in Camarillo, Ventura County, California. The new 8-classroom building will be a 20,000 square-foot single-story building and is expected to have a slab-on-grade floor and to be supported by conventional spread foundations. The accompanying three-point fabric shade shelters will be pole-supported. The rectangular shade structure at 200 Horizon Drive will have a 7-foot by 24-foot footprint. Ancillary improvements may include new auto parking areas, a stormwater infiltration system, and landscaping.

Earth Systems prepared an Engineering Geology and Geotechnical Engineering Report for the Triton Academy in 2017 (CGS Application No. 03-CGS3320), which was located at the 550 Airport Way site. That project involved temporary buildings that have been removed.

Grading for the current project is expected to be limited to preparing the ground to receive the proposed shade shelters, building, and pavements. Existing pavement in the project areas is anticipated to be removed from the site. Surface elevations after grading are expected to be about the same as they were when this report was prepared.

Continuous foundation loads are not expected to exceed 1.5 kip per lineal foot and maximum column loads are not expected to about 20 kips. If actual loads vary significantly from these assumed loads, Earth Systems should be notified since reevaluation of the recommendations contained in this report may be required.

Previous Engineering Geology and Geotechnical Engineering Studies

Gateway School. In 1989, Pacific Materials Laboratory, Inc., prepared a Soils Exploration report for proposed Gateway High School on the south side of Durley Avenue at the Camarillo Airport. This site is now known as 200 Horizon Circle. The school was constructed in 1989-1990. Soil exploration was to 40 feet below the ground surface. Samples were taken various depth intervals with a 2.5-inch inside-diameter split-barrel sampler. Groundwater was measured at a depth of 8.75 feet. The proposed shade shelter at the existing Gateway Community School is on the east side of and immediately adjacent to this building.

Reserve Officer Training Facility. In 1992, Buena Engineers, Inc. prepared a Geotechnical Engineering Report for reserve officer training facility at the Camarillo Airport. Site exploration included a hollow-stem auger boring to a maximum depth of 40 feet. Either California ring samples were taken, or standard penetration tests were performed, at a maximum of 5-foot intervals. Groundwater was encountered at a depth 28 feet, but the report notes that soils appeared to be saturated at more shallow depths. This site is about 450 feet northeast of the existing Gateway Community School.

Frontier High School Lunch Shelter. An Engineering Geology and Geotechnical Engineering Report was prepared for this site in 2010 for a proposed 20-foot by 30-foot lunch shelter by Earth Systems Southern California. The site is located at 545 Airport. Soil exploration by the mud-rotary technique was to a depth of 50 feet. Either California ring samples were taken, or standard penetration tests were performed, at a maximum of 5-foot intervals. Groundwater was encountered at a depth of about 10 feet. This site is about 730 feet southwest of the existing Gateway Community School and about 350 feet northwest of the proposed 8-classroom campus for Gateway Community School.

Triton Academy. Between approximately 2018 and 2020, the project site served as a temporary location for the Triton Academy. A building that had occupied the site was removed, and the site was paved with asphalt concrete before the Triton Academy was constructed. The buildings of the academy were supported with temporary foundations. Earth Systems prepared an Engineering Geology and Geotechnical Engineering Report for the Triton Academy project (Earth Systems, 2017). Soil exploration was to 50 feet below the ground surface with a cone penetrometer test sounding was taken to a depth of 50 feet, and several hollow-stem auger borings were drilled to a depth of 11.5 feet. Groundwater was encountered at a depth of 8 feet. Data from this report are the basis for the geotechnical recommendations prepared for the 8-classroom building and three-point fabric shade shelters.

Oxnard College Fire Academy. In 2020, Earth Systems Pacific prepared an Engineering Geology and Geotechnical Engineering Report for a 12,200 square-foot one-story building and associated parking areas. Soil exploration was to a depth of 50 feet with a cone penetration test sounding and hollow-stem auger borings to a maximum depth of 31.5 feet. Either California ring samples were taken, or standard penetration tests were performed, at a maximum of 5-foot intervals. Groundwater was encountered at a depth of 8 feet. This site is about 500 feet southeast of the existing Gateway Community School and about 850 feet northeast of the proposed 8-classroom campus for Gateway Community School.

Frontier High School Multi-Use Building and Portable Classrooms. In 2021, Earth Systems Pacific prepared an Engineering Geology and Geotechnical Engineering Report for a 6,000 square-foot multi-use building and a 3,900 square-foot portable classroom building. Soil exploration was to a depth of 60 feet with a cone penetration test sounding and with a mud-rotary boring to a maximum depth of 56.5 feet. In the boring, either California ring samples were taken, or standard penetration tests were performed, at a maximum of 5-foot intervals. Groundwater was encountered at a depth of 10 feet. This site is about 800 feet southwest of the existing Gateway Community School and about 500 feet northwest of the proposed 8-classroom campus for Gateway Community School.

The locations of these studies in relation to the project sites is shown on the Boring Location Map presented in Appendix A.

Purpose and Scope of Work

The purpose of this geotechnical study was to evaluate the soil conditions that might impact development of the proposed construction sites and to prepare geotechnical recommendations for site development and design. The soil conditions evaluated include surface and subsurface soil types, liquefaction potential, expansion potential, settlement potential, hydroconsolidation potential, bearing capacity, and the presence or absence of subsurface water. The scope of our work included:

1. Performing a reconnaissance of the site.
2. Drilling, sampling, and logging four 8-inch diameter hollow stem auger borings, all drilled with a truck-mounted drill rig and performing one cone penetrometer test (CPT) sounding.
3. Laboratory testing soil samples obtained from the subsurface exploration to determine their physical and engineering properties.
4. Reviewing geotechnical data and recommendations from report for the original Gateway High School (Pacific Materials Laboratory, Inc, 1989), the Camarillo Airport Reserve Officers Training Facility (Buena Engineers, Inc., 1992), the Frontier High School Lunch Shelter (Earth Systems Southern California, 2010), the Oxnard College Fire Academy (Earth Systems Pacific, 2019), and the Frontier High School Multi-Use Building and Portable Classrooms (Earth Systems Pacific, 2021).
5. Consulting with Owner representatives.
6. Analyzing the geotechnical data obtained.
7. Preparing this report.

Contained in this report are:

1. Descriptions and results of field and laboratory tests that were performed.
2. Discussions pertaining to the soil and groundwater conditions, and geologic hazards.
3. Conclusions and recommendations pertaining to site grading and structural design.

Site Setting

The new south annex is scheduled for construction at 550 Airport Way in the southeast corner of the Camarillo Airport in the City of Camarillo, California. When our site visit was made, the proposed building and shade shelter areas were vacant, paved with asphalt, and fenced. The site is near level with drainage to the south. The geographic coordinates of the project site are 34.2064˚ North Latitude and 119.0758° West Longitude.

The south annex area is bordered by an asphalt paved parking lot, a strip of landscaping with lawn and trees, and the asphalt paved street Airport Way to the west, a strip of landscaping with lawn and trees, and an asphalt paved parking lot of ACE Charter High School to the south, lawns and office buildings of ACE Charter High School to the east, and the asphalt paved street Horizon Circle and Phoenix School to the north.

The area of the shade shelter to be constructed at 200 Horizon Circle in the City of Camarillo, is about 650 feet north of the project site at 550 Airport Way. This area is paved with asphalt and is being used as a basketball court. The site is level with no obvious surface drainage direction. The geographic coordinates of the project site are 34.2083˚ North Latitude and 119.0748° West Longitude.

This proposed shade shelter area is bordered by a small buildings and basketball courts to the east, Horizon Circle to the south, the existing Gateway Community School building to the west, and asphalt paving, small buildings and Durley Avenue to the north.

GEOLOGY

The sites lie within the Oxnard Plain area of the Ventura basin in the western portion of the Transverse Ranges geologic province. Numerous east-west trending folds and reverse faults indicative of ongoing north-south transpressional tectonics characterize the region. Ongoing

folding and uplift have tilted Pleistocene to Tertiary age sedimentary rocks in the region. Recent alluvium blankets the bedrock units in the vicinity of the campus.

Neither the existing Gateway Community School campus nor the proposed south annex is within any of the Fault Rupture Hazard Zones that have been delineated by the State of California. The Simi-Santa Rosa fault is the fault that is nearest to the sites. It is a north dipping reverse fault that generally parallels the north side of the Camarillo area. At its closest position it is approximately 1.3 miles to the northwest of the campus. Portions of this fault are considered ”active” by the State.

Bedrock was not encountered during the subsurface investigation, nor was it encountered during subsurface exploration for any of the project reviewed, and it is anticipated that it is located more than one hundred feet below the existing ground surface. A thin veneer of artificial fill (Af) overlies the site. Natural earth materials underlying the subject site are deltaic alluvial deposits (Qal). A geologic section of the site is presented in Appendix A.

Bedding attitudes were not measured within the alluvial deposits, but it is considered likely that bedding is oriented nearly parallel to the natural ground surface.

GEOLOGIC HAZARDS

Geologic hazards that may impact a site include seismic shaking, fault rupture, landsliding, liquefaction and related effects, seismic-induced settlement of dry sands, and flooding.

Seismic Shaking

Southern California is a seismically active region where the potential for significant ground shaking is universal. Earthquakes of a size large enough to cause structural damage are relatively common in the region. Per the State of California guidelines for these types of reports, when evaluating the seismicity potential of a specific site, it is general practice to look at the historical seismic record of the area and also review the site location with respect to mapped potentially active and active faults. By using this procedure, estimates of maximum ground accelerations are determined for consideration in structural design for buildings. The geotechnical community uses the method even though most are well aware of its shortcomings. The most significant shortcomings relate to the presence of unknown seismogenic faults well below the surface, and the amount of uncertainty regarding the time intervals between earthquake events on many of the recognized faults. The 1983 Coalinga and 1994 Northridge Earthquakes are examples of relatively large events that

occurred on previously unrecognized faults. Man has only been using instruments to monitor earthquakes since the 1930's, which is a relatively short time span considering that the intervals between large earthquakes on some of the regional faults are on the order of thousands of years. Considering the above, an evaluation of site acceleration potential will lead to a value that must be considered an approximation. The structural designers must be aware that there are inherent uncertainties in the determined value or range.

The Camarillo area has not experienced any local large earthquakes since records have been kept; however, regional earthquakes have led to significant ground shaking and structural damage. Notable regional earthquakes include the 1812 Santa Barbara Channel and 1857 Fort Tejon events. The epicenter of the 1812 earthquake is thought to have been in the western part of the Santa Barbara channel. Associated with this earthquake, a tsunami with a disputed run up height of up to 15 feet impacted the Ventura coastal area. On January 9, 1857, the Fort Tejon earthquake with an estimated Richter magnitude of 8.25 impacted the region. According to C.D.M.G. (1975), the earthquake caused the roof of the Mission San Buenaventura to fall in.

One measure of ground shaking is intensity. The Modified Mercalli Intensity Scale of ground shaking ranges from I to XII with XII indicating the maximum possible intensity of ground movement. Structural damage begins to occur when the intensity exceeds a value of VI. Southern Ventura County has been mapped by the California Division of Mines and Geology to delineate areas of varying predicted seismic response. The Alluvium that underlies the subject area is mapped as having a probable maximum intensity of earthquake response of approximately IX on the Modified Mercalli Scale. Historically, the highest estimated intensity in the Camarillo area has been VI (CDMG, 1975, 1994).

The school sites, like other sites in the region, are subject to relatively severe ground shaking in the event of a maximum earthquake on a nearby fault. A regional fault map that shows the site's relationship to the identified faults in the region is included in Appendix C. A summary table of well-identified faults within a 34-mile radius of the school is provided in Appendix C. The table includes the distance between each fault and the school, and the mean earthquake magnitudes that could occur on each of the listed faults. A proprietary program utilizing the State of California’s fault model (CGS and USGS, 2008) was used to prepare the list.

It is assumed that the 2019 CBC and ASCE 7-16 guidelines will apply for the seismic design parameters used in design. The 2019 CBC includes several seismic design parameters that are influenced by the geographic site location with respect to active and potentially active faults, and

with respect to subsurface soil or rock conditions. The "general procedure" (i.e., probabilistic) seismic design parameters presented below were retrieved from the U.S. Seismic Design Maps web services using the SEAOC/OSHPD website which presents the data in a report format. The data were retrieved for ASCE 7-16 design code, site coordinates 34.4360° North Latitude and 119.6901° West Longitude, Soil Site Class D (for stiff soils), for Occupancy (Risk) Category III (which includes public school buildings). (A listing of the calculated 2019 CBC and ASCE 7-16 Seismic Parameters is presented below and again in Appendix D.) Because of the proximity of the two sites, it is believed that these data can be applied to both the proposed south annex and the existing campus modernization.

Summary of Seismic Parameters – 2019 CBC "General Procedure"

Site Class (ASCE 7-16)	D
Occupancy (Risk) Category	III
Seismic Design Category	See CBC Section 11.4.8
Maximum Considered Earthquake (MCE) Ground Motion	
Spectral Response Acceleration, Short Period – S_s	1.683 g
Spectral Response Acceleration at 1 sec. – S_1	0.623 g
Site Coefficient – F_a	1.00
Site Coefficient – F_v	See CBC Section 11.4.8
Site-Modified Spectral Response Acceleration, Short Period – S_{MS}	1.683 g
Site-Modified Spectral Response Acceleration at 1 sec. – S_{M1}	See CBC Section 11.4.8
Design Earthquake Ground Motion	
Short Period Spectral Response – S_{DS}	1.122 g
One Second Spectral Response – S_{D1}	See CBC Section 11.4.8
Site Modified Peak Ground Acceleration - PGA_M	0.810 g
Values appropriate for a 2% probability of exceedance in 50 years	

The seismic factor S1 is greater than 0.2 g and the Site Class is "D". If the structural engineer determines that the exemptions of Section 11.4.8 of ASCE 7-16 do not apply, a site-specific (i.e., deterministic) ground motion hazard analysis is required. The site-specific study considers soil amplification effects. The United States Geological Survey (USGS, 2009) has undertaken probabilistic earthquake analyses that covers the continental United States. A reasonable site-

specific spectral response curve may be developed from USGS Unified Hazard Tool web page, which adjusts for site-specific ground factors. The interactive webpage appears to be a precise calculation based on site coordinates. For the purposes of this study, the Dynamic: Conterminous U.S. 2014 (Update) (Version 4.20) values have been chosen for use in the analysis. A velocity of 259 meters per second has been utilized for Site Class D soils that underlie the site.

NGA West 2014 attenuation relationships were used in the analyses. These attenuations included those of Abrahamson, Silva and Kamai, Boore and Stewart, Campbell and Bozorgnia, Chiou and Youngs, and Idriss.

Summary of Seismic Parameters – 2019 CBC "Site-Specific Procedure"

Site Class (ASCE 7-16)	D
Occupancy (Risk) Category	III
Seismic Design Category	D
Maximum Considered Earthquake (MCE) Ground Motion	
Spectral Response Acceleration, Short Period – S_s	1.683 g
Spectral Response Acceleration at 1 sec. – S_1	0.623 g
Site Coefficient – F_a	1.00
Site Coefficient – F_v	2.50
Site-Modified Spectral Response Acceleration, Short Period – S_{MS}	1.819 g
Site-Modified Spectral Response Acceleration at 1 sec. – S_{M1}	1.589 g
Design Earthquake Ground Motion	
Short Period Spectral Response – S_{DS}	1.213 g
One Second Spectral Response – S_{D1}	1.059 g
Site Modified Peak Ground Acceleration - PGA_M	0.778 g
Values appropriate for a 2% probability of exceedance in 50 years	

California has had several large earthquakes in this century, and studies on the structural effects of the ground shaking have led to changes in the building codes. After the 1933 Long Beach Earthquake, the State of California Field Act was written with the intention of making public schools more earthquake resistant. The intent of the act, as is the intent of the most modern codes, is as follows: "School buildings constructed pursuant to these regulations are expected to resist

earthquake forces generated by major earthquakes in California without catastrophic collapse, but may experience some repairable architectural or structural damage". Following the 1971 San Fernando Earthquake, many changes were made to the public school building codes. After the 1994 Northridge Earthquake, a study of 127 public schools in the Los Angeles area by the State of California Division of the State Architect (1994a) revealed that the intent of the Field Act was being met even when buildings were subjected to horizontal accelerations approaching 0.9 g (much higher than expected) over a large area. None of the schools collapsed and most of the damage that would have caused injury to students, had school been in session, was from failures of non-structural items such as light fixtures, florescent bulbs, suspended ceilings, etc. Most of the schools that experienced these non-structural failures were built before the changes to the building code that applied to these non-structural items. The study also resulted in recommended changes to building codes regarding steel framed school buildings, (State of Calif. Div. of State Architect, 1994b).

Fault Rupture

Surficial displacement along a fault trace is known as fault rupture. Fault rupture typically occurs along previously existing fault traces. No faults were observed to be located on or trending into either site during the field study, during reviews of the referenced geologic literature, or during review of the aerial photographs taken of the sites. As a result, it is the opinion of this firm that the potential for fault rupture on these sites is low.

Landsliding and Rock Fall

As mentioned previously, the subject sites are relatively flat. Furthermore, no landslides were observed to be located on or trending into the subject property during the field study, during reviews of the referenced geologic literature, or during review of the aerial photographs taken of the site. As a result, it appears that the hazards posed by landsliding and rock fall are considered nil.

Liquefaction

Earthquake-induced cyclic loading can be the cause of several significant phenomena, including liquefaction. Fine sands and silty sands that are poorly graded and lie below the groundwater table are the soils most susceptible to liquefaction. Soils that have cone penetrometer soil behavior type indices (I_c values) greater than 2.6, soils with plasticity indices (PIs) greater than 7, soils that are sufficiently dense soils, and/or soils located above the groundwater table are not generally susceptible to liquefaction. Liquefaction results in a loss of soil strength and can cause structures to settle and, in extreme cases, to experience bearing failure. Cyclic softening in clays during

earthquakes has resulted in buildings experiencing foundation failure and ground surface deformation similar to that resultant from liquefaction. If liquefaction or cyclic softening occurs beneath sloping ground, a phenomenon known as lateral spreading can occur. Liquefaction and cyclic softening are typically limited to the upper 50 feet of the subsurface soils.

There are a number of conditions that need to be satisfied for liquefaction or cyclic softening to occur. Of primary importance is that groundwater, perched or otherwise, usually must be within the upper 50 feet of soils. In order for liquefaction to occur, a potentially liquefiable soil must be saturated and subjected to rapid cyclic loading that is sufficiently intense to overcome a soil's internal resistance to liquefaction.

The subject sites are located within one of the Liquefaction Hazard Zones delineated by the State of California (CGS, 2002b).

An examination of the conditions existing at the south annex, in relation to the criteria listed above, indicates the following:

1. Groundwater was found under this site at a depth of approximately 8.7 feet in Boring B-1, and at 8.9 feet in Borings B-2, and B-3 (see boring logs in Appendix A). It was not encountered in Boring B-4, which was only advanced to a depth of 3 feet. A mapping of historic high groundwater levels in the subject area by the State shows the site to have a high groundwater level of about 10 feet below the surface (CGS, 2003a). Refer to the Historical High Groundwater Map in Appendix A. Based on these data, high groundwater was conservatively assumed to be at a depth of 8 feet for liquefaction analysis.
2. Ic values indicate that about 30 percent the soil profile has grain size distribution of potentially liquefiable soils.
3. CPT tip resistance of some of the soils identified as potentially liquefiable based on grain size distribution, also have CPT tip resistance values below what is considered a threshold for strength resistance to liquefaction (160 tsf).

The majority (about 35 feet) of the alluvial soils encountered in CPT-1 were determined to be non-liquefiable either because the soil is above the high groundwater level used for liquefaction analysis, or because the soil's I_c was determined to be 2.6 or higher by interpreting the CPT log.

Based on the above, a cyclic mobility analysis was undertaken to analyze the liquefaction potentials of the various soil layers. The analysis was performed in general accordance with the methods

proposed by NCEER (Youd, et al., 2001) using the computer program CLiq developed by Geologismiki. In the analysis, the design earthquake was considered to be a 7.4 moment magnitude event with the "site specific" peak ground acceleration of 0.778 g, as per the discussion in the "Seismicity and Seismic Design" section of this report. The moment magnitude of 7.4 is the largest mean moment magnitude of nearby faults. A groundwater depth of 8 feet, higher that both the historical high groundwater depth (10 feet) and the measured groundwater depth (8.7 feet) was used in the analysis.

The analysis indicated about 8 soil zones with liquefaction potential, and a total of about 1.4 inches of seismically induced settlement. Most of the settlement is predicted to occur in two soil zones, one between about 9 and 10 feet below the ground surface and the other between about 25 and 28 feet below the ground surface. Because of the high PGA_M used in the analysis, potentially liquefiable soil layers had a factor of safety less than 1.0, and the non-liquefiable soil layers had factors of safety of 2.0 (or greater). Appendix D includes the calculations and graphical presentations of the results, and the more significant potentially liquefiable layers are depicted on the Geologic Section in Appendix A . Liquefiable layers less than 1 foot thick are not depicted.

Surface Manifestations of Liquefaction

No "surface manifestations" of liquefaction are expected. Examples of surface manifestations of liquefaction are sand boils and ground cracks. The potential for surface manifestation of liquefaction is evaluated using boundary curves developed by Ishihara (1985) in which the thickness of liquefiable sand is plotted against the thickness of its overlying surface layer. For the most-shallow potentially liquefiable layer (1-foot thick with 9 feet of cover), and another thick and potentially liquefiable layer (3 feet thick with 24.5 feet of cover), the intersection of the liquefiable layer and overlying soil layer thicknesses plot to the right and well below Ishihara's boundary curves. This indicates that surface manifestations are unlikely. All other potentially liquefiable layers are as thin or thinner (1 foot or less), and deeper, than either of the layers just discussed, and would plot similarly.

Although the analysis predicts that there will be no ground damage, there is a potential for differential areal settlement suggested by the findings. As mentioned previously, the predicted total potential liquefaction-related settlement is about 1.4 inches. There is also a potential for seismic-induced settlement of dry sands of up to about 0.04 inch predicted, but that is inconsequential and will be ignored. According to SCEC (1999), up to about half of the combination of these total settlements could be realized as differential settlement. As a result, differential settlement could range up to about 0.7 inch at the ground surface. Given the depth at which the

majority of this would occur, it is estimated that 0.7 inch of differential settlement could occur over a distance of 40 feet.

The estimated total seismic-induced settlement is similar to what was estimated for the Oxnard College Fire Academy, Frontier High School's Multi-Use Building, and Frontier High School's Lunch Shelter, 1.0, 1.3, and 1.8 inches, respectively. This suggests that the seismic behavior of soils in the vicinity of the sites is fairly uniform, and the results can be applied to the existing campus modernization.

Liquefaction Related Bearing Failure

Another potential hazard resulting from liquefaction is bearing failure. According to the Southern California Earthquake Center (2002), there are no recognized methods for evaluating bearing failure resulting from liquefaction. That report recommends using the Ishihara method for analyzing surface manifestations with the bottom of the foundation as the top of the surface layer, and checking if the foundation induced vertical stress at the top of the liquefiable layer is less than 10 percent of the foundation bearing pressure. We assumed a foundation depth of 2 feet to check the Ishihara method and surface manifestations are not predicted. For the assumed foundation loads and bearing capacities provided in this report, for both continuous foundations and pad foundations embedded two feet into the ground, the vertical stress at the top of the first liquefiable layer will be less than 10 percent of the bearing pressure. Based on these analyses, bearing failures related to liquefaction are considered unlikely.

Cyclic Softening Related Bearing Failure

Bearing failure can also be caused by cyclic softening of clay soils. The CPT interpretation identified some clay soil layers as being sensitive. The level of sensitivity was estimated by comparing the undrained shear strength of these layers to their CPT friction value, which is a remolded soil strength value. Only a layer of clay at a depth of 20 feet had a high sensitivity (9.3). However, this layer will be about 18 feet below the foundations for the proposed structure, which is too far to have any influence on the foundation bearing capacity. Hence, cyclic softening does not appear to be a hazard for the foundations of the proposed classroom building.

Cyclic softening was evaluated for the Frontier High School Multi-Use Building and the Oxnard College Fire Academy projects. Neither found post seismic effects of cyclic softening to be significant. Hence, this phenomenon does not appear to be significant in the area, which includes the existing campus modernization.

Lateral Spreading

Lateral spreading is a phenomenon involving lateral movement of soils on or near a slope that have been temporarily weakened due to liquefaction. Lateral spreading can be experienced as two different types of phenomena.

One is where a free face slope is near the site. This type of lateral spreading does not appear to pose a potential hazard because there are no nearby sloped areas or canyons (Bartlett and Youd, 1995).

Ground oscillation, which is the other type of lateral spreading, occurs where sites are gently sloping, but not adjacent to sloped areas or canyons. It can pose a hazard when standard blow counts (N1(60)) in the zones of potential liquefaction are less than 15 (Bartlett and Youd, 1995). According to our Log of CPT Sounding and Interpretations in Appendix A, the correlated standard blow counts for the liquefiable zones in CPT-1 are greater than 15. Therefore, the potential for ground oscillation-type of lateral spreading at the project sites is considered to be low.

A review of the lateral spreading predicted at nearby sites revealed similar estimates. The estimates were 0.6 feet, 0.6 feet, and nil at the Oxnard College Fire Academy, Frontier High School's Multi-Use Building, and Frontier High School's Lunch Shelter, respectively. This suggests that the lateral spreading of soils in the vicinity of the sites, including the existing campus modernization, is fairly uniform and not of large magnitude

Seismic-Induced Settlement of Dry Sands

Dry (unsaturated) soils tend to settle and densify when subjected to earthquake shaking. The amount of settlement is a function of relative density, cyclic shear strain magnitude, and the number of strain cycles. A procedure to evaluate this type of settlement was developed by Seed and Silver (1972) and later modified by Pyke, et al. (1975). Tokimatsu and Seed (1987) presented a simplified procedure that has been reduced to a series of equations by Pradel (1998).

The computer program CLiq used to analyze liquefaction potential, also analyzes cyclic-induced settlement of dry sands. The analysis is presented in Appendix D, and it indicates only 0.04 inch of settlement from this phenomenon. This is minor and can be ignored.

The amounts of this type of settlement estimated at the Frontier High School Multi-Use Building was 0.1 inch, and at the Oxnard College Fire Academy it was nil. However, about 1.3 inches of seismic induced settlement of dry sands was estimated for the Frontier High School Lunch Shelter

project. Fortunately, if this is the case, recompaction soils to a depth of 5 feet will eliminate all but about 0.5 inch of this settlement.

Flooding

Earthquake-induced flooding types include tsunamis, seiches, and reservoir failure. Due to the inland location of the site and distance from reservoirs, hazards from tsunamis and seiches are considered extremely unlikely.

According to the Ventura County General Plan Hazards Appendix (2013), this site, like most of the Oxnard Plain, is within a dam failure inundation zone. Proper maintenance of reservoirs is anticipated, and assuming the maintenance continues as planned, the hazard posed by dam failure appears to be low.

The sites are located within an area designated by the FEMA Flood Map Service Center website as Zone X, which is designated as an “area of minimal flood hazard". As a result, it appears that the hazard posed by storm-induced flooding is low.

HYDROCONSOLIDATION

Hydroconsolidation is a phenomenon in which naturally occurring soil deposits, or non-engineered fill soils, collapse when wetted. Natural soils that are susceptible to this phenomenon are typically aeolian, debris flow, alluvial, or colluvial deposits with high apparent strength when dry. The dry strength is attributed to salts, clays, silts, and in some cases, capillary tension, "bonding" larger soil grains together. So long as these soils remain dry, their strength and resistance to compression are retained. However, when wetted, the salt, clay, or silt bonding agent is weakened or dissolved, or capillary tension reduced, eventually leading to collapse. Soils susceptible to this phenomenon are found throughout the southwestern United States.

To evaluate hydroconsolidation potential, the degree of saturation of the samples from above groundwater were reviewed. Research has shown that that most soil collapse (hydroconsolidation) occurs before a soil reaches a degree of saturation of 65-70 percent (El Ehwany and Houston, 1990). Conversely, little hydroconsolidation occurs in soils with a degree of saturation above 65-70 percent. The average degree of saturation of the samples from above groundwater at the project site was about 83 percent, and the lowest value was 70 percent. Based on this analysis,, hydroconsolidation appears to be a low potential at the project site.

At the Frontier High School Multi-Use Building site, the potential for hydroconsolidation was found to be nil. At the Oxnard College Fire Academy site and the Gateway High School Site, soils samples tested for consolidation characteristics, swelled when water was added. Hence, no hydroconsolidation potential was noted. Hence, in the area of the proposed shade shelter at the existing Gateway Community School campus, hydroconsolidation appears to be a low potential

SOIL CONDITIONS

Based on the grading that was performed for the Triton Academy (Earth Systems Pacific, 2018b), the proposed south annex is blanketed by a layer of artificial fill that is compacted to a minimum of 90 percent of the maximum dry density obtainable by ASTM D 1557. The thickness of the fill varies. It is about 3 feet thick in Triton Academy building areas, but only about 2 feet thick in areas that just received paving. According to our borings, the artificial fill is underlain by alluvium, most of which is clayey silts and silty clays, interbedded with sands and silty sands. The clayey alluvial deposits vary from soft to stiff, and occasionally are very stiff in the lower portion of the soil profile. The sandy alluvial soils vary from medium dense to dense.

At the proposed rectangular shade structure at the existing Gateway Community School building the soil profile is interbedded lean and fat clays, with some thin interbeds of clayey silts and silty to clean sands. Although logged as moderately loose, based on the recorded blow counts the clayey soils appear to be medium stiff to stiff. The thin interbedded sandy layers appear to be loose.

The analysis of liquefaction and its secondary affects indicates that liquefaction induced settlement is the only significate geotechnical hazard related seismicity at the proposed 8-classroom and three-point shade shelter. About 1.4 inches of total liquefaction-induced settlement is estimated from our analysis. About half that amount or 0.7 inch, should be anticipated as differential settlement over a distance of 40 feet. The first occurrence of liquefaction is predicted at about 9 feet below the ground surface, but the most significant occurrence is at a depth of 25 feet below the ground surface.

Liquefaction potential at the proposed rectangular shade structure at the existing Gateway Community School is believed to be similar because it is similar at other project in the area. In those areas, Frontier High School Multi-Use Building and Lunch Shelter, and the Oxnard College Fire Academy projects, liquefaction induced settlement was estimated to be in the range of 1 to 2 inches.

Testing indicates that anticipated bearing soils lie in the "Medium" expansion range based on a measured expansion index of 53 at the 8-classroom Building and Three-Pont Shade Shelter project and 60 at the Gateway School project (Pacific Materials Laboratory, 1989).. The locally (City of Camarillo) adopted version of this classification of soil expansion, Table 403.1, is included in Appendix C of this report. It appears that soils can be cut by normal grading equipment. However, just a few feet below pavement surfaces, the soils are well above the optimum moisture for compaction.

Groundwater was encountered at a depth of about 8.7 feet in Borings B-1, and at 8.9 feet in Borings B-2, and B-3 at the 8-classroom Building and Three-Pont Shade Shelter project. Pacific Materials Laboratory (1989) encountered 8.75 feet at the Gateway School Project. According to the Seismic Hazard Zone Report for the Camarillo 7.5-Minute Quadrangle, Ventura County, California (CGS, 2002), the depth of historical high groundwater is estimated to be about 10 feet in the project vicinities. See Historical High Groundwater Map in Appendix A. It should be noted that fluctuations in groundwater levels may occur due to variations in rainfall, regional climate, and other factors.

At the 8-classroom Building and Three-Pont Shade Shelter project, a sample of near-surface soil was tested for pH, resistivity, soluble sulfates, and soluble chlorides. The test results provided in Appendix B should be distributed to the design team for their interpretations pertaining to the corrosivity or reactivity of various construction materials (such as concrete and piping) with the soils. It should be noted that sulfate content (200 mg/Kg) is in the "S0" exposure class (i.e., "Negligible" severity range) of Table 19.3.1.1 of ACI 318-14. Therefore, special concrete designs will not be necessary for the measured sulfate contents according to Table 19.3.2.1 of ACI 318-14.

Pacific Materials Laboratory did not report a soluble sulfate content for the Gateway School project, at which the rectangular shade structure will be located. However, other data from the area (Frontier High School Multi-Use building, 250 ppm, Frontier High School Shade Structure,250 ppm, and Oxnard College Fire Academy, 110 ppm) indicate the area of the proposed rectangular shade structure is also in the “S0” sulfate exposure class.

Based on criteria established by the County of Los Angeles, at the south annex 8-Classroom and Three-Point Shade Structure project, the measured resistivity of a near-surface soil sample (4,200 ohms-cm) indicates that near-surface soils are "Moderately Corrosive" to ferrous metal (i.e., cast iron, etc.) pipes. Test results from Frontier High School Multi-Use building, 2,600 ohms-cm,

Frontier High School Shade Structure, 2,200 ohms-cm, and Oxnard College Fire Academy, 1,955 ohms-cm, all of which are in or on the border of "Moderately Corrosive" soils range, indicates that the soil corrosivity at the rectangular shade structure at the Gateway Community School campus will be the same. It should be noted that Earth Systems does not practice soil corrosion engineering.

CONCLUSIONS AND RECOMMENDATIONS

The sites for the proposed Gateway Community School south annex 8-classroom building and three-point shade shelters, and the proposed rectangular shade shelter at the existing Gateway School Campus are suitable for the proposed developments from a Geotechnical Engineering standpoint if the recommendations contained in this report are successfully implemented into the project.

Static settlement from anticipated foundation loads of 1.5 klf for continuous foundations and 20 kips for pad foundations is estimated to be about 0.5 inch and differential settlement between adjacent load bearing members is estimated to be half that amount, or 0.25 inch.

Liquefaction-induced seismic settlement is a potential at both sites, but its effect appears to be limited to about 1.4 inches of seismic-induce settlement, half of which (0.7 inch) could be differential over a distance of about 40 feet. It is Earth Systems opinion that he 8-classoroom building and the two shade shelters can be supported on conventional shallow foundations if the structures are underlain by a reinforced mat of soil. .

Although the site of the 8-classrom building and three-point shade structure is blanketed with a layer of certified artificial fill, it will need to be removed in the building area so that the fill thickness is increased to limited settlement, and so that it is of a uniform thickness.

A. Grading

1. Pre-Grading Considerations

   a. Grading at a minimum should conform to Appendix J and Chapter 18 of the 2019 CBC.

   b. The existing ground surface should be initially prepared for grading by removing any remaining structural elements, pavement, slabs, vegetation or any other organics. All organics, debris, and asphalt concrete should be removed from the construction areas to preclude their inclusion in fill. Voids created by removing such material should be

properly backfilled and compacted. No compacted fill should be placed unless a representative of the Geotechnical Engineer has observed the underlying soil.

c. All excavations should be sloped or shored in accordance with OSHA guidelines. Stability of those slopes will depend to a great extent on keeping traffic and outside loads away from the slope top, at a minimum distance equal to the excavation depth. No water should run over the slope faces.

d. On-site soils may be used for fill once they are cleaned of all organic material, rock, debris and irreducible material larger than 8 inches. Alternately, a commercial quality granular import soil may be used for fill.

e. Fill and backfill placed about 3% above the optimum moisture content for compaction in layers with loose thicknesses not greater than 8 inches should be compacted to a minimum of 90% of the maximum dry density obtainable by the ASTM D 1557 test method unless otherwise recommended or specified. Random compaction tests by Earth Systems can assist the Grading Contractor in evaluating whether the Grading Contractor is meeting compaction requirements. However, compaction tests pertain only to a specific location and do not guaranty that all the fill has been compacted to the prescribed percentage of maximum density. It is the ultimate responsibility of the Grading Contractor to achieve uniform compaction in accordance with the requirements of this report and the grading ordinance.

f. Shrinkage of soils affected by compaction will include both existing compacted fill and underlying alluvium. In aggregate, shrinkage is expected to be about 10%. Subsidence of underlying soils affected by compaction is estimated to be about 0.1 feet. Shrinkage from clearing should be considered when estimating quantities.

g. Import soils should be equal to, or better than, on-site soils in strength, expansion, and compressibility characteristics. Import soil can be evaluated but will not be prequalified by the Geotechnical Engineer. Final comments on the characteristics of the import will be given after the material is at the project site.

h. Roof draining systems should be designed so that water is not discharged into bearing soils or near structures. Roofs should be fitted with gutters and downspouts. Final site grade could be such that all water is diverted away from the structures toward either hardscapes or drain inlets and is not allowed to pond. Adjacent to buildings, the CBC requires that landscape areas have a minimum gradient of 5% away from the edge of the foundations for a minimum distance of 10 feet.

i. Earth Systems should be retained to provide Geotechnical Engineering services during site development and grading, and foundation construction phases of the work to observe compliance with the design concepts, specifications and recommendations. This

will allow for timely design changes if subsurface conditions differ from those anticipated prior to the start of construction.

j. Plans and specifications should be provided to Earth Systems prior to grading. Plans should include the grading plans, foundation plans, and foundation details. Earth Systems will review these plans only for conformity with geotechnical parameters not including drainage. It is the responsibility of the Client and other Engineers to review and approve designs and plans for conformity with all engineering and design requirements necessary to the proper function and performance of the structure.

2. Grading/ Development for Structures

a. Recompaction in the proposed building area and shade shelter areas is recommended to create more uniform bearing conditions, improve bearing capacity, and limit settlement.

b. The building area and shade structures areas, and to 5 feet beyond, should be over-excavated 4 feet below the existing grade, through any existing fill, or 2 feet below the bottom of foundations, whichever is deeper. The exposed surface should be scarified to a depth of 6 inches, moisture conditioned to above optimum moisture, and compacted. After the recompacted surface is smoothed, it should be covered with a layer of Tensar InterAx NX850 geogrid, or it equivalent, before placing fill.

c. Areas outside the building of shade structures to receive paving or slabs-on-grade should be over-excavated to a depth of 1 foot, scarified to a depth of 6 inches, brought to above optimum moisture, and compacted.

d. Areas to receive retaining walls should be over-excavated to the deeper depth of 2 feet below the bottom of foundations or through any existing fill, and to 2 feet beyond either side. The exposed surfaces should be scarified to a depth of 6 inches, brought to above optimum moisture, and compacted, before returning the removed soils as compacted fill.

e. Removed soils, after being cleaned of over-sized rocks (if any), can then be replaced in loose lifts with thicknesses not greater than 8 inches, moisture conditioned to at least 3 percent above the optimum moisture content, and compacted. This process should be repeated until finish grade is reached.

3. Utility Trenches

a. Utility trench backfill should be governed by the provisions of this report relating to minimum compaction standards. In general, on-site service lines may be backfilled with processed on-site soils, placed up to 8-inch-thick lifts at above optimum moisture, and compacted to 90% of the maximum dry density. Backfill of offsite service lines will be

subject to the specifications of the jurisdictional agency or this report, whichever are greater.

c. Backfill operations should be observed and tested by the Geotechnical Engineer to monitor compliance with these recommendations.

d. Sand should not be used for backfill in utility trenches under the perimeter foundations because sand backfill is a conduit for water that could cause moisture problems under the classroom building.

e. Jetting should not be utilized for compaction in utility trenches.

B. Structural Design

1. Conventional Spread Foundations

a. Continuous and isolated pad spread foundations supporting buildings, retaining walls, and miscellaneous structures may bear into the compacted fill as recommended elsewhere in this report. Foundation excavations should be cleaned of all loose or unsuitable soils and debris prior to placement of concrete.

b. Continuous foundations (a minimum of 12 inches wide) and isolated pad foundations a minimum of 2 feet square, for the classroom building and other miscellaneous structures should bear a minimum of 21 inches below lowest adjacent grade. However, for the classroom building, footings interior to the continuous perimeter footing can bear a minimum of 12 inches below lowest adjacent grade.

c. Continuous and isolated pad foundations bearing as described above can be designed for allowable bearing capacities of 1,800 and 2,200 psf, respectively. These values include a factor of safety of three.

d. When transient loads such as those from wind or seismicity are included, the bearing values can be increased by one-third.

e. The allowable bearing values are net (weight of foundation and soil surcharge may be neglected).

f. Lateral loads may be resisted by soil friction on floors and foundations and by passive resistance of the soils acting on foundation edges and foundation stem walls. Lateral bearing is based partially on the assumption that soils adjacent to foundations are properly compacted.

g. Foundations at a minimum should be designed to meet the requirements of Amended CBC Table 1809.7 in Appendix D for soils in the "Medium" expansion range. However, at a minimum it is recommended that continuous foundations should be reinforced with two No. 4 bars top and two No. 4 bars bottom. In addition, the foundations should be tied to the adjacent slabs with No. 4 reinforcing bars embedded 12 inches into the

foundation and bent 3 feet into the slab. When other requirements of this report exceed those of the table, the report's requirements will govern. However, when the requirements of the Structural Engineer exceed those of this report, the Structural Engineer's requirements will govern.

h. Because the bearing soils are in the "Medium" expansion range, foundation subgrade soils require pre-saturation to 3% above the optimum moisture content to a depth of 18 inches below lowest adjacent grade. Pre-saturation should be confirmed by testing.

i. A member of Earth Systems should check footing excavations prior to placing reinforcing to confirm bearing conditions.

2. Slabs-on-Grade

a. Concrete slabs-on-grade should be supported by compacted fill as recommended elsewhere in this report. Reinforcing and thickness provided below are for non-structural slabs-on-grade.

b. Slabs-on-grade should be a minimum of 4 inches thick. Floor slabs should be underlain by a minimum of 4 inches of sand. In areas where moisture sensitive floor coverings are to be used or where it is desired to limit moisture transmission through the slab, a vapor barrier should be centered in the 4 inches of sand.

c. Reinforcement and premoistening data given herein for slabs are generally the same as those given in Table 1809.7 in Appendix D for soils in the "Medium" expansion range. However, although the table recommends minimum slab reinforcement of No. 3 reinforcing bars spaced 24 inches on center each direction, it is Earth Systems opinion that slab reinforcing should be increased to No. 4 bars spaced 18 inches on center in each direction.. In addition, the slabs should be tied to the adjacent foundations with No. 4 reinforcing bars embedded 12 inches into the foundation and bent 3 feet into the slab. It should be noted that these values are minima and that other more stringent structural considerations may govern. Actual reinforcement and slab thickness should be determined by the project Structural Engineer but should not be less than values recommended in the table or this report

d. Because the bearing soils are in the "Medium" expansion range, slab subgrade soils do require pre-saturation to 3 percent above the optimum moisture content to a depth of 18 inches below lowest adjacent grade. Pre-saturation should be confirmed by testing.

e. Slabs should be cast using concrete with a maximum slump of 4 inches or less. Excessive water content is the major cause of concrete cracking. To reduce concrete shrinkage, a water reducing agent or plasticizer may be utilized in the concrete to increase slump while maintaining an appropriate water/cement ratio. Hot reinforcing steel should be

cooled prior to concrete placement to help prevent concrete shrinkage at the bar location. Where there is potential for moisture accumulation under the slab, special consideration should be given to allow gravity drainage of any water that could migrate into the subgrade of the slab or rock cushion. Control joints should be provided at appropriate intervals to control the location of shrinkage cracks.

3. Exterior Slabs-on-Grade
   a. Exterior concrete slabs-on-grade should be supported by compacted fill as recommended elsewhere in this report. Reinforcing and thickness provided below are for non-structural slabs-on-grade.
   b. Sidewalk and patio exterior slabs-on-grade (near or at existing grades) can be a minimum of 4 inches thick, have turned down edges that penetrates 8 inches into the grade adjacent to landscaped areas. Although reinforcement is not required, a minimum of No. 3 reinforcing bars spaced 24 inches on center each way is recommended to control cracking. Actual reinforcement and slab thickness should be determined by the project Structural Engineer but should not be less than values recommended in this report.
   c. Exterior slabs-on-grade (near or at existing grades) should be underlain with a minimum of 4 inches of sand.
   d. It is recommended that perimeter slabs (walks, patios, etc.) be designed relatively independent of footing stems (i.e., free floating), so foundation adjustment will be less likely to cause cracking.

   e. Slab subgrade soils in the “Medium” expansion range require pre-saturation to 3 percent above the optimum moisture content to a depth of 18 inches. Pre-saturation should be confirmed by testing.

4. Retaining Walls
   a. Although the site is flat and retaining walls may not be included in the project, we are providing recommendations for them in the case they are used in the project.
   b. Retaining walls should not be backfilled with on-site soils because those soils are expansive. Active earth pressures for cantilever retaining walls backfilled with imported non-expansive soils can be determined using an equivalent fluid weight of 35 pcf for well-drained, level backfill. For restrained retaining walls, an equivalent fluid weight of 55 pcf can be used to determine earth pressures. If retaining walls retain more than

6 feet of soil, a seismic increment of earth pressure of 20 pcf should be added to cantilever retaining structures and 34 pcf should be added to rigid retaining structures.

c. The pressures listed above assume that backfill soils will be compacted to 90% of the maximum dry density as determined by the ASTM D 1557 Test Method.
d. Foundations for retaining walls should be designed as recommended elsewhere in this report.
e. The lateral earth pressure to be resisted by the retaining walls or similar structures should also be increased to allow for applicable surcharge loads. The surcharges considered should include forces generated by any structures or temporary loads that would influence the wall design. Uniform surcharges will generate a uniform increase in pressure on cantilever retaining walls equal to the surcharge multiplied by coefficient of 0.35. For restrained retaining walls, the coefficient to apply to uniform surcharges should be 0.52.
f. A system of backfill drainage should be incorporated into retaining wall designs. Backfill comprising the drainage system immediately behind retaining structures should be free-draining granular material with a filter fabric between it and the rest of the backfill soils. As an alternative, the backs of walls could be lined with geodrain systems. The back drains should extend from the bottoms of the walls to about 18 inches from finished backfill grade. Waterproofing may aid in reducing the potential for efflorescence on the faces of retaining walls.
g. Compaction on the uphill sides of walls within a horizontal distance equal to one wall height should be performed by hand-operated or other lightweight compaction equipment. This is intended to reduce potential "locked-in" lateral pressures caused by compaction with heavy grading equipment.
h. Water should not be allowed to pond near the tops of retaining walls. To accomplish this, final backfill site grades should be such that all water is diverted away from retaining walls.

5. Frictional and Lateral Coefficients
   a. Resistance to lateral loading may be provided by friction acting on the base of foundations. A coefficient of friction of 0.50 may be applied to dead load forces. This value does not include a factor of safety.
   b. Passive resistance acting on the sides of foundation stems equal to 340 pcf of equivalent fluid weight may be included for resistance to lateral load. This value does not include a factor of safety.

c. Passive resistance may be combined with frictional resistance if a one-third reduction in the coefficient of friction is used.
d. A minimum factor-of-safety of 1.5 should be applied to these ultimate values.

6. Settlement Considerations
   a. Estimated static settlement from the maximum anticipated column and continuously loaded foundations is estimated to be about one-half of an inch. Differential settlement between adjacent load bearing members could be half this value.
   b. Potential total liquefaction related seismic-induced settlement resulting from a design level earthquake could be about 1.4 inches. Differential seismic induced settlement over a distance of 40 feet could be about half this amount, or about 0.7 inch.
   c. Potential settlement resulting from seismic-induced settlement of dry sands is estimated to be negligible.
   d. Settlement from hydroconsolidation is a low potential based on the testing presented in this report and is anticipated to be negligible.

7. Preliminary Asphalt Pavement Sections
   a. New pavements are expected to be limited to asphaltic concrete constructed on prepared subgrade and limited to auto parking and access lanes. Preliminary pavement designs that follow area based on an R-value measured on the anticipated subgrade soils (Earth Systems Southern California, 2017b).
   b. Preliminary asphalt pavement sections for untreated subgrade soils are presented below based on the measured R-value of 12, current Caltrans design procedures, and a traffic index of 4.5. The traffic index (TI) is a measure of traffic wheel loading frequency and intensity of anticipated traffic and a TI of 4.5 is suitable for automobile parking and drive areas. The assumed TI should be reviewed by the project Owner, Architect, and/or Civil Engineer to evaluate its suitability for this project.

TRAFFIC INDEX	ASPHALT-CONCRETE (INCH)	AGGREGATE BASE (INCH)
4.5	3.0	7.0

   c. The preliminary paving section provided above has been designed for the type of traffic indicated. If the pavement is placed before construction on the project is complete,

construction loads, which could increase the traffic index values assumed above, should be considered.

d. The subgrade soils in the upper 12 inches below the finished subgrade elevation should be properly moisture conditioned to above optimum moisture and compacted to achieve a minimum relative compaction of 90 percent of the ASTM D1557 maximum dry density. The subgrade soils should be in a stable, non-pumping condition at the time the aggregate base material is placed and compacted.
e. Aggregate base materials should conform to the specifications stated in the 2021 "Greenbook" and be compacted as engineered fill to at least 95 percent compaction. Asphalt paving materials and placement methods should meet specifications stated in the 2021 "Greenbook" for asphalt concrete.
f. Adequate drainage (both surface and subsurface) should be provided such that the subgrade soils and aggregate base materials are not allowed to become continuously wet. All concrete curbs separating pavement and landscaped areas should extend at least 6 inches into the subgrade and below the bottom of the adjacent aggregate base to provide a barrier against lateral migration of landscape water or runoff into the pavement section.
g. Periodic maintenance should be performed to repair degraded areas and seal cracks with appropriate filler.

ADDITIONAL SERVICES

This report assumes that an adequate program of monitoring and testing will be performed by Earth Systems during construction to check compliance with the recommendations given in this report. The recommended tests and observations include, but are not necessarily limited to the following:

1. Review of the plans during the design phase of the project.
2. Observation and testing during site preparation, grading, placing of engineered fill, and foundation construction.
3. Consultation as required during construction.

LIMITATIONS AND UNIFORMITY OF CONDITIONS

The analysis and recommendations submitted in this report are based in part upon the data obtained from the borings drilled and a CPT sounding performed on the site by Earth Systems in 2017, and on experience and judgment. The nature and extent of variations between and beyond the borings and CPT may not become evident until construction. If variations then appear evident, it will be necessary to reevaluate the recommendations of this report.

The scope of our services did not include any environmental assessment or investigation for the presence or absence of wetlands, hazardous or toxic materials in the soil, surface water, groundwater or air, on, below, or around this site. Any statements in this report or on the soil logs regarding odors noted, unusual or suspicious items or conditions observed, are strictly for the information of our client.

Findings of this report are valid as of this date; however, changes in conditions of a property can occur with passage of time whether they be due to natural processes or works of man on this or adjacent properties. In addition, changes in applicable or appropriate standards may occur whether they result from legislation or broadening of knowledge. Accordingly, findings of this report may be invalidated wholly or partially by changes outside our control. Therefore, this report is subject to review and should not be relied upon after a period of 1 year.

If that any changes in the nature, design, or location of the classroom building and other improvements are planned, the conclusions and recommendations contained in this report shall not be considered valid unless the changes are reviewed, and the conclusions of this report modified or verified in writing.

This report is issued with the understanding that it is the responsibility of the Owner, or of his representative to ensure that the information and recommendations contained herein are called to the attention of the Architect and Engineers for the project and incorporated into the plan and that the necessary steps are taken to see that the Contractor and Subcontractors carry out such recommendations in the field.

As the Geotechnical Engineers for this project, Earth Systems strives to provide our services in accordance with the generally accepted geotechnical engineering practices in this community at

this time. No warranty or guarantee is expressed or implied. This report was prepared for the exclusive use of the Client and their authorized agents.

It is recommended that Earth Systems be provided the opportunity for a general review of final design and specifications in order that earthwork and foundation recommendations may be properly interpreted and implemented in the design and specifications. If Earth Systems is not accorded the privilege of making this recommended review, we can assume no responsibility for misinterpretation of our recommendations.

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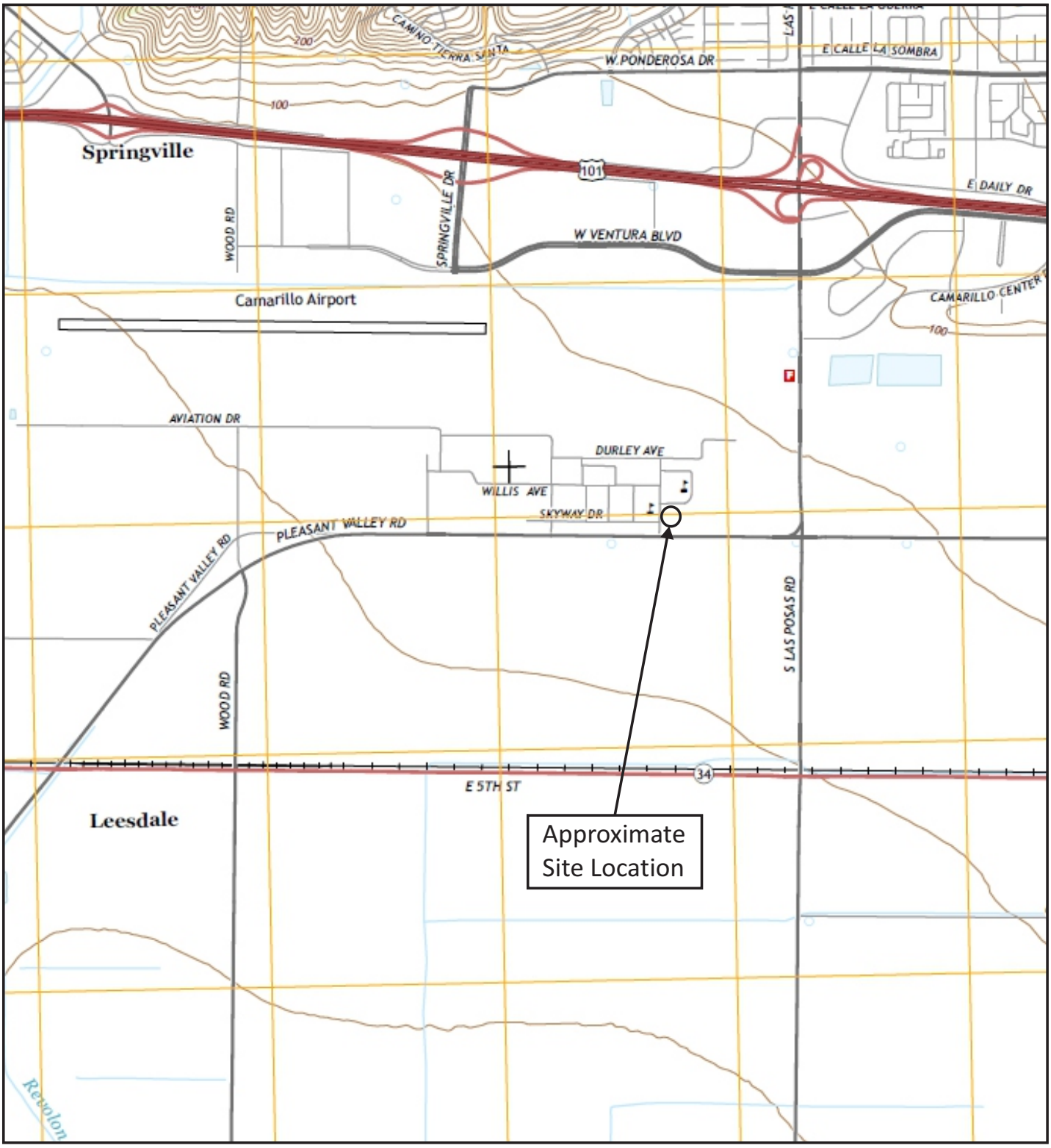
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APPENDIX A

Vicinity Map
Regional Geologic Map 1
Regional Geology Map 2
Geologic Sections A-A' and B-B'
Seismic Hazard Zones Map
Historical High Groundwater Map
Geology Maps
Boring Location Map
Field Study
Boring Logs
Boring Log Symbols
Unified Soil Classification System CPT
Log
CPT Interpretations
Boring and CPT Logs from Nearby Sites



*Taken from USGS Topo Map, Camarillo Quadrangle, California, 2015.

Approximate Scale: 1" = 2,000'

0 2,000' 4,000'

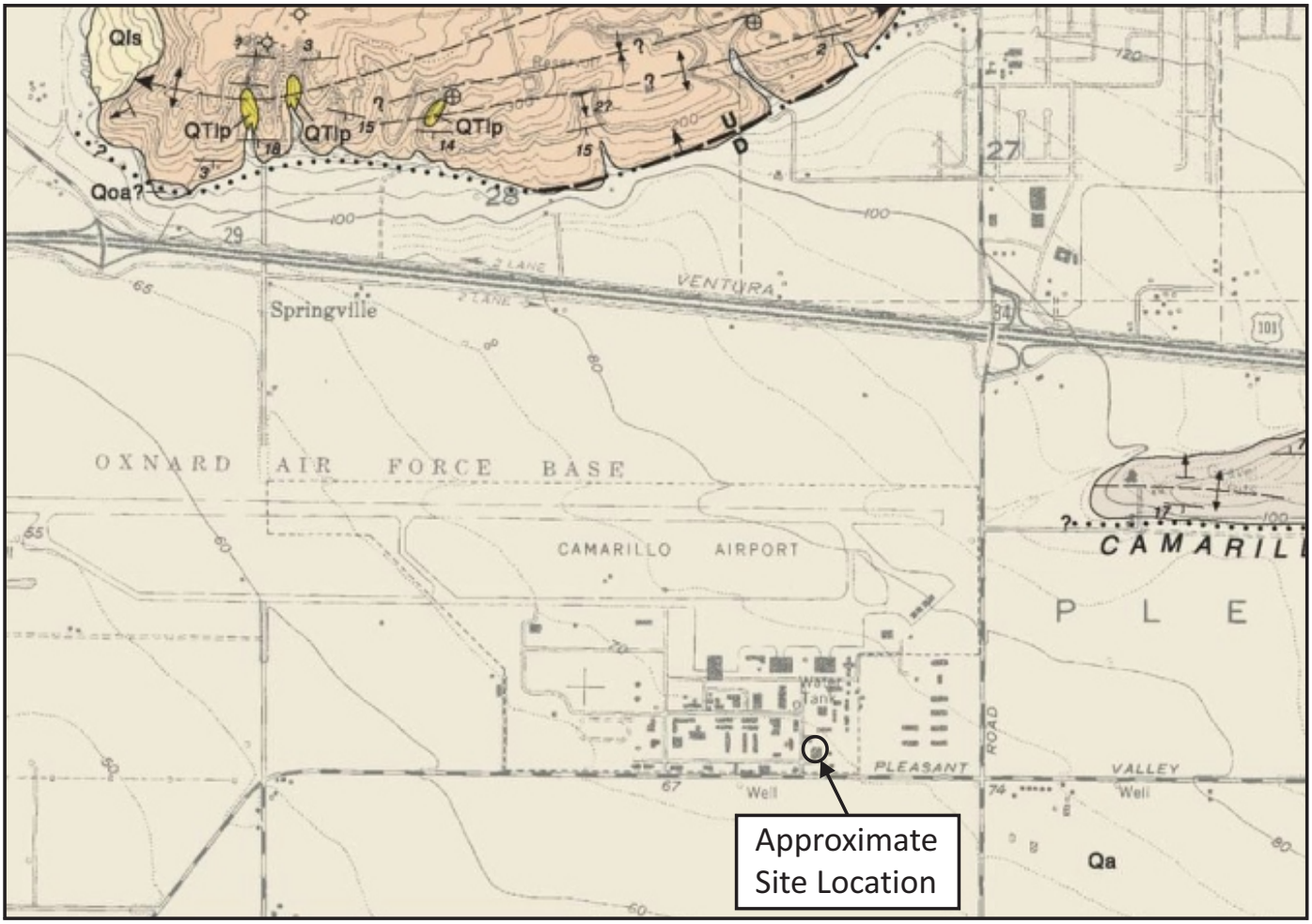
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VICINITY MAP

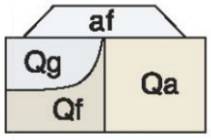
Gateway Community School 8-Room Classroom Building
Camarillo, California

Earth Systems

September 2021	300852-003



*Taken from Dibblee, Jr., Geologic Map of The Camarillo and Newbury Park Quadrangles, Ventura County, California, 1990, DF-28.



SURFICIAL SEDIMENTS

af *Artificial fill*
Qg *Stream channel sand and gravel*
Qf *Alluvial fan gravel and sand, locally slightly indurated*
Qa *Alluvium: gravel, sand and clay of flatlands*

GEOLOGIC SYMBOLS

not all symbols shown on each map

FORMATION CONTACT *dashed where inferred or indefinite, dotted where concealed*

MEMBER CONTACT *between units of a formation* ····· Prominent bed

CONTACT BETWEEN SURFICIAL SEDIMENTS *located only approximately in places*

FAULT: *Dashed where indefinite or inferred, dotted where concealed, queried where existence is doubtful. Parallel arrows indicate inferred relative lateral movement. Relative vertical movement is shown by U/D (U=upthrown side, D=downthrown side). Short arrow indicates dip of fault plane. Sawteeth are on upper plate of low angle thrust fault.*

FOLDS: *overturned* — **ANTICLINE** — **SYNCLINE**

arrow on axial trace of fold indicates direction of plunge; dotted where concealed by surficial sediments

Strike and dip of sedimentary rocks: 18 inclined; 20 inclined (approximate); 80 overturned; horizontal; vertical

Strike and dip of metamorphic or igneous rock foliation or flow banding or compositional layers: 75 inclined; inclined (approximate); vertical; 80 overturned

OTHER SYMBOLS: Direction of landslide movement; outline of water bodies shown on map; water well; oil well; springs

Approximate Scale: 1" = 2,000'

0 2,000' 4,000'

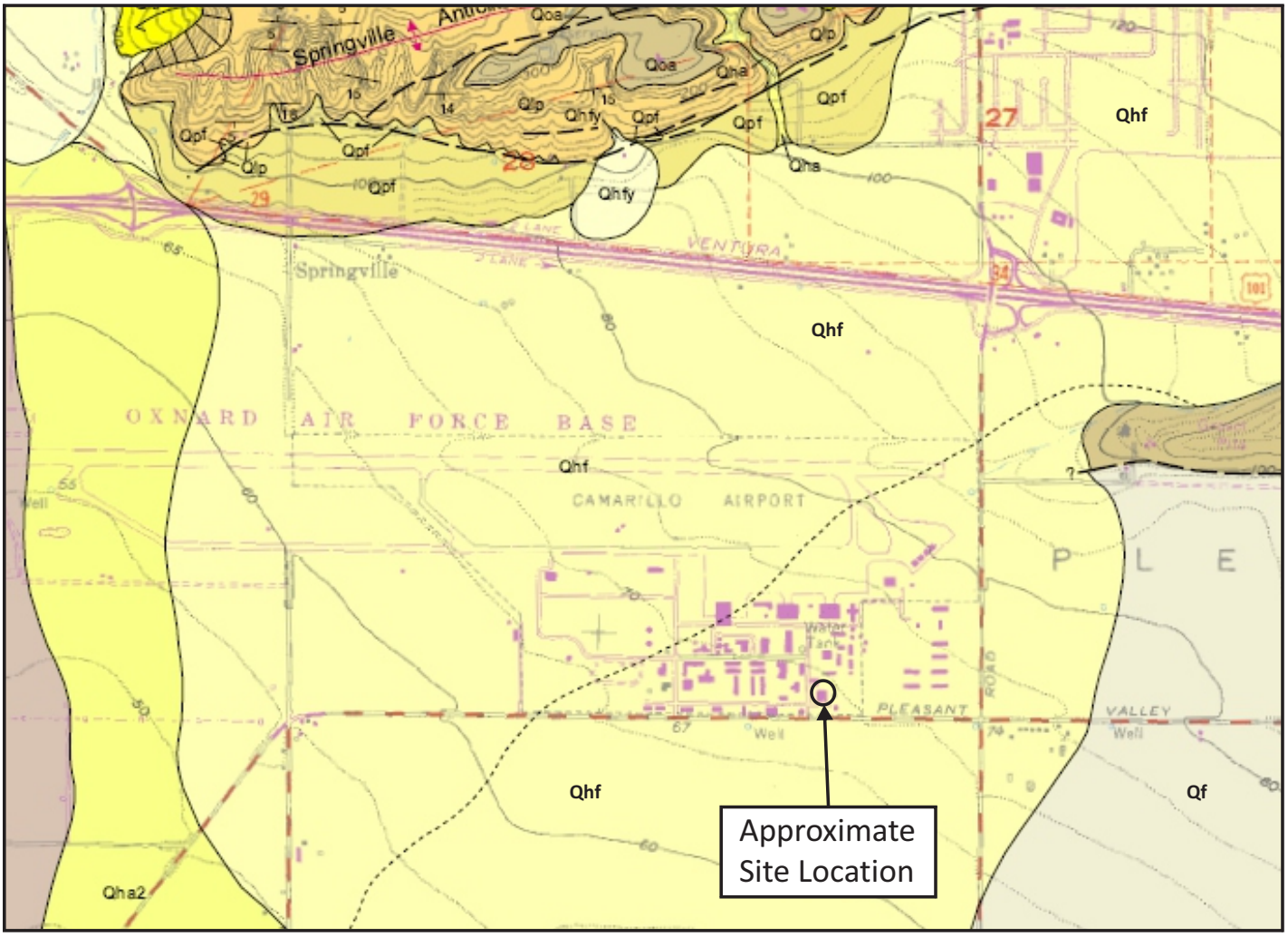
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REGIONAL GEOLOGIC MAP 1

Gateway Community School 8-Room Classroom Building
Camarillo, California

Earth Systems

September 2021	300852-003



*Taken from USGS, SCAMP Geologic Map of the Camarillo 7.5' Quadrangle, Ventura County, California, 2004.

Qhf	Alluvial fan deposits (Holocene) - Includes active fan deposits, deposited by streams emanating from mountain canyons to the north onto the alluvial valley floor; deposits originate as debris flows, hyperconcentrated mudflows or braided stream flows; composed of moderately to poorly sorted and moderately to poorly bedded sandy clay with some silt and gravel.
Qf	Alluvial fan deposits (late Pleistocene to Holocene) - Deposited on gently sloping, relatively undissected alluvial surfaces where deposits might be of either late Pleistocene or Holocene age, composed of moderately to poorly sorted sand, gravel, silt , and clay.
———————----------	Contact between map units - Generally approximately located or inferred, dotted where concealed.
----------	Contact between similar map units of different relative age - Recognized by scour and incised channelling features. Generally approximately located.
———— — — —----?-	Fault - Generally approximately located or inferred, dotted where concealed, queried where location is uncertain.

Approximate Scale: 1" = 2,000'

0 2,000' 4,000'

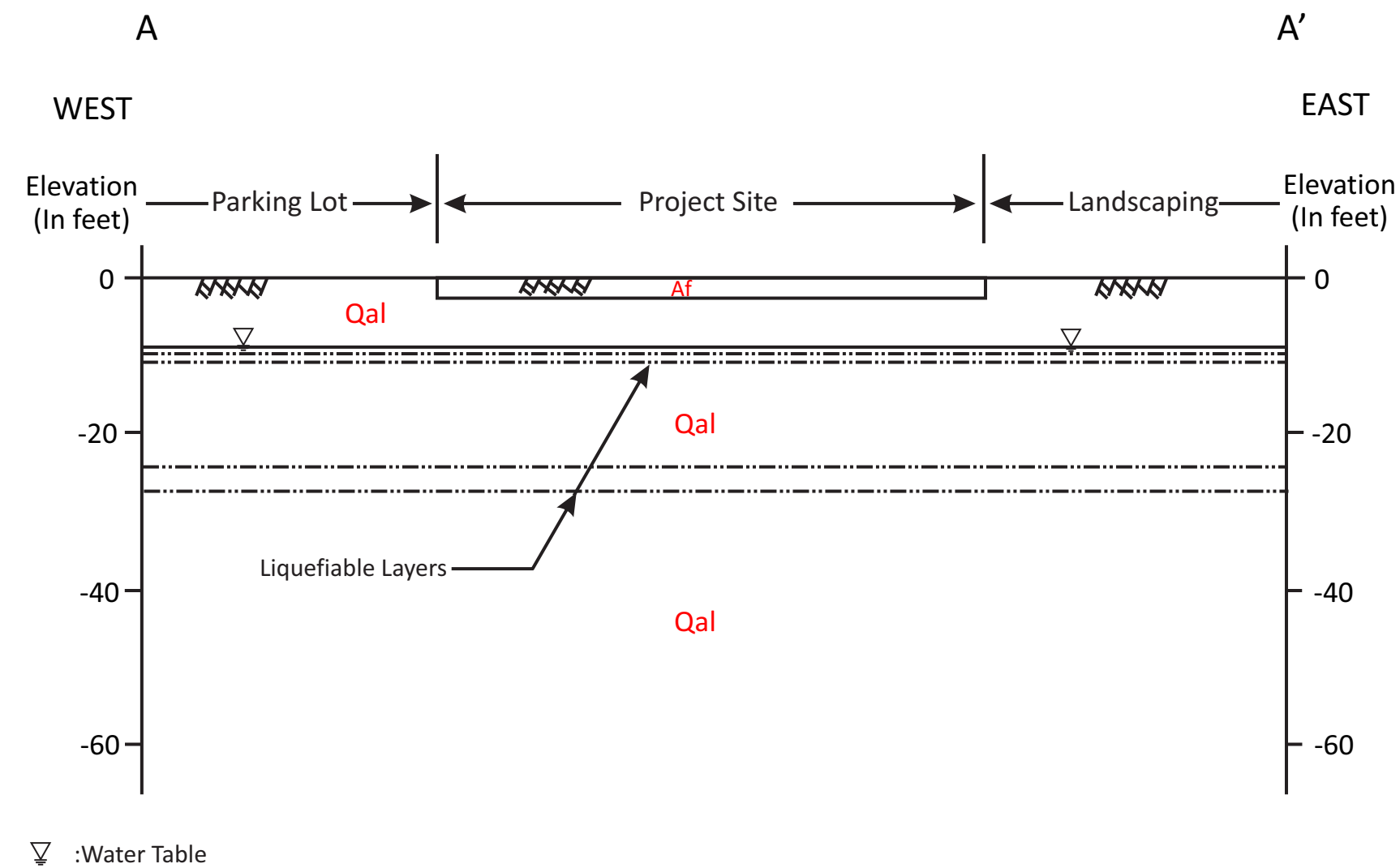
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REGIONAL GEOLOGIC MAP 2

Gateway Community School 8-Room Classroom Building
Camarillo, California

Earth Systems

September 2021	300852-003

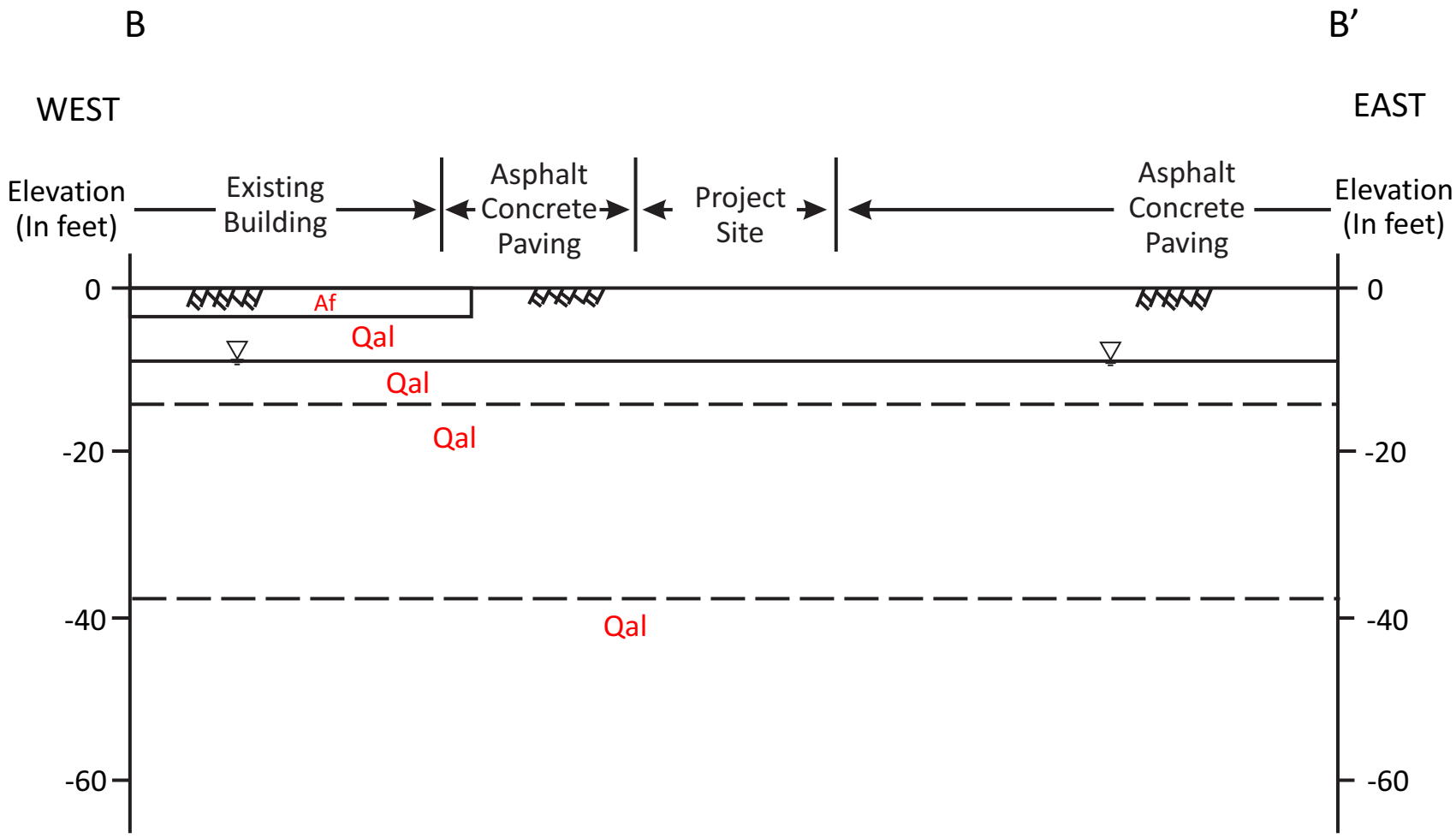


GEOLOGIC CROSS-SECTION A-A'

Gateway Community School 8-Room Classroom Building
Camarillo, California

Earth Systems

September 2021	300852-003



▽ :Water Table

Qal : Alluvial Deposits

Af : Artificial Fill

Approximate Scale: 1" = 20'

0 20' 40'

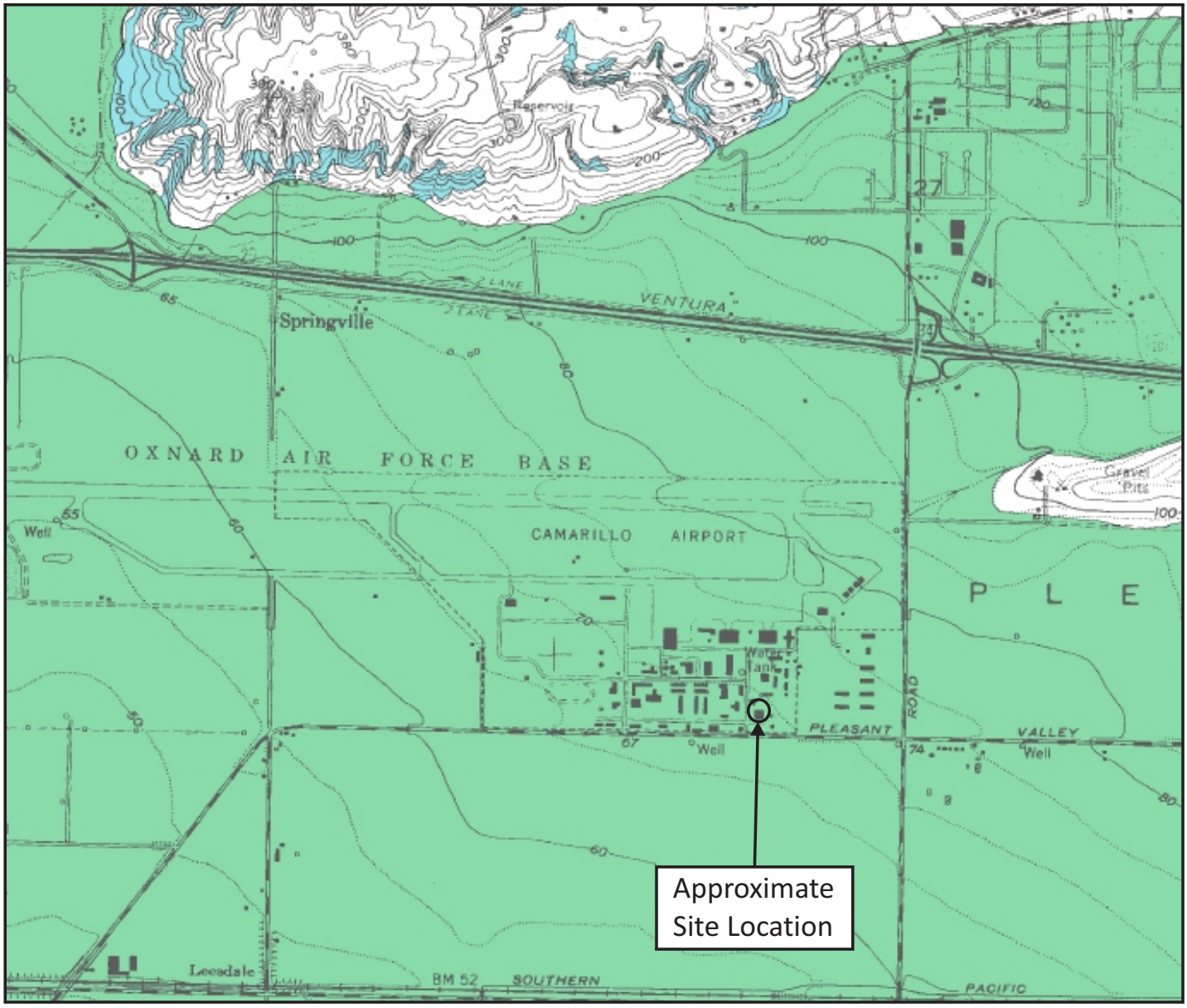
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GEOLOGIC CROSS-SECTION B-B'

Gateway Community School
Existing Building Shade Structure
Camarillo, California

Earth Systems

May 2022 | 300852-003



MAP EXPLANATION

Zones of Required Investigation:

Liquefaction

Areas where historical occurrence of liquefaction, or local geological, geotechnical and ground-water conditions indicate a potential for permanent ground displacements such that mitigation as defined in Public Resources Code Section 2693(c) would be required.

Earthquake-Induced Landslides

Areas where previous occurrence of landslide movement, or local topographic, geological, geotechnical and subsurface water conditions indicate a potential for permanent ground displacements such that mitigation as defined in Public Resources Code Section 2693(c) would be required.

NOTE: Seismic Hazard Zones identified on this map may include developed land where delineated hazards have already been mitigated to city or county standards. Check with your local building/planning department for information regarding the location of such mitigated areas.

Approximate Scale: 1" = 2,000'

0 2,000' 4,000'

STATE OF CALIFORNIA

SEISMIC HAZARD ZONES

Delineated in compliance with
Chapter 7.8, Division 2 of the California Public Resources Code
(Seismic Hazards Mapping Act)

CAMARILLO QUADRANGLE

OFFICIAL MAP

Released: February 7, 2002

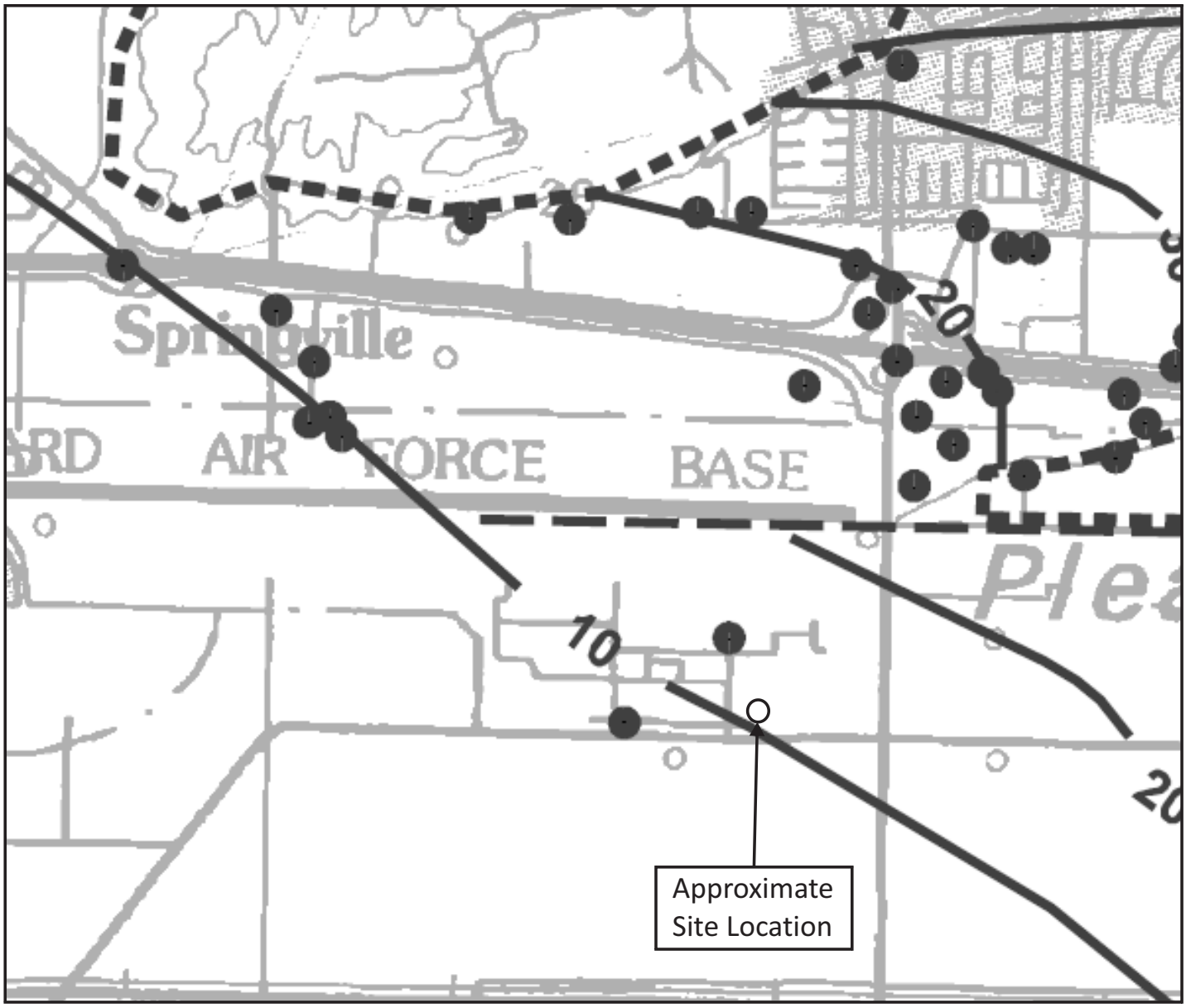
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SEISMIC HAZARD ZONES MAP

Gateway Community School 8-Room Classroom Building
Camarillo, California

Earth Systems

September 2021	300852-003



*Taken from Seismic Hazard Zone Report For The Camarillo 7.5 Minute Quadrangle, Ventura County, California, 2002.

LEGEND

30 Depth to historically highest ground water level in feet

Borehole Site

Valley / Mountains Boundary

Approximate Scale: 1" = 2,000'

0 2,000' 4,000'

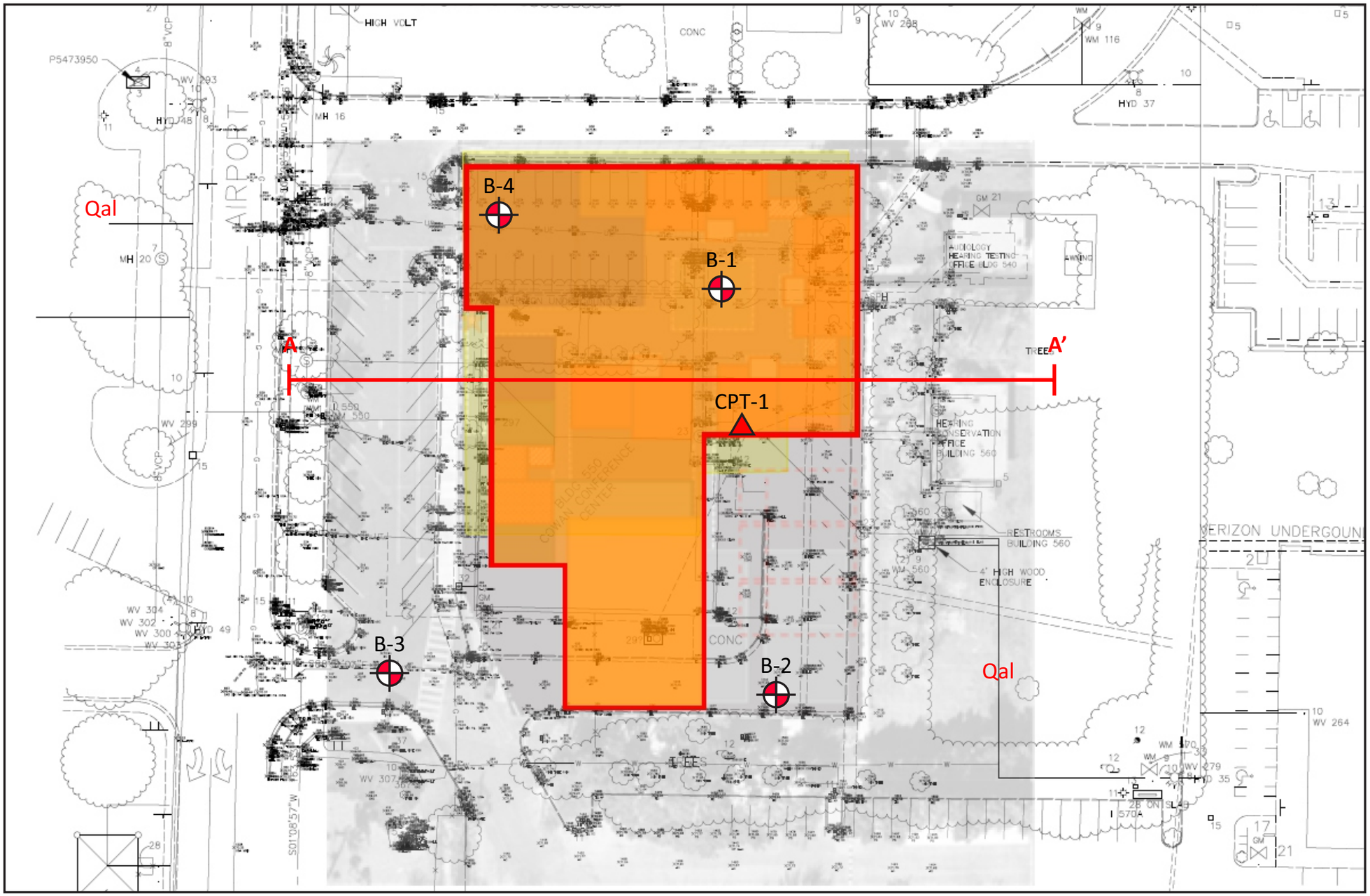
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HISTORICAL HIGH GROUNDWATER

Gateway Community School 8-Room Classroom Building
Camarillo, California

Earth Systems

September 2021	300852-003



B-4 : Approximate boring locations.

CPT-1 : Approximate CPT location.

Qal : Alluvial Deposits

Approximate Scale: 1" = 60'

0 60' 120'

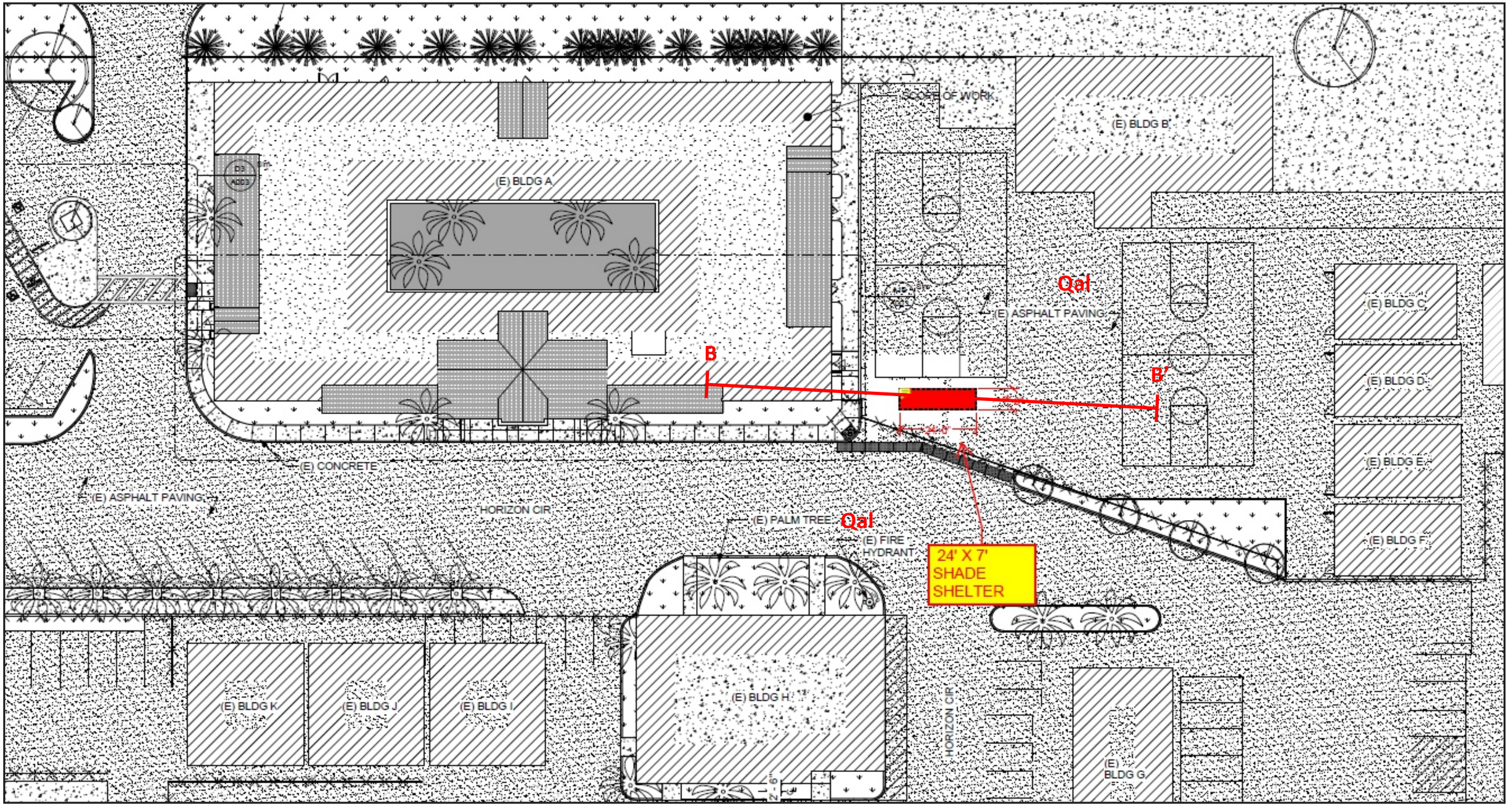
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GEOLOGIC MAP

Gateway Community School 8-Room Classroom Building
Camarillo, California

Earth Systems

May 2022	300852-003



B — B' : Line of Cross Section

Qal : Alluvium

Approximate Scale: 1" = 30'

0 30' 60'

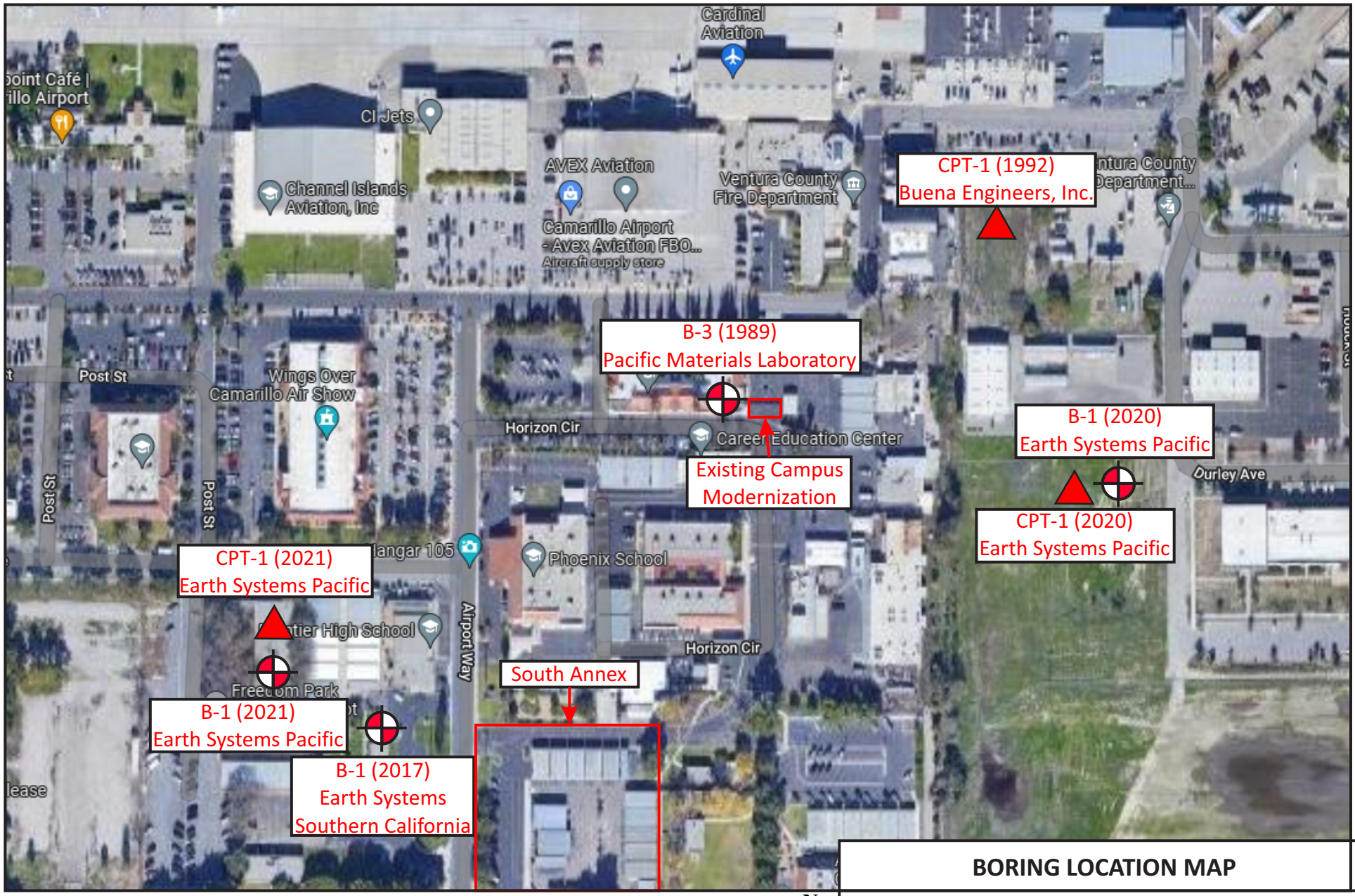
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GEOLOGIC MAP

Gateway Community School
Camarillo, California

Earth Systems

May 2022	300852-003



BORING LOCATION MAP

Gateway Community School
Camarillo, California

Earth Systems

May 2022	300852-003

FIELD STUDY

A. Four borings (B-1 through B-4) were drilled to a maximum depth of about 11.5 feet below the existing ground surface to observe the soil profile and to obtain samples for laboratory analyses. The borings were drilled on October 25, 2017, using 8-inch diameter hollow-stem continuous flight auger powered by a Mobile Drill B-61 HDX truck mounted drilling rig. The approximate locations of the borings were determined in the field by pacing and sighting, and are shown on the Site Plan in this Appendix.
B. Samples were obtained within the borings with a Modified California (M.C.) ring sampler (ASTM D 3550 with shoe similar to ASTM D 1586), and with a Standard Penetration Test (SPT) sampler (ASTM D 1586). The M.C. sampler has a 3 inch outside diameter, and a 2.42-inch inside diameter when used with brass ring liners (as it was during this study). The SPT sampler has a 2.00-inch outside diameter and a 1.37-inch inside diameter, but when used without liners, as was done for this project, the inside diameter is 1.63 inches. The samples were obtained by driving the samplers with a 140-pound hammer dropping 30 inches in accordance with ASTM D 1586. The hammer was operated with an automatic trip mechanism.
C. One bulk sample was collected from the cuttings of the soils encountered between the depths of 1 and 4 feet in Boring B-1.
D. On November 1, 2017, a Cone Penetrometer Test (CPT) sounding was performed to obtain information pertaining to the soil profile. The CPT sounding was performed using equipment owned and operated by Middle Earth Geo Testing. During advancement of the cone penetrometer, readings of sleeve friction (in tons per square foot), tip resistance (also in tons per square foot), and friction ratio (in percent) were recorded at 0.15-meter intervals as per ASTM D 5778 and ASTM D 3441. The approximate location of the test sounding was determined in the field by pacing and sighting, and is shown on the Site Plan in this Appendix.
E. The final logs of the borings represent interpretations of the contents of the field logs and the results of laboratory testing performed on the samples obtained during the subsurface study. The final logs, as well as the interpretations of the CPT sounding, are included in this Appendix.

Earth Systems Southern California
1731-A Walter Street, Ventura, California 93003
PHONE: (805) 642-6727 FAX: (805) 642-1325

BORING NO: B-1
PROJECT NAME: 550 Airport Way
PROJECT NUMBER: VT-25450-01
BORING LOCATION: Per Plan

DRILLING DATE: 10/25/2017
DRILLING METHOD: 8" Hollow Stem Auger
DRILL: Mobile B-61 HDX
LOGGED BY: JW

Vertical Depth	Sample Type: Bulk	Sample Type: SPT	Sample Type: Mod. Calif.	PENETRATION RESISTANCE (BLOWS/6")	SYMBOL	USCS CLASS	UNIT DRY WT. (pcf)	MOISTURE CONTENT (%)	DESCRIPTION OF UNITS
0									Asphalt: 3.5", Base Material 8.0".
	X		■	3/4/4		SC	100.5	21.2	**ARTIFICIAL FILL:** Pale brown to pale olive brown clayey sand; damp; medium dense; medium grain sand.
5			■	2/2/4		CL	88.3	26.4	**ALLUVIUM:** Pale olive brown sandy clay; damp; firm.
	▼		■	1/4/6		CL	97.3	23.7	**ALLUVIUM:** Pale olive brown silty clay with trace fine grain sand; moist to very moist; firm; some caliche.
10		■	▨	2/1/2		CL			**ALLUVIUM**: Pale olive brown clay; wet; soft; abundant caliche.
15									Total Depth: 11.5 feet. Groundwater Depth: 8.7 feet.
20									

Note: The stratification lines shown represent the approximate boundaries between soil and/or rock types and the transitions may be gradual.

Earth Systems Southern California
1731-A Walter Street, Ventura, California 93003
PHONE: (805) 642-6727 FAX: (805) 642-1325

BORING NO: B-2
PROJECT NAME: 550 Airport Way
PROJECT NUMBER: VT-25450-01
BORING LOCATION: Per Plan

DRILLING DATE: 10/25/2017
DRILLING METHOD: 8" Hollow Stem Auger
DRILL: Mobile B-61 HDX
LOGGED BY: JW

Vertical Depth	Sample Type: Bulk	Sample Type: SPT	Sample Type: Mod. Calif.	PENETRATION RESISTANCE (BLOWS/6")	SYMBOL	USCS CLASS	UNIT DRY WT. (pcf)	MOISTURE CONTENT (%)	DESCRIPTION OF UNITS
0									Asphalt: 3.0", Base Material 8.0".
			■	4/5/6		ML	86.2	27.7	**ARTIFICIAL FILL:** Pale olive brown sandy silt; damp; stiff; some pale brown clayey silt present at bottom of sampler; damp; soft.
5			■	2/3/2		CL	81.9	32.2	**ALLUVIUM:** Pale olive brown silty clay with trace fine grain sand; very damp; soft.
	▼		■	1/3/3		CL	82.3	38.5	**ALLUVIUM:** Pale olive brown silty clay; moist to very moist; soft; some caliche.
10		■	▨	Push/1/1		CL			**ALLUVIUM**: Pale olive brown silty clay; wet; soft; abundant caliche.
15									Total Depth: 11.5 feet. Groundwater Depth: 8.9 feet.
20									

Note: The stratification lines shown represent the approximate boundaries between soil and/or rock types and the transitions may be gradual.

Earth Systems Southern California
1731-A Walter Street, Ventura, California 93003
PHONE: (805) 642-6727 FAX: (805) 642-1325

BORING NO: B-3
PROJECT NAME: 550 Airport Way
PROJECT NUMBER: VT-25450-01
BORING LOCATION: Per Plan

DRILLING DATE: 10/25/2017
DRILLING METHOD: 8" Hollow Stem Auger
DRILL: Mobile B-61 HDX
LOGGED BY: JW

Vertical Depth	Sample Type: Bulk	Sample Type: SPT	Sample Type: Mod. Calif.	PENETRATION RESISTANCE (BLOWS/6")	SYMBOL	USCS CLASS	UNIT DRY WT. (pcf)	MOISTURE CONTENT (%)	DESCRIPTION OF UNITS
0									Asphalt: 5.0", Base Material 8.0".
			■	5/5/5		SM	83.2	26.4	**ARTIFICIAL FILL:** Pale brown silty sand; damp; medium dense; medium grain sand.
5			■	2/3/3		CL	86.6	25.7	**ALLUVIUM:** Pale olive brown silty clay with trace fine grain sand; soft to firm.
	▼		■	2/2/5		CL	92.6	20.9	**ALLUVIUM:** Pale olive brown silty clay to clayey silt with trace fine grain sand; moist to very moist; some caliche present in bottom of sampler.
10		■	▨	1/1/1		CL			**ALLUVIUM**: Dark brown silty clay; wet; soft; abundant caliche.
15									Total Depth: 11.5 feet. Groundwater Depth: 8.9 feet.
20									

Note: The stratification lines shown represent the approximate boundaries between soil and/or rock types and the transitions may be gradual.

Earth Systems Southern California
1731-A Walter Street, Ventura, California 93003
PHONE: (805) 642-6727 FAX: (805) 642-1325

BORING NO: B-4
PROJECT NAME: 550 Airport Way
PROJECT NUMBER: VT-25450-01
BORING LOCATION: Per Plan

DRILLING DATE: 10/25/2017
DRILLING METHOD: 8" Hollow Stem Auger
DRILL: Mobile B-61 HDX
LOGGED BY: JW

Vertical Depth	Sample Type: Bulk	Sample Type: SPT	Sample Type: Mod. Calif.	PENETRATION RESISTANCE (BLOWS/6")	SYMBOL	USCS CLASS	UNIT DRY WT. (pcf)	MOISTURE CONTENT (%)	DESCRIPTION OF UNITS
0									Asphalt: 3.5", Base Material 8.0".
			■	5/8/refusal		CL	102.2	24.3	**ARTIFICIAL FILL:** Pale dark brown silty clay with trace medium grain sand; firm to hard; concrete refusal.
5									Total Depth: 3.0 feet. No Groundwater Encountered.
10									
15									
20									

Note: The stratification lines shown represent the approximate boundaries between soil and/or rock types and the transitions may be gradual.

BORING LOG SYMBOLS


Modified California Split Barrel Sampler


Modified California Split Barrel Sampler - No Recovery


Standard Penetration Test (SPT) Sampler


Standard Penetration Test (SPT) Sampler - No Recovery


Perched Water Level


Water Level First Encountered


Water Level After Drilling


Pocket Penetrometer (tsf)


Vane Shear (ksf)

1. The location of borings were approximately determined by pacing and/or siting from visible features. Elevations of borings are approximately determined by interpolating between plan contours. The location and elevation of the borings should be considered.

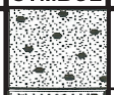
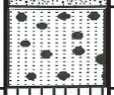
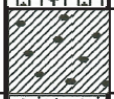
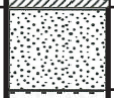
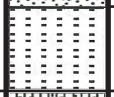
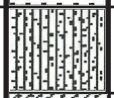
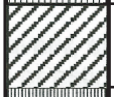
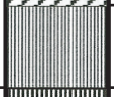
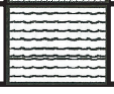
2. The stratification lines represent the approximate boundary between soil types and the transition may be gradual.

3. Water level readings have been made in the drill holes at times and under conditions stated on the boring logs. This data has been reviewed and interpretations made in the text of this report. However, it must be noted that fluctuations in the level of the groundwater may occur due to variations in rainfall, tides, temperature, and other factors at the time measurements were made.

BORING LOG SYMBOLS

Earth Systems

UNIFIED SOIL CLASSIFICATION SYSTEM

MAJOR DIVISIONS			GRAPH SYMBOL	LETTER SYMBOL	TYPICAL DESCRIPTIONS
COARSE GRAINED SOILS MORE THAN 50% OF MATERIAL IS LARGER THAN NO. 200 SIEVE SIZE	GRAVEL AND GRAVELLY SOILS MORE THAN 50% OF COARSE FRACTION RETAINED ON NO. 4 SIEVE	CLEAN GRAVELS (LITTLE OR NO FINES)		GW	WELL-GRADED GRAVELS, GRAVEL-SAND MIXTURES, LITTLE OR NO FINES
				GP	POORLY-GRADED GRAVELS, GRAVEL-SAND MIXTURES, LITTLE OR NO FINES
		GRAVELS WITH FINES (APPRECIABLE AMOUNT OF FINES)		GM	SILTY GRAVELS, GRAVEL-SAND-SILT MIXTURES
				GC	CLAYEY GRAVELS, GRAVEL-SAND-CLAY MIXTURES
	SAND AND SANDY SOILS MORE THAN 50% OF COARSE FRACTION PASSING NO. 4 SIEVE	CLEAN SAND (LITTLE OR NO FINES)		SW	WELL-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
				SP	POORLY-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
		SANDS WITH FINES (APPRECIABLE AMOUNTOF FINES)		SM	SILTY SANDS, SAND-SILT MIXTURES
				SC	CLAYEY SANDS, SAND-CLAY MIXTURES
FINE GRAINED SOILS MORE THAN 50% OF MATERIAL IS SMALLER THAN NO. 200 SIEVE SIZE	SILTS AND CLAYS	LIQUID LIMIT LESS THAN 50		ML	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS WITH SLIGHT PLASTICITY
				CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
				OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
	SILTS AND CLAYS	LIQUID LIMIT GREATER THAN 50		MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SAND OR SILTY SOILS
				CH	INORGANIC CLAYS OF HIGH PLASTICITY, FAT CLAYS
				OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
HIGHLY ORGANIC SOILS				PT	PEAT, HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENT

NOTE: DUAL SYMBOLS ARE USED TO INDICATE BORDERLINE SOIL CLASSIFICATIONS

UNIFIED SOIL CLASSIFICATION SYSTEM

Earth Systems

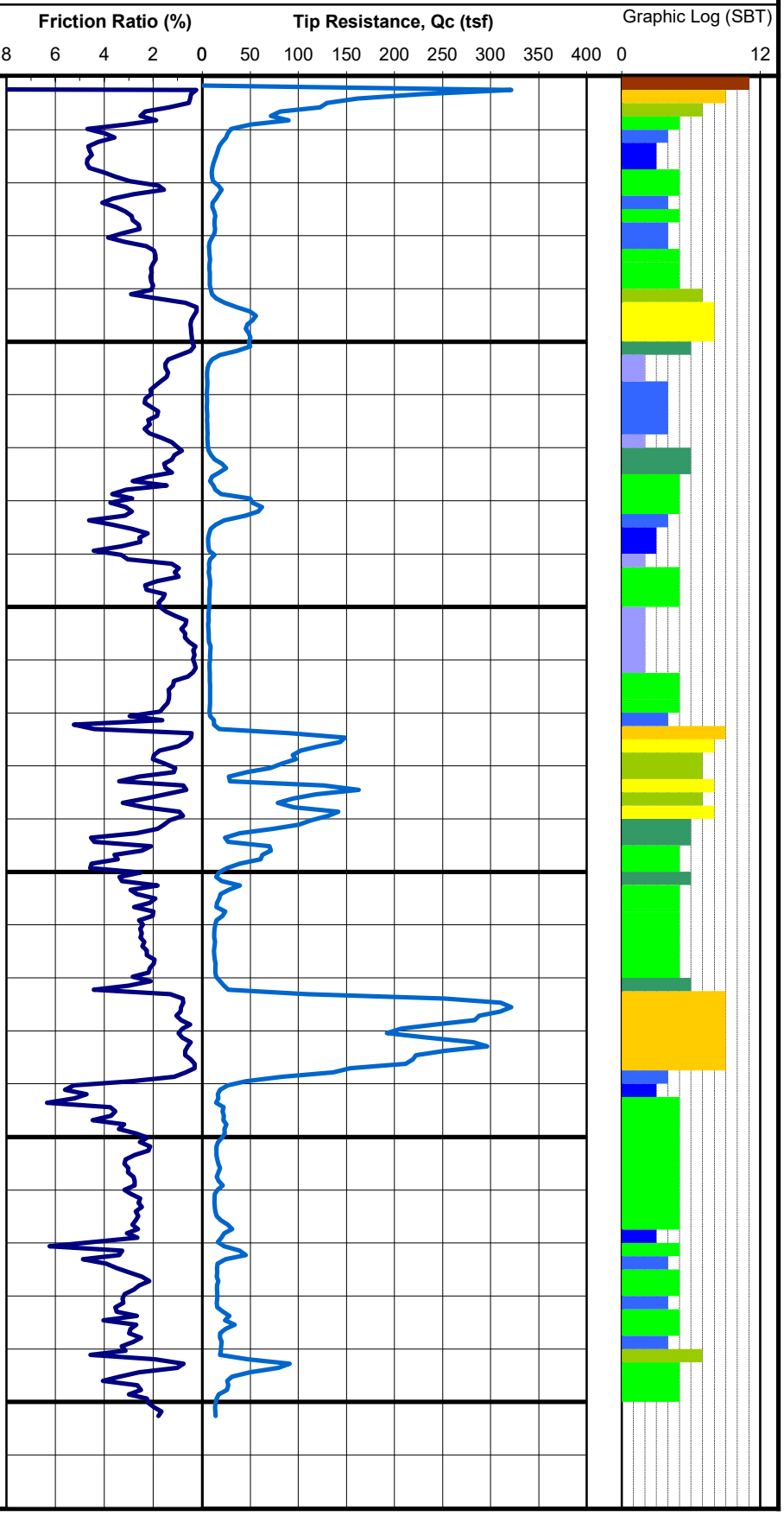
Earth Systems
Southern California

CPT No: CPT-1
Project Name: 550 Airport Way
Project No.: VT-25450-01
Location: See Site Exploration Plan

CPT Vendor: **Middle Earth**
Truck Mounted Electric
Cone with 23-ton reaction
Date: 11/1/2017

DEPTH (FEET)	Interpreted Soil Stratigraphy Robertson & Campanella ('89)	Density/Consistency
	Overconsolidated Soil	dense
	Sandy Silt to Clayey Silt	dense
	Clay	very stiff
	Silty Clay to Clay	stiff
	Silty Clay to Clay	stiff
5	Silty Clay to Clay	stiff
	Silty Clay to Clay	firm
	Silty Clay to Clay	firm
	Silty Sand to Sandy Silt	medium dense
	Sand to Silty Sand	medium dense
10	Sandy Silt to Clayey Silt	loose
	Silty Clay to Clay	firm
	Silty Clay to Clay	firm
	Sensitive fine grained	firm
	Sandy Silt to Clayey Silt	stiff
15	Clayey Silt to Silty Clay	medium dense
	Clayey Silt to Silty Clay	very stiff
	Clay	firm
	Clayey Silt to Silty Clay	firm
	Clayey Silt to Silty Clay	firm
20	Sensitive fine grained	firm
	Sensitive fine grained	firm
	Sensitive fine grained	firm
	Clayey Silt to Silty Clay	firm
	Silty Sand to Sandy Silt	medium dense
25	Silty Sand to Sandy Silt	medium dense
	Silty Sand to Sandy Silt	medium dense
	Sand to Silty Sand	medium dense
	Sandy Silt to Clayey Silt	medium dense
	Clayey Silt to Silty Clay	hard
30	Clayey Silt to Silty Clay	very stiff
	Clayey Silt to Silty Clay	stiff
	Clayey Silt to Silty Clay	stiff
	Clayey Silt to Silty Clay	stiff
	Sand to Silty Sand	dense
35	Sand	dense
	Sand	dense
	Sandy Silt to Clayey Silt	medium dense
	Clay	very stiff
	Clayey Silt to Silty Clay	very stiff
40	Clayey Silt to Silty Clay	stiff
	Clayey Silt to Silty Clay	stiff
	Clayey Silt to Silty Clay	stiff
	Clayey Silt to Silty Clay	very stiff
	Clayey Silt to Silty Clay	very stiff
45	Clayey Silt to Silty Clay	stiff
	Clayey Silt to Silty Clay	very stiff
	Clayey Silt to Silty Clay	very stiff
	Sandy Silt to Clayey Silt	medium dense
	Clayey Silt to Silty Clay	stiff
50		

End of Sounding @ 0.2 feet



Earth Systems
Southern California

CONE PENETROMETER INTERPRETATION (based on Robertson & Campanella, 1989)

Project: 550 Airport Way Project No: VT-25450-01 Date: 11/01/17

CPT SOUNDING: CPT-1 Plot: 1 Density: 1 SPT N Program developed 2003 by Shelton L. Stringer, GE, Earth Systems Southwest

Est. GWT (feet): **25.0** Dr correlation: 0 Baldi Qc/N: 1 Robertson Phi Correlation: 4 SPT N

Base Depth meters	Base Depth feet	Avg Tip Qc, tsf	Avg Friction Ratio, %	Soil Classification	USCS	Density or Consistency	Est. Density (pcf)	Qc to N	SPT N(60)	Total po tsf	p'o tsf	F	n	Cq	Norm. Qc1n	2.6 Ic	Clean Sand Qc1n	$N_{1(60)}$	Clean Sand $N_{1(60)}$	Rel. Dens. Dr (%)	Phi (deg.)	Nk: 17 Su (tsf)	OCR
0.15	0.5	183.53	23.11	Overconsolidated Soil	??	hard	110	6.0	31	0.014	0.014	####	0.84	1.70	294.9	2.77		31				10.79	####
0.30	1.0	137.94	0.79	Sand	SP	dense	100	5.0	28	0.040	0.040	0.79	0.50	1.70	221.6	1.58	221.6	47	44	100	40		
0.46	1.5	80.79	2.24	Silty Sand to Sandy Silt	SM/ML	dense	110	3.0	27	0.066	0.066	2.25	0.63	1.70	129.8	2.08	183.4	46	37	88	40		
0.61	2.0	35.53	3.93	Clayey Silt to Silty Clay	ML/CL	dense	110	2.0	18	0.094	0.094	3.94	0.76	1.70	57.1	2.50	157.1	30	31	54	36		
0.76	2.5	20.99	4.17	Silty Clay to Clay	CL	very stiff	110	1.5	14	0.121	0.121	4.19	0.81	1.70	33.7	2.68		14				1.23	51.6
0.91	3.0	14.77	4.60	Clay	CL/CH	stiff	110	1.0	15	0.149	0.149	4.65	0.85	1.70	23.7	2.82		15				0.86	29.5
1.07	3.5	10.41	4.44	Clay	CL/CH	stiff	110	1.0	10	0.176	0.176	4.52	0.89	1.70	16.7	2.93		10				0.60	17.4
1.22	4.0	12.62	2.76	Clayey Silt to Silty Clay	ML/CL	stiff	110	2.0	6	0.204	0.204	2.81	0.83	1.70	20.3	2.73		6				0.73	18.3
1.37	4.5	17.14	2.67	Clayey Silt to Silty Clay	ML/CL	stiff	110	2.0	9	0.231	0.231	2.70	0.79	1.70	27.5	2.62		9				0.99	21.9
1.52	5.0	11.18	3.58	Silty Clay to Clay	CL	stiff	110	1.5	7	0.259	0.259	3.66	0.86	1.70	18.0	2.84		7				0.64	12.7
1.68	5.5	12.99	2.72	Clayey Silt to Silty Clay	ML/CL	stiff	110	2.0	6	0.286	0.286	2.78	0.83	1.70	20.9	2.72		6				0.75	13.3
1.83	6.0	10.09	3.40	Silty Clay to Clay	CL	stiff	110	1.5	7	0.314	0.314	3.51	0.87	1.70	16.2	2.87		7				0.58	9.4
1.98	6.5	7.23	2.05	Silty Clay to Clay	CL	firm	110	1.5	5	0.341	0.341	2.16	0.87	1.70	11.6	2.86		5				0.41	6.1
2.13	7.0	7.63	2.00	Clayey Silt to Silty Clay	ML/CL	firm	110	2.0	4	0.369	0.369	2.10	0.86	1.70	12.3	2.84		4				0.43	5.9
2.29	7.5	7.79	2.08	Clayey Silt to Silty Clay	ML/CL	firm	110	2.0	4	0.396	0.396	2.19	0.87	1.70	12.5	2.84		4				0.43	5.6
2.44	8.0	8.91	2.33	Clayey Silt to Silty Clay	ML/CL	firm	110	2.0	4	0.424	0.424	2.44	0.86	1.70	14.3	2.82		4				0.50	6.0
2.59	8.5	24.58	0.92	Silty Sand to Sandy Silt	SM/ML	medium dense	110	3.0	8	0.451	0.451	0.94	0.68	1.70	39.5	2.22	67.9	12	14	38	31		
2.74	9.0	52.57	0.34	Sand to Silty Sand	SP/SM	medium dense	100	4.0	13	0.478	0.478	0.34	0.54	1.53	76.2	1.76	76.2	19	15	66	33		
2.90	9.5	46.83	0.45	Sand to Silty Sand	SP/SM	medium dense	100	4.0	12	0.503	0.503	0.46	0.57	1.53	67.6	1.86	67.6	17	14	61	32		
3.05	10.0	49.38	0.38	Sand to Silty Sand	SP/SM	medium dense	100	4.0	12	0.528	0.528	0.39	0.56	1.47	68.8	1.82	68.8	17	14	61	32		
3.20	10.5	21.39	0.92	Sandy Silt to Clayey Silt	ML	medium dense	110	2.5	9	0.554	0.554	0.95	0.70	1.58	31.9	2.30	62.3	11	12	29	30		
3.35	11.0	5.77	1.46	Sensitive fine grained	ML	firm	110	2.0	3	0.581	0.581	1.62	0.88	1.70	9.3	2.88		3				0.31	2.7
3.51	11.5	5.09	1.67	Sensitive fine grained	ML	firm	110	2.0	3	0.609	0.609	1.90	0.91	1.66	8.0	2.97		3				0.26	2.2
3.66	12.0	4.85	2.16	Silty Clay to Clay	CL	soft	110	1.5	3	0.636	0.636	2.49	0.94	1.61	7.4	3.06		3				0.25	2.0
3.81	12.5	4.83	2.08	Silty Clay to Clay	CL	soft	110	1.5	3	0.664	0.664	2.41	0.95	1.55	7.1	3.07		3				0.25	1.9
3.96	13.0	5.13	2.06	Silty Clay to Clay	CL	firm	110	1.5	3	0.691	0.691	2.38	0.94	1.49	7.2	3.06		3				0.26	1.9
4.11	13.5	5.32	2.06	Silty Clay to Clay	CL	firm	110	1.5	4	0.719	0.719	2.38	0.94	1.44	7.2	3.06		4				0.27	1.9
4.27	14.0	5.99	1.04	Sensitive fine grained	ML	firm	110	2.0	3	0.746	0.746	1.19	0.89	1.36	7.7	2.89		3				0.31	2.1
4.42	14.5	14.32	1.30	Sandy Silt to Clayey Silt	ML	stiff	110	2.5	6	0.774	0.774	1.37	0.80	1.28	17.4	2.61		6				0.80	5.3
4.57	15.0	17.43	1.64	Sandy Silt to Clayey Silt	ML	stiff	110	2.5	7	0.801	0.801	1.72	0.79	1.25	20.5	2.60		7				0.98	6.2
4.72	15.5	11.06	2.46	Clayey Silt to Silty Clay	ML/CL	stiff	110	2.0	6	0.829	0.829	2.66	0.88	1.24	13.0	2.87		6				0.60	3.7
4.88	16.0	45.89	3.35	Clayey Silt to Silty Clay	ML/CL	medium dense	110	2.0	23	0.856	0.856	3.41	0.76	1.17	50.9	2.49	137.5	25	28	49	35		
5.03	16.5	42.05	3.55	Clayey Silt to Silty Clay	ML/CL	medium dense	110	2.0	21	0.884	0.884	3.63	0.77	1.15	45.7	2.54	135.7	22	27	44	34		
5.18	17.0	9.94	2.91	Silty Clay to Clay	CL	stiff	110	1.5	7	0.911	0.911	3.20	0.91	1.15	10.8	2.99		7				0.53	3.0
5.33	17.5	6.19	2.79	Clay	CL/CH	firm	110	1.0	6	0.939	0.939	3.29	0.98	1.12	6.6	3.17		6				0.31	1.7
5.49	18.0	9.34	3.59	Clay	CL/CH	firm	110	1.0	9	0.966	0.966	4.00	0.94	1.09	9.6	3.08		9				0.49	2.6
5.64	18.5	7.02	1.10	Sensitive fine grained	ML	firm	110	2.0	4	0.994	0.994	1.29	0.91	1.06	7.0	2.94		4				0.35	1.8
5.79	19.0	7.81	1.71	Clayey Silt to Silty Clay	ML/CL	firm	110	2.0	4	1.021	1.021	1.97	0.92	1.03	7.6	3.00		4				0.40	2.0
5.94	19.5	7.36	1.80	Clayey Silt to Silty Clay	ML/CL	firm	110	2.0	4	1.049	1.049	2.10	0.94	1.01	7.0	3.04		4				0.37	1.8
6.10	20.0	6.96	1.65	Clayey Silt to Silty Clay	ML/CL	firm	110	2.0	3	1.076	1.076	1.95	0.94	0.98	6.5	3.06		3				0.35	1.6
6.25	20.5	6.38	0.81	Sensitive fine grained	ML	firm	110	2.0	3	1.104	1.104	0.97	0.92	0.96	5.8	2.96		3				0.31	1.4
6.40	21.0	6.49	0.75	Sensitive fine grained	ML	firm	110	2.0	3	1.131	1.131	0.90	0.92	0.94	5.8	2.95		3				0.32	1.4
6.55	21.5	7.95	0.38	Sensitive fine grained	ML	firm	110	2.0	4	1.159	1.159	0.45	0.86	0.92	6.9	2.77		4				0.40	1.8
6.71	22.0	7.89	0.33	Sensitive fine grained	ML	firm	120	2.0	4	1.188	1.188	0.39	0.86	0.91	6.8	2.76		4				0.39	1.7
6.86	22.5	7.70	0.40	Sensitive fine grained	ML	firm	120	2.0	4	1.218	1.218	0.48	0.87	0.88	6.4	2.81		4				0.38	1.6
7.01	23.0	7.88	1.24	Clayey Silt to Silty Clay	ML/CL	firm	120	2.0	4	1.248	1.248	1.48	0.93	0.86	6.4	3.00		4				0.39	1.6
7.16	23.5	7.94	1.37	Clayey Silt to Silty Clay	ML/CL	firm	120	2.0	4	1.278	1.278	1.64	0.94	0.84	6.3	3.03		4				0.39	1.6
7.32	24.0	7.79	2.08	Clayey Silt to Silty Clay	ML/CL	firm	120	2.0	4	1.308	1.308	2.50	0.97	0.81	6.0	3.14		4				0.38	1.5
7.47	24.5	13.82	3.76	Silty Clay to Clay	CL	stiff	120	1.5	9	1.338	1.338	4.16	0.94	0.80	10.5	3.06		9				0.73	2.8
7.62	25.0	127.68	0.51	Sand	SP	medium dense	120	5.0	26	1.368	1.368	0.51	0.53	0.87	105.5	1.72	110.9	22	22	79	34		
7.77	25.5	105.98	1.55	Sand to Silty Sand	SP/SM	medium dense	120	4.0	26	1.398	1.382	1.58	0.64	0.84	84.5	2.10	122.2	23	24	70	34		
7.92	26.0	83.54	1.54	Silty Sand to Sandy Silt	SM/ML	medium dense	120	3.0	28	1.428	1.396	1.57	0.66	0.83	65.7	2.18	105.7	24	21	59	34		
8.08	26.5	57.33	1.97	Silty Sand to Sandy Silt	SM/ML	medium dense	120	3.0	19	1.458	1.411	2.02	0.72	0.81	44.0	2.38	98.2	16	20	43	32		
8.23	27.0	125.42	1.48	Sand to Silty Sand	SP/SM	medium dense	120	4.0	31	1.488	1.425	1.50	0.62	0.83	98.6	2.03	132.5	26	26	76	35		
8.38	27.5	105.01	2.17	Silty Sand to Sandy Silt	SM/ML	medium dense	120	3.0	35	1.518	1.440	2.20	0.67	0.81	80.7	2.21	136.5	29	27	68	36		
8.53	28.0	115.12	1.22	Sand to Silty Sand	SP/SM	medium dense	120	4.0	29	1.548	1.454	1.24	0.61	0.82	89.6	2.01	117.3	24	23	72	34		
8.69	28.5	45.21	3.02	Sandy Silt to Clayey Silt	ML	medium dense	120	2.5	18	1.578	1.468	3.13	0.79	0.77	33.0	2.60	109.3	15	22	31	32		
8.84	29.0	56.10	2.98	Sandy Silt to Clayey Silt	ML	medium dense	120	2.5	22	1.608	1.483	3.07	0.77	0.77	40.9	2.52	118.3	18	24	40	33		
8.99	29.5	54.06	3.85	Clayey Silt to Silty Clay	ML/CL	hard	120	2.0	27	1.638	1.497	3.98	0.80	0.76	38.8	2.62		27				3.09	10.5
9.14	30.0	19.11	3.49	Clayey Silt to Silty Clay	ML/CL	very stiff	120	2.0	10	1.668	1.512	3.82	0.91	0.72	13.1	2.96		10				1.04	3.5
9.30	30.5	28.97	2.68	Sandy Silt to Clayey Silt	ML	very stiff	120	2.5	12	1.698	1.526	2.85	0.83	0.74	20.2	2.74		12				1.61	5.4
9.45	31.0	17.32	2.24	Clayey Silt to Silty Clay	ML/CL	stiff	120	2.0	9	1.728	1.540	2.49	0.89	0.72	11.7	2.89		9				0.93	3.0
9.60	31.5	19.87	2.26	Clayey Silt to Silty Clay	ML/CL	very stiff	120	2.0	10	1.758	1.555	2.48	0.87	0.72	13.4	2.84		10				1.08	3.5
9.75	32.0	13.79	2.51	Clayey Silt to Silty Clay	ML/CL	stiff	120	2.0	7	1.788	1.569	2.89	0.93	0.69	9.0	3.02		7				0.72	2.3
9.91	32.5	12.67	2.45	Clayey Silt to Silty Clay	ML/CL	stiff	120	2.0	6	1.818	1.584	2.86	0.94	0.68	8.2	3.06		6				0.65	2.1
10.06	33.0	12.33	2.32	Clayey Silt to Silty Clay	ML/CL	stiff	120	2.0	6	1.848	1.598	2.73	0.94	0.68	7.9	3.06		6				0.63	2.0
10.21	33.5	13.58	2.02	Clayey Silt to Silty Clay	ML/CL	stiff	120	2.0	7	1.878	1.612	2.34	0.92	0.68	8.7	2.99		7				0.70	2.2
10.36	34.0	15.63	2.38	Clayey Silt to Silty Clay	ML/CL	stiff	120	2.0	8	1.908	1.627	2.71	0.91	0.68	10.0	2.97		8				0.82	2.5
10.52	34.5	52.61	2.90	Sandy Silt to Clayey Silt	ML	medium dense	120	2.5	21	1.938	1.641	3.01	0.78	0.71	35.3	2.57	110.2	16	22	34	32		
10.67	35.0	294.94	0.81	Sand	SP	dense	120	5.0	59	1.968	1.656	0.81	0.50	0.80	222.9	1.59	222.9	46	45	100	40		
10.82	35.5	294.04	0.93	Sand	SP	dense	120	5.0	59	1.998	1.670	0.94	0.50	0.80	221.1	1.64	221.1	46	44	100	40		
10.97	36.0	213.66	0.75	Sand	SP	dense	120	5.0	43	2.028	1.684	0.76	0.51	0.79	159.1	1.68	162.7	33	33	96	37		
11.13	36.5	266.28	0.64	Sand	SP	dense	120	5.0	53	2.058	1.699	0.64	0.50	0.79	198.6	1.56	198.6	41	40	100	39		
11.28	37.0	217.72	0.49	Sand	SP	dense	120	5.0	44	2.088	1.713	0.49	0.50	0.79	161.7	1.56	161.7	33	32	97	37		
11.43	37.5	124.44	0.70	Sand	SP	medium dense	120	5.0	25	2.118	1.728	0.71	0.57	0.76	89.0	1.86	102.7	19	21	72	33		

Earth Systems
Southern California

CONE PENETROMETER INTERPRETATION (based on Robertson & Campanella, 1989)

Project: 550 Airport Way Project No: VT-25450-01 Date: 11/01/17

CPT SOUNDING: CPT-1 Plot: 1 Density: 1 SPT N Program developed 2003 by Shelton L. Stringer, GE, Earth Systems Southwest

Est. GWT (feet): **25.0** Dr correlation: 0 Baldi Qc/N: 1 Robertson Phi Correlation: 4 SPT N

Base Depth meters	Base Depth feet	Avg Tip Qc, tsf	Avg Friction Ratio, %	Soil Classification	USCS	Density or Consistency	Est. Density (pcf)	Qc to N	SPT N(60)	Total po tsf	p'o tsf	F	n	Cq	Norm. Qc1n	2.6 Ic	Clean Sand Qc1n	Clean Sand $N_{1(60)}$	Rel. Dens. Dr (%)	Phi (deg.)	Nk: 17 Su (tsf)	OCR
11.58	38.0	30.19	4.58	Silty Clay to Clay	CL	very stiff	120	1.5	20	2.148	1.742	4.93	0.89	0.64	18.3	2.92		20			1.67	4.8
11.73	38.5	15.81	5.43	Clay	CL/CH	stiff	120	1.0	16	2.178	1.756	6.29	0.99	0.61	9.1	3.22		16			0.83	2.3
11.89	39.0	21.78	3.68	Clayey Silt to Silty Clay	ML/CL	very stiff	120	2.0	11	2.208	1.771	4.09	0.91	0.62	12.9	2.99		11			1.18	3.3
12.04	39.5	23.28	3.69	Clayey Silt to Silty Clay	ML/CL	very stiff	120	2.0	12	2.238	1.785	4.08	0.91	0.62	13.7	2.97		12			1.26	3.5
12.19	40.0	20.08	2.49	Clayey Silt to Silty Clay	ML/CL	very stiff	120	2.0	10	2.268	1.800	2.81	0.89	0.62	11.8	2.92		10			1.08	3.0
12.34	40.5	14.85	2.36	Clayey Silt to Silty Clay	ML/CL	stiff	120	2.0	7	2.298	1.814	2.79	0.93	0.60	8.5	3.04		7			0.77	2.1
12.50	41.0	16.94	3.11	Clayey Silt to Silty Clay	ML/CL	stiff	120	2.0	8	2.328	1.828	3.61	0.94	0.60	9.6	3.06		8			0.89	2.4
12.65	41.5	16.32	2.86	Clayey Silt to Silty Clay	ML/CL	stiff	120	2.0	8	2.358	1.843	3.34	0.94	0.59	9.2	3.05		8			0.85	2.3
12.80	42.0	16.78	2.94	Clayey Silt to Silty Clay	ML/CL	stiff	120	2.0	8	2.388	1.857	3.43	0.94	0.59	9.4	3.05		8			0.88	2.3
12.95	42.5	12.91	2.53	Clayey Silt to Silty Clay	ML/CL	stiff	120	2.0	6	2.418	1.872	3.11	0.97	0.58	7.0	3.13		6			0.65	1.7
13.11	43.0	16.00	2.67	Clayey Silt to Silty Clay	ML/CL	stiff	120	2.0	8	2.448	1.886	3.16	0.94	0.58	8.8	3.06		8			0.83	2.2
13.26	43.5	26.73	2.85	Clayey Silt to Silty Clay	ML/CL	very stiff	120	2.0	13	2.478	1.900	3.14	0.87	0.60	15.1	2.86		13			1.46	3.8
13.41	44.0	19.63	4.46	Clay	CL/CH	very stiff	120	1.0	20	2.508	1.915	5.11	0.95	0.57	10.5	3.12		20			1.04	2.7
13.56	44.5	35.97	3.84	Clayey Silt to Silty Clay	ML/CL	hard	120	2.0	18	2.538	1.929	4.14	0.87	0.59	20.2	2.84		18			2.00	5.2
13.72	45.0	15.66	3.46	Silty Clay to Clay	CL	stiff	120	1.5	10	2.568	1.944	4.14	0.97	0.56	8.2	3.15		10			0.81	2.0
13.87	45.5	15.82	2.40	Clayey Silt to Silty Clay	ML/CL	stiff	120	2.0	8	2.598	1.958	2.87	0.94	0.56	8.4	3.05		8			0.82	2.0
14.02	46.0	15.51	3.07	Clayey Silt to Silty Clay	ML/CL	stiff	120	2.0	8	2.628	1.972	3.69	0.96	0.55	8.1	3.13		8			0.80	2.0
14.17	46.5	17.49	3.42	Silty Clay to Clay	CL	stiff	120	1.5	12	2.658	1.987	4.03	0.95	0.55	9.1	3.11		12			0.91	2.2
14.33	47.0	27.48	3.08	Clayey Silt to Silty Clay	ML/CL	very stiff	120	2.0	14	2.688	2.001	3.42	0.88	0.57	14.8	2.89		14			1.50	3.7
14.48	47.5	18.95	2.76	Clayey Silt to Silty Clay	ML/CL	stiff	120	2.0	9	2.718	2.016	3.23	0.93	0.55	9.9	3.02		9			1.00	2.4
14.63	48.0	19.17	3.66	Silty Clay to Clay	CL	very stiff	120	1.5	13	2.748	2.030	4.27	0.95	0.54	9.8	3.09		13			1.01	2.4
14.78	48.5	72.50	1.23	Silty Sand to Sandy Silt	SM/ML	medium dense	120	3.0	24	2.778	2.044	1.28	0.69	0.63	43.5	2.26	79.6	17	16	42	32		
14.94	49.0	35.31	3.34	Clayey Silt to Silty Clay	ML/CL	very stiff	120	2.0	18	2.808	2.059	3.63	0.86	0.56	18.8	2.83		18			1.96	4.7
15.09	49.5	23.28	2.71	Clayey Silt to Silty Clay	ML/CL	very stiff	120	2.0	12	2.838	2.073	3.09	0.90	0.55	12.0	2.94		12			1.25	3.0
15.24	50.0	14.14	2.13	Clayey Silt to Silty Clay	ML/CL	stiff	120	2.0	7	2.868	2.088	2.67	0.96	0.52	7.0	3.10		7			0.71	1.6

Boring and CPT Logs
From
Nearby Sites

File No. 88-6323-3 Lab No. 20823-3 Enclosure B-3

BORING NO. 3

BORING LOG DATA

Neq.	Dry Density (pcf)	Moisture Content (%)	Depth (ft)	Soil Log	Soil Description
			0		
			1	CL	Dk brn slightly sandy clay moist & mod firm
15	SB 86.8	28.2			
		28.2	2	CL-CH	Tanish lt brn silty clay w/traces of caliche moist & mod loose
		26.6	3		
		21.2	4	SW-SP	Lt brn med-fine silty sand moist & mod loose
7	SB 89.4	28.2	5	ML-MH	Lt brn clayey silt moist & mod loose
	--		6		
		32.4	7	CL-CH	Tan clay moist & mod loose
	Free water	32.4	8		Brn clay, plastic very moist & mod loose
			≈ 9	CL-CH	
3	SB 80.7	23.4	10	SW-SP	Tan clean med-fine sand saturated & mod loose
		40.8	11	CL-CH	Tanish brn clay saturated & mod loose
		34.2	12		Tan clay, plastic saturated & mod loose
			13	CL-CH	
		35.1	14		Tan fine sandy clay (sticky & plastic) saturated & mod loose
11	*	36.0	15	CL	
			16		
			17		
		25.0	18		Brn clay, sticky saturated & mod loose
			19	CL-CH	
9	SB 94.0	29.8	20	CL-CH	Dk brn clay, sticky & plastic saturated & mod loose
		29.8	21		Lt brn clay, sticky & plastic saturated & mod firm
			22	CL-CH	
			23		
			24		
23	SB 95.8	32.4	25		

Total depth attempted = 25'
Free water below 8.75'
Sidewall caving 9-10'

* Sample was attempted but not recovered

Pacific Materials Laboratory, Inc.

LOG OF BORING for

Job No. B-19409-V1
Report No. 92-1-92

Camarillo Airport Reserved Officer Training Facility

DATE December 18, 1991 BORING NO. 1 LOCATION Per Plan

Depth (ft)	Symbol	Core	Blows/ft	DESCRIPTION	Unit Dry Wt. (pcf)	Moisture (Percent)	Soil Type	Relative Compaction (Percent)	REMARKS AND ANALYSIS
0			36	C1: Dark yellow-brown very silty fine sandy clay	102.5	8.5	CL	92	inclusions of $CaCO_3$
			17		94.1	21.2		84	
5			8	B1: (see right)	86.5	27.4	ML	--	B1: Yellow-brown fine sandy silt
				B1/C1: interbedded			ML/CL		
10			12	C1: Yellow-brown very silty fine sandy clay	74.7	44.5	CL	--	
15			17		95.8	26.6		--	
20			18						
25			43	A1: Pale yellow-orange silty fine sand			SM		▼ groundwater encountered @ 28 ft. during drilling
30			32 10 8 7	No recovery					
35			6 6 7	A1/C1: Olive green to pale yellow-orange silty fine sand interbedded with silty fine sandy clay			SM/CL		
40			6 8 9						
									Total Depth: 41 feet

Plate B

Earth Systems Southern California
1731-A Walter Street, Ventura, California 93003
PHONE: (805) 642-6727 FAX: (805) 642-1325

BORING NO: 1
PROJECT NAME: Frontier High Shade Structure
PROJECT NUMBER: VT-24489-01
BORING LOCATION: Per Plan

DRILLING DATE: September 23, 2010
DRILL RIG: Mobile B-61
DRILLING METHOD: 4" Mud Rotary
LOGGED BY: PEM

Vertical Depth	Sample Type: Bulk	Sample Type: SPT	Sample Type: Mod. Calif.	PENETRATION RESISTANCE (BLOWS/6")	SYMBOL	USCS CLASS	UNIT DRY WT. (pcf)	MOISTURE CONTENT (%)	DESCRIPTION OF UNITS
0			■	7/9/9		CL	95.8	19.3	**ARTIFICIAL FILL:** Mottled pale and dark yellowish brown silty clay. Stiff, dry.
5			■	2/2/2		ML	91.2	26.7	**ALLUVIUM:** Moderate yellowish brown clayey silt, soft, saturated.
			■	2/3/8		SM	107.8	18.3	**ALLUVIUM:** Moderate yellowish brown silty fine sand. Loose, saturated.
	▼		■	5/7/4		SP	93.1	21.1	**ALLUVIUM:** Moderate yellowish brown poorly graded medium sand. Loose, saturated.
10		▯		Push for 18"		CL			**ALLUVIUM:** Moderate yellowish brown silty clay. Very soft.
						CL			**ALLUVIUM:** Moderate yellowish brown sandy clay. Soft.
15		■		1/3/6		CL			**ALLUVIUM:** Pale brown silty clay. Medium Stiff.
20		■		2/2/1		CL			**ALLUVIUM:** Pale brown silty clay. Soft.
25		■		Push for 12"/1		CL			**ALLUVIUM:** Pale brown silty clay. Very soft.
30		■		7/8/6		SM			**ALLUVIUM:** Moderate yellowsih brown silty fine sand. Loose.
35		■		2/3/4		CL			**ALLUVIUM:** Pale brown silty clay. Medium stiff.
						SM			**ALLUVIUM:** Pale yellowsih brown silty fine sand. Medium dense.

Note: The stratification lines shown represent the approximate boundaries between soil and/or rock types and the transitions may be gradual.

Earth Systems Southern California
1731-A Walter Street, Ventura, California 93003
PHONE: (805) 642-6727 FAX: (805) 642-1325

BORING NO: 1
PROJECT NAME: Frontier High Shade Structure
PROJECT NUMBER: VT-24489-01
BORING LOCATION: Per Plan

DRILLING DATE: September 23, 2010
DRILL RIG: Mobile B-61
DRILLING METHOD: 4" Mud Rotary
LOGGED BY: PEM

Vertical Depth	Sample Type: Bulk	Sample Type: SPT	Sample Type: Mod. Calif.	PENETRATION RESISTANCE (BLOWS/6")	SYMBOL	USCS CLASS	UNIT DRY WT. (pcf)	MOISTURE CONTENT (%)	DESCRIPTION OF UNITS
40		■		10/10/9		SM			**ALLUVIUM:** Pale yellowsih brown silty fine sand. Medium dense.
45		■		4/6/6		CL			**ALLUVIUM:** Dark yellowish brown silty clay. Stiff.
50		■		5/8/8		CL			**ALLUVIUM**: Dark yellowish brown silty clay. Stiff.
55									**TOTAL DEPTH: 51.5 feet** **GROUNDWATER ENCOUNTERED AT 5 feet**
60									
65									
70									
75									

Note: The stratification lines shown represent the approximate boundaries between soil and/or rock types and the transitions may be gradual.

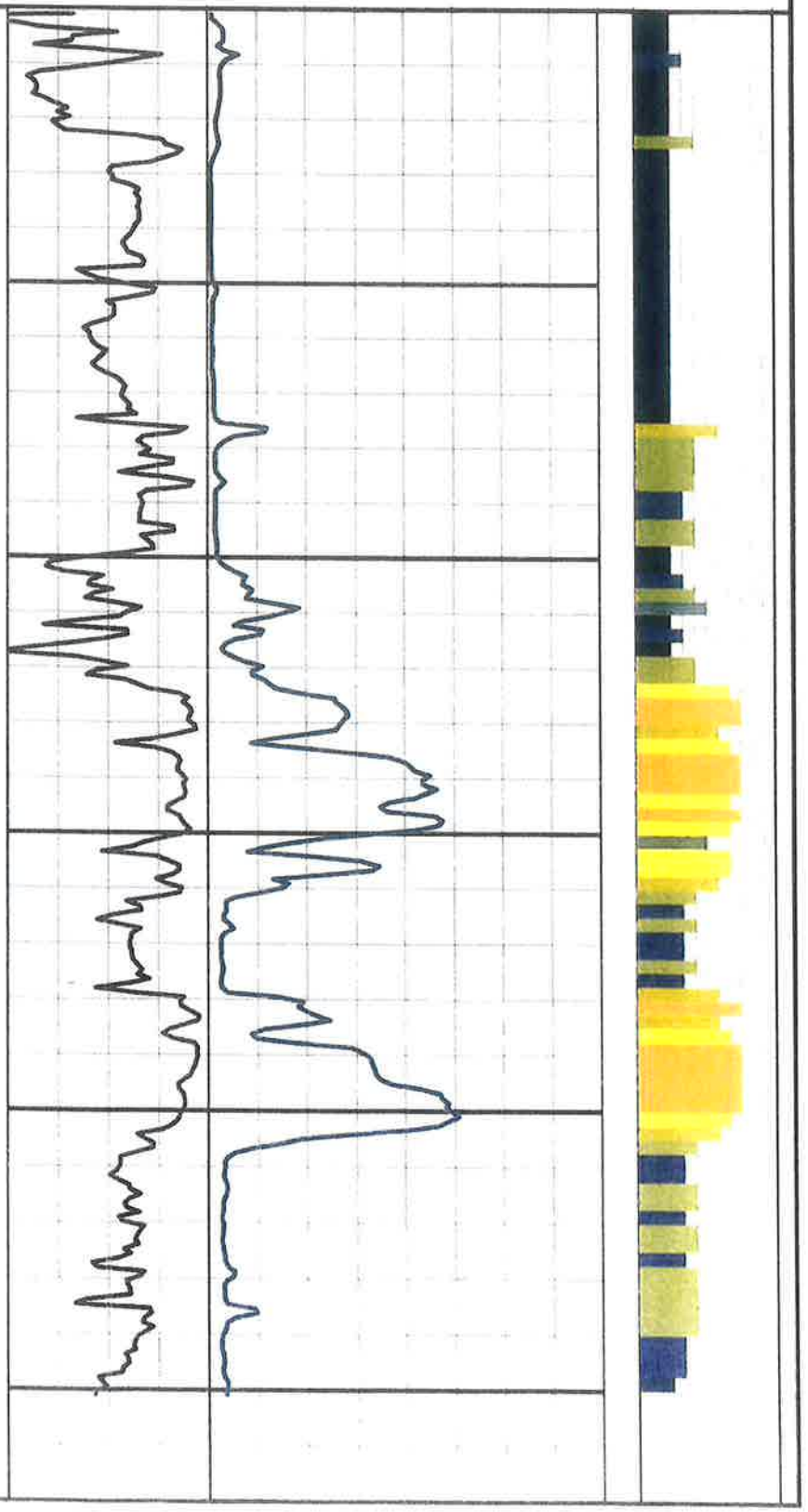
Earth Systems

CPT No: CPT-1
Project Name: Oxnard College Fire Academy
Project No.: 302245-001
Location: See Site Exploration Plan

CPT Vendor: **Middle Earth GeoTesting**
Truck Mounted Electric
Cone with 23-ton reaction
Date: 3/28/2019

DEPTH (FEET)	Interpreted Soil Stratigraphy Robertson & Campanella ('89)	Density/Consistency
	Clay	stiff
	Silty Clay to Clay	very stiff
	Clay	stiff
	Clay	stiff
5	Silty Clay to Clay	stiff
	Clay	soft
	Clay	soft
	Clay	soft
	Clay	soft
10	Clay	firm
	Clay	firm
	Clay	soft
	Clay	soft
	Clay	firm
15	Clay	firm
	Sandy Silt to Clayey Silt	medium dense
	Clayey Silt to Silty Clay	stiff
	Silty Clay to Clay	firm
	Silty Clay to Clay	firm
20	Clay	stiff
	Clay	very stiff
	Clayey Silt to Silty Clay	dense
	Silty Clay to Clay	hard
	Clay	very stiff
25	Sandy Silt to Clayey Silt	dense
	Sand	medium dense
	Silty Sand to Sandy Silt	dense
	Sand	dense
	Sand	dense
30	Sand	dense
	Silty Sand to Sandy Silt	dense
	Sand to Silty Sand	medium dense
	Clayey Silt to Silty Clay	very stiff
	Clayey Silt to Silty Clay	stiff
35	Clayey Silt to Silty Clay	stiff
	Sandy Silt to Clayey Silt	medium dense
	Sand to Silty Sand	medium dense
	Sand	medium dense
	Sand	dense
40	Sand	dense
	Silty Sand to Sandy Silt	dense
	Clayey Silt to Silty Clay	very stiff
	Clayey Silt to Silty Clay	stiff
	Clayey Silt to Silty Clay	stiff
45	Clayey Silt to Silty Clay	stiff
	Clayey Silt to Silty Clay	very stiff
	Clayey Silt to Silty Clay	very stiff
	Clayey Silt to Silty Clay	stiff
	Silty Clay to Clay	stiff
50	Silty Clay to Clay	stiff

End of Sounding @ 50.4 feet



Earth Systems

CONE PENETROMETER INTERPRETATION

(based on Robertson & Campanella, 1989)

Project: Oxnard College Fire Academy — Project No: 302245-001 — Date: 03/28/19

CPT SOUNDING: CPT-1 — Plot: 1 — Density: 1 — SPT N — Program developed 2003 by Shelton L. Stringer, GE, Earth Systems Southwest

Est. GWT (feet): 8.0 — Dr correlation: 0 — Baldi — Qc/N: 1 — Robertson — Phi Correlation: 4 — SPT N

Base Depth meters	Base Depth feet	Avg Tip Qc, tsf	Avg Friction Ratio, %	Soil Classification	USCS	Density or Consistency	Est Density (pcf)	Qc to N	SPT N(60)	Total po tsf	p'o tsf	F	n	Cq	Norm Qc1n	2.6 Ic	Clean Sand Qc1n	Clean Sand $N_{1(60)}$	Rel Dens Dr (%)	Phi (deg.)	Nk 17 Su (tsf)	OCR
0.15	0.5	9.77	8.81	Clay	CL/CH	stiff	110	1.0	10	0.014	0.014	8.62	0.95	1.70	15.7	3.14		10			0.57	####
0.30	1.0	16.47	4.86	Clay	CL/CH	stiff	110	1.0	16	0.041	0.041	4.87	0.85	1.70	26.5	2.80		16			0.97	####
0.46	1.5	19.37	4.40	Clay	CL/CH	very stiff	110	1.0	19	0.069	0.069	4.42	0.82	1.70	31.1	2.72		19			1.14	84.2
0.61	2.0	16.30	4.06	Silty Clay to Clay	CL	stiff	110	1.5	11	0.096	0.096	4.08	0.83	1.70	26.2	2.75		11			0.95	50.5
0.76	2.5	12.37	7.00	Clay	CL/CH	stiff	110	1.0	12	0.124	0.124	7.08	0.91	1.70	19.9	3.00		12			0.72	29.7
0.91	3.0	13.00	6.92	Clay	CL/CH	stiff	110	1.0	13	0.151	0.151	7.01	0.90	1.70	20.9	2.98		13			0.76	25.5
1.07	3.5	11.43	6.10	Clay	CL/CH	stiff	110	1.0	11	0.179	0.179	6.20	0.91	1.70	18.4	2.99		11			0.66	18.9
1.22	4.0	8.97	5.96	Clay	CL/CH	stiff	110	1.0	9	0.206	0.206	6.10	0.93	1.70	14.4	3.06		9			0.52	12.7
1.37	4.5	9.00	4.92	Clay	CL/CH	stiff	110	1.0	9	0.234	0.234	5.06	0.91	1.70	14.5	3.01		9			0.52	11.3
1.52	5.0	10.83	1.51	Clayey Silt to Silty Clay	ML/CL	stiff	120	2.0	5	0.263	0.263	1.55	0.80	1.70	17.4	2.64		5			0.62	12.1
1.68	5.5	5.15	2.30	Clay	CL/CH	firm	120	1.0	5	0.293	0.293	2.44	0.92	1.70	8.3	3.02		5			0.29	5.0
1.83	6.0	2.57	3.90	Clay	CL/CH	soft	120	1.0	3	0.323	0.323	4.46	1.00	1.70	4.1	3.41		3			0.13	2.1
1.98	6.5	3.40	2.95	Clay	CL/CH	soft	120	1.0	3	0.353	0.353	3.29	0.99	1.70	5.5	3.24		3			0.18	2.6
2.13	7.0	3.57	2.80	Clay	CL/CH	soft	120	1.0	4	0.383	0.383	3.14	0.98	1.70	5.7	3.21		4			0.19	2.5
2.29	7.5	3.60	2.78	Clay	CL/CH	soft	120	1.0	4	0.413	0.413	3.14	0.98	1.70	5.8	3.21		4			0.19	2.3
2.44	8.0	3.30	3.03	Clay	CL/CH	soft	120	1.0	3	0.443	0.443	3.50	1.00	1.70	5.3	3.26		3			0.17	1.9
2.59	8.5	2.97	3.37	Clay	CL/CH	soft	120	1.0	3	0.473	0.457	4.01	1.00	1.70	4.8	3.33		3			0.15	1.6
2.74	9.0	3.57	2.83	Clay	CL/CH	soft	120	1.0	4	0.503	0.471	3.30	0.99	1.70	5.7	3.22		4			0.18	2.0
2.90	9.5	3.90	4.26	Clay	CL/CH	soft	120	1.0	4	0.533	0.486	4.93	1.00	1.70	6.3	3.29		4			0.20	2.1
3.05	10.0	6.60	3.32	Clay	CL/CH	firm	120	1.0	7	0.563	0.500	3.63	0.92	1.70	10.6	3.02		7			0.36	3.6
3.20	10.5	6.77	3.14	Clay	CL/CH	firm	120	1.0	7	0.593	0.515	3.44	0.92	1.70	10.9	3.00		7			0.37	3.6
3.35	11.0	5.30	3.77	Clay	CL/CH	firm	120	1.0	5	0.623	0.529	4.28	0.96	1.70	8.5	3.14		5			0.28	2.7
3.51	11.5	4.43	4.55	Clay	CL/CH	soft	120	1.0	4	0.653	0.543	5.34	1.00	1.70	7.1	3.26		4			0.23	2.1
3.66	12.0	4.23	4.72	Clay	CL/CH	soft	120	1.0	4	0.683	0.558	5.63	1.00	1.70	6.8	3.29		4			0.22	1.9
3.81	12.5	4.70	4.26	Clay	CL/CH	soft	120	1.0	5	0.713	0.572	5.02	0.99	1.70	7.6	3.23		5			0.24	2.1
3.96	13.0	4.43	4.51	Clay	CL/CH	soft	120	1.0	4	0.743	0.587	5.42	1.00	1.70	7.1	3.27		4			0.23	1.9
4.11	13.5	5.40	3.72	Clay	CL/CH	firm	120	1.0	5	0.773	0.601	4.34	0.96	1.70	8.7	3.14		5			0.28	2.3
4.27	14.0	5.83	3.43	Clay	CL/CH	firm	120	1.0	6	0.803	0.615	3.98	0.95	1.67	9.2	3.10		6			0.31	2.5
4.42	14.5	6.20	3.23	Clay	CL/CH	firm	120	1.0	6	0.833	0.630	3.73	0.94	1.63	9.5	3.07		6			0.33	2.6
4.57	15.0	9.27	3.97	Clay	CL/CH	stiff	120	1.0	9	0.863	0.644	4.38	0.91	1.57	13.8	2.98		9			0.51	3.9
4.72	15.5	48.03	1.55	Silty Sand to Sandy Silt	SM/ML	medium dense	120	3.0	16	0.893	0.659	1.58	0.67	1.37	62.3	2.20	103.2	20	21	57	33		
4.88	16.0	11.28	2.62	Clayey Silt to Silty Clay	ML/CL	stiff	120	2.0	8	0.923	0.673	2.86	0.86	1.48	15.7	2.82		6			0.62	4.6
5.03	16.5	7.17	1.85	Clayey Silt to Silty Clay	ML/CL	firm	120	2.0	4	0.953	0.687	2.13	0.89	1.47	10.0	2.92		4			0.38	2.7
5.18	17.0	12.57	1.94	Clayey Silt to Silty Clay	ML/CL	stiff	120	2.0	8	0.983	0.702	2.11	0.83	1.41	16.7	2.73		6			0.70	5.0
5.33	17.5	9.73	1.99	Clayey Silt to Silty Clay	ML/CL	stiff	120	2.0	5	1.013	0.716	2.22	0.87	1.40	12.9	2.83		5			0.53	3.7
5.49	18.0	7.47	2.68	Silty Clay to Clay	CL	firm	120	1.5	5	1.043	0.731	3.11	0.92	1.41	9.9	3.01		5			0.40	2.8
5.64	18.5	7.27	2.75	Silty Clay to Clay	CL	firm	120	1.5	5	1.073	0.745	3.23	0.93	1.39	9.5	3.03		5			0.38	2.5
5.79	19.0	7.30	1.82	Clayey Silt to Silty Clay	ML/CL	firm	120	2.0	4	1.103	0.759	2.14	0.90	1.35	9.3	2.94		4			0.38	2.4
5.94	19.5	8.73	2.29	Clayey Silt to Silty Clay	ML/CL	firm	120	2.0	4	1.133	0.774	2.64	0.90	1.32	10.9	2.93		4			0.47	2.9
6.10	20.0	10.43	4.94	Clay	CL/CH	stiff	120	1.0	10	1.163	0.788	5.56	0.94	1.32	13.0	3.07		10			0.57	3.5
6.25	20.5	27.93	5.52	Clay	CL/CH	very stiff	120	1.0	28	1.193	0.803	5.76	0.84	1.26	33.3	2.78		28			1.60	10.0
6.40	21.0	38.53	4.46	Silty Clay to Clay	CL	hard	120	1.5	26	1.223	0.817	4.60	0.80	1.23	44.7	2.62		26			2.22	13.7
6.55	21.5	48.67	4.39	Clayey Silt to Silty Clay	ML/CL	medium dense	120	2.0	24	1.253	0.831	4.50	0.77	1.21	55.4	2.55	167.4	27	33	52	35		
6.71	22.0	78.03	3.17	Sandy Silt to Clayey Silt	ML	dense	120	2.5	31	1.283	0.846	3.23	0.70	1.17	86.3	2.31	171.3	34	34	71	37		
6.86	22.5	39.10	5.03	Clay	CL/CH	hard	120	1.0	39	1.313	0.860	5.20	0.81	1.18	43.7	2.66		39			2.25	13.2
7.01	23.0	33.23	4.28	Silty Clay to Clay	CL	very stiff	120	1.5	22	1.343	0.875	4.47	0.81	1.17	36.7	2.67		22			1.90	10.9
7.16	23.5	19.07	6.92	Clay	CL/CH	very stiff	120	1.0	19	1.373	0.889	7.45	0.91	1.17	21.1	3.00		19			1.07	6.0
7.32	24.0	45.90	3.99	Clayey Silt to Silty Clay	ML/CL	medium dense	120	2.0	23	1.403	0.903	4.12	0.78	1.13	49.1	2.56	150.4	24	30	47	34		
7.47	24.5	55.13	3.68	Clayey Silt to Silty Clay	ML/CL	medium dense	120	2.0	28	1.433	0.918	3.78	0.75	1.11	58.0	2.48	154.4	29	31	54	36		
7.62	25.0	98.03	1.44	Sand to Silty Sand	SP/SM	medium dense	120	4.0	25	1.463	0.932	1.46	0.61	1.08	100.2	2.02	132.9	25	27	77	35		
7.77	25.5	135.90	0.79	Sand	SP	medium dense	120	5.0	27	1.493	0.947	0.80	0.53	1.06	136.3	1.74	145.5	28	29	90	35		
7.92	26.0	136.63	0.68	Sand	SP	medium dense	120	5.0	27	1.523	0.961	0.69	0.52	1.05	135.8	1.71	141.4	28	28	90	35		
8.08	26.5	84.13	1.90	Silty Sand to Sandy Silt	SM/ML	medium dense	120	3.0	28	1.553	0.975	1.94	0.66	1.05	83.9	2.16	131.9	28	26	70	36		
8.23	27.0	139.30	1.62	Sand to Silty Sand	SP/SM	dense	120	4.0	35	1.583	0.990	1.64	0.60	1.04	137.0	1.96	171.1	35	34	90	37		
8.38	27.5	204.73	1.19	Sand	SP	dense	120	5.0	41	1.613	1.004	1.20	0.53	1.03	199.0	1.75	213.0	41	43	100	39		
8.53	28.0	220.17	0.97	Sand	SP	dense	120	5.0	44	1.643	1.019	0.98	0.51	1.02	212.2	1.66	215.0	44	43	100	39		
8.69	28.5	221.27	0.93	Sand	SP	dense	120	5.0	44	1.673	1.033	0.94	0.50	1.01	211.7	1.65	212.9	44	43	100	39		
8.84	29.0	179.67	1.56	Sand to Silty Sand	SP/SM	dense	120	4.0	45	1.703	1.047	1.58	0.57	1.01	170.8	1.88	200.2	44	40	99	39		
8.99	29.5	234.37	1.07	Sand	SP	dense	120	5.0	47	1.733	1.062	1.08	0.51	1.00	221.1	1.68	226.9	45	45	100	40		
9.14	30.0	164.17	1.22	Sand to Silty Sand	SP/SM	dense	120	4.0	41	1.763	1.076	1.23	0.56	0.99	153.7	1.83	174.0	40	35	95	38		
9.30	30.5	60.73	3.33	Sandy Silt to Clayey Silt	ML	medium dense	120	2.5	24	1.793	1.091	3.43	0.75	0.98	56.1	2.46	144.0	23	29	53	34		
9.45	31.0	144.33	1.62	Sand to Silty Sand	SP/SM	dense	120	4.0	36	1.823	1.105	1.64	0.60	0.97	132.9	1.97	167.5	34	33	89	37		
9.60	31.5	117.90	1.56	Sand to Silty Sand	SP/SM	medium dense	120	4.0	29	1.853	1.119	1.58	0.61	0.97	107.6	2.02	142.9	28	29	80	35		
9.75	32.0	69.83	1.31	Silty Sand to Sandy Silt	SM/ML	medium dense	120	3.0	23	1.883	1.134	1.34	0.65	0.96	63.1	2.15	97.4	22	19	58	34		
9.91	32.5	21.63	2.73	Clayey Silt to Silty Clay	ML/CL	very stiff	120	2.0	11	1.913	1.148	2.99	0.84	0.93	19.1	2.77		11			1.21	5.2
10.06	33.0	16.67	3.65	Silty Clay to Clay	CL	stiff	120	1.5	11	1.943	1.163	4.13	0.90	0.92	14.5	2.95		11			0.91	3.8
10.21	33.5	21.33	3.14	Clayey Silt to Silty Clay	ML/CL	very stiff	120	2.0	11	1.973	1.177	3.46	0.86	0.91	18.4	2.82		11			1.19	4.9
10.36	34.0	12.70	3.15	Silty Clay to Clay	CL	stiff	120	1.5	8	2.003	1.191	3.74	0.93	0.90	10.8	3.03		8			0.68	2.7
10.52	34.5	13.10	3.05	Silty Clay to Clay	CL	stiff	120	1.5	9	2.033	1.206	3.61	0.92	0.89	11.0	3.01		9			0.70	2.8
10.67	35.0	14.40	2.78	Clayey Silt to Silty Clay	ML/CL	stiff	120	2.0	7	2.063	1.220	3.25	0.90	0.88	12.0	2.95		7			0.78	3.0
10.82	35.5	12.90	3.34	Silty Clay to Clay	CL	stiff	120	1.5	9	2.093	1.235	3.99	0.93	0.87	10.6	3.05		9			0.69	2.6
10.97	36.0	62.70	1.72	Silty Sand to Sandy Silt	SM/ML	medium dense	120	3.0	21	2.123	1.249	1.78	0.70	0.89	52.8	2.28	100.3	19	20	50	33		
11.13	36.5	106.03	0.64	Sand	SP	medium dense	120	5.0	21	2.153	1.263	0.66	0.56	0.91	90.7	1.83	102.7	19	21	73	33		
11.28	37.0	64.60	1.47	Silty Sand to Sandy Silt	SM/ML	medium dense	120	3.0	22	2.183	1.278	1.52	0.68	0.88	53.7	2.23	94.2	19	19	51	33		
11.43	37.5	93.83	0.81	Sand to Silty Sand	SP/SM	medium dense	120	4.0	23	2.213	1.292	0.83	0.59	0.89	78.8	1.94	97.1	21	19	67	33		
11.58	38.0	160.67	0.46	Sand	SP	medium dense	120	5.0	32	2.243	1.307	0.46	0.50	0.90	136.8	1.60	136.8	28	27	90	36		
11.73	38.5	168.27	0.63	Sand	SP	medium dense	120	5.0	34	2.273	1.321	0.64	0.51	0.89	142.0	1.67	144.6	29	29	91	36		
11.89	39.0	192.23	1.14	Sand	SP	dense	120	5.0	38	2.303	1.335	1.15	0.55	0.88	159.9	1.80	177.1	33	35	96	37		
12.04	39.5	238.43	0.98	Sand	SP	dense	120	5.0	48	2.333	1.350	0.99	0.52	0.88	196.8	1.69	204.7	41	41	100	39		
12.19	40.0	247.43	1.08	Sand	SP	dense	120	5.0	49	2.363	1.364	1.09	0.52	0.88	204.9	1.71	213.8	42	43	100	39		

Earth Systems CONE PENETROMETER INTERPRETATION (based on Robertson & Campanella, 1989)

Project: Oxnard College Fire Academy Project No: 302245-001 Date: 03/28/19

CPT SOUNDING: CPT-1 Plot: 1 Density: 1 SPT N Program developed 2003 by Shelton L. Stringer, GE, Earth Systems Southwest

Est GWT (feet): 8.0 Dr correlation: 0 Baldi Qc/N: 1 Robertson Phi Correlation: 4 SPT N

Base Depth meters	Base Depth feet	Avg Tip Qc, tsf	Avg Friction Ratio, %	Soil Classification	USCS	Density or Consistency	Est Density (pcf)	Qc to N	SPT N(60)	Total po tsf	p'o tsf	F	n	Cq	Norm Qc1n	2.6 Ic	Clean Sand Qc1n	$N_{1(60)}$	Clean Sand $N_{1(60)}$	Rel Dens Dr (%)	Phi (deg.)	Nk 17 Su (tsf)	OCR
12 34	40 5	227 03	1 56	Sand to Silty Sand	SP/SM	dense	120	4 0	57	2 393	1 379	1 58	0 57	0 86	184 7	1 86	213 0	48	43	100	40		
12 50	41 0	102 37	2 56	Silty Sand to Sandy Silt	SM/ML	medium dense	120	3 0	34	2 423	1 393	2 62	0 69	0 83	80 0	2 27	147 9	29	30	68	36		
12 65	41 5	30 43	2 92	Clayey Silt to Silty Clay	ML/CL	very stiff	120	2 0	15	2 453	1 407	3 17	0 83	0 79	22 7	2 73		15				1 71	6 0
12 80	42 0	16 63	3 61	Silty Clay to Clay	CL	stiff	120	1 5	11	2 483	1 422	4 24	0 92	0 76	12 0	3 02		11				0 89	3 0
12 95	42 5	16 80	3 60	Silty Clay to Clay	CL	stiff	120	1 5	11	2 513	1 436	4 23	0 92	0 75	12 0	3 02		11				0 90	3 0
13 11	43 0	17 67	3 02	Clayey Silt to Silty Clay	ML/CL	stiff	120	2 0	9	2 543	1 451	3 53	0 90	0 75	12 6	2 98		9				0 95	3 1
13 26	43 5	14 77	3 16	Clayey Silt to Silty Clay	ML/CL	stiff	120	2 0	7	2 573	1 465	3 82	0 93	0 74	10 3	3 05		7				0 78	2 5
13 41	44 0	14 50	3 24	Silty Clay to Clay	CL	stiff	120	1 5	10	2 603	1 479	3 94	0 94	0 73	10 0	3 07		10				0 77	2 4
13 56	44 5	13 97	2 87	Clayey Silt to Silty Clay	ML/CL	stiff	120	2 0	7	2 633	1 494	3 53	0 94	0 72	9 6	3 05		7				0 73	2 3
13 72	45 0	14 93	3 12	Clayey Silt to Silty Clay	ML/CL	stiff	120	2 0	7	2 663	1 508	3 60	0 93	0 72	10 1	3 05		7				0 79	2 4
13 87	45 5	17 97	4 25	Silty Clay to Clay	CL	stiff	120	1 5	12	2 693	1 523	5 00	0 94	0 71	12 1	3 06		12				0 97	3 0
14 02	46 0	23 40	2 90	Clayey Silt to Silty Clay	ML/CL	very stiff	120	2 0	12	2 723	1 537	3 28	0 87	0 72	16 0	2 86		12				1 29	4 0
14 17	46 5	15 73	3 18	Clayey Silt to Silty Clay	ML/CL	stiff	120	2 0	8	2 753	1 551	3 85	0 93	0 70	10 4	3 05		8				0 83	2 5
14 33	47 0	32 23	3 74	Clayey Silt to Silty Clay	ML/CL	very stiff	120	2 0	16	2 783	1 566	4 09	0 86	0 71	21 8	2 81		16				1 80	5 6
14 48	47 5	21 23	2 50	Clayey Silt to Silty Clay	ML/CL	very stiff	120	2 0	11	2 813	1 580	2 88	0 88	0 70	14 1	2 86		11				1 16	3 5
14 63	48 0	14 43	2 78	Clayey Silt to Silty Clay	ML/CL	stiff	120	2 0	7	2 843	1 595	3 47	0 94	0 68	9 3	3 06		7				0 76	2 2
14 78	48 5	13 90	3 11	Silty Clay to Clay	CL	stiff	120	1 5	9	2 873	1 609	3 92	0 95	0 67	8 8	3 11		9				0 72	2 1
14 94	49 0	15 20	3 29	Silty Clay to Clay	CL	stiff	120	1 5	10	2 903	1 623	4 07	0 95	0 67	9 6	3 09		10				0 80	2 3
15 09	49 5	16 33	4 05	Silty Clay to Clay	CL	stiff	120	1 5	11	2 933	1 638	4 94	0 95	0 66	10 2	3 12		11				0 86	2 5
15 24	50 0	18 23	4 40	Clay	CL/CH	stiff	120	1 0	18	2 963	1 652	5 25	0 95	0 66	11 3	3 10		18				0 98	2 8

Earth Systems

1731-A Walter Street, Ventura, California 93003
PHONE: (805) 642-6727 FAX: (805) 642-1325

BORING NO: B-1
PROJECT NAME: Oxnard College Fire Academy
PROJECT NUMBER: 302245-001
BORING LOCATION: Per Plan

DRILLING DATE: March 19, 2019
DRILL RIG: CME-75
DRILLING METHOD: Eight-Inch Hollow Stem Auger
LOGGED BY: SC

Vertical Depth	Sample Type: Bulk	Sample Type: SPT	Sample Type: Mod. Calif.	PENETRATION RESISTANCE (BLOWS/6")	SYMBOL	USCS CLASS	UNIT DRY WT. (pcf)	MOISTURE CONTENT (%)	DESCRIPTION OF UNITS
0				3/6/8		CL/ML	91.8	23.9	**ALLUVIUM:** Mottled olive brown silty clay to clayey silt; stiff; moist.
5				1/1/2		CL	81.2	36.6	**ALLUVIUM:** Dark yellowish brown silty clay; soft; very moist.
				1/1/2		CL	72.7	45.3	As above; with caliche.
10				1/3/2		CL	78.4	43.1	**ALLUVIUM:** Dark yellowish brown silty clay; minor sand; some caliche; soft; very moist to wet.
15				1/2/3		CH		43.1	**ALLUVIUM:** Interbedded dark yellowish brown fat clay; caliche; medium stiff; wet.
20				2/3/7		SC/ CL			**ALLUVIUM:** Olive brown sandy clay to clayey sand; medium dense to stiff; wet.
25				8/16/19		SM/ SP			**ALLUVIUM:** Interbedded pale yellowish brown fine silty sand and fine sand; dense; wet.
30				8/10/10		SM/ SP			**ALLUVIUM:** Interbedded pale yellowish brown sandy silt; silty sand and fine sand; medium dense; wet.
35									Total Depth: 31.5 feet. Groundwater Depth 8.0 feet.

Note: The stratification lines shown represent the approximate boundaries between soil and/or rock types and the transitions may be gradual.

Earth Systems

1731-A Walter Street, Ventura, California 93003
PHONE: (805) 642-6727 FAX: (805) 642-1325

BORING NO: B-2
PROJECT NAME: Oxnard College Fire Academy
PROJECT NUMBER: 302245-001
BORING LOCATION: Per Plan

DRILLING DATE: March 19, 2019
DRILL RIG: CME-75
DRILLING METHOD: Eight-Inch Hollow Stem Auger
LOGGED BY: SC

Vertical Depth	Sample Type: Bulk	Sample Type: SPT	Sample Type: Mod. Calif.	PENETRATION RESISTANCE (BLOWS/6")	SYMBOL	USCS CLASS	UNIT DRY WT. (pcf)	MOISTURE CONTENT (%)	DESCRIPTION OF UNITS
0									
			■	2/2/2		CL/ML	80.7	39.6	**ALLUVIUM:** Mottled olive brown silty clay to clayey silt; soft; moist.
5			■	1/1/1		CL	69.8	50.2	Same as above; with caliche and very soft.
	▼								
10			■	1/2/3		CL			**ALLUVIUM:** Dark olive brown silty clay; caliche; soft; very moist to wet.
15		■		1/1/1		CL/ ML			**ALLUVIUM:** Dark olive brown silty clay; caliche; soft; very moist to wet.
20									Total Depth: 16.5 feet. Groundwater Depth 8.0 feet.
25									
30									
35									

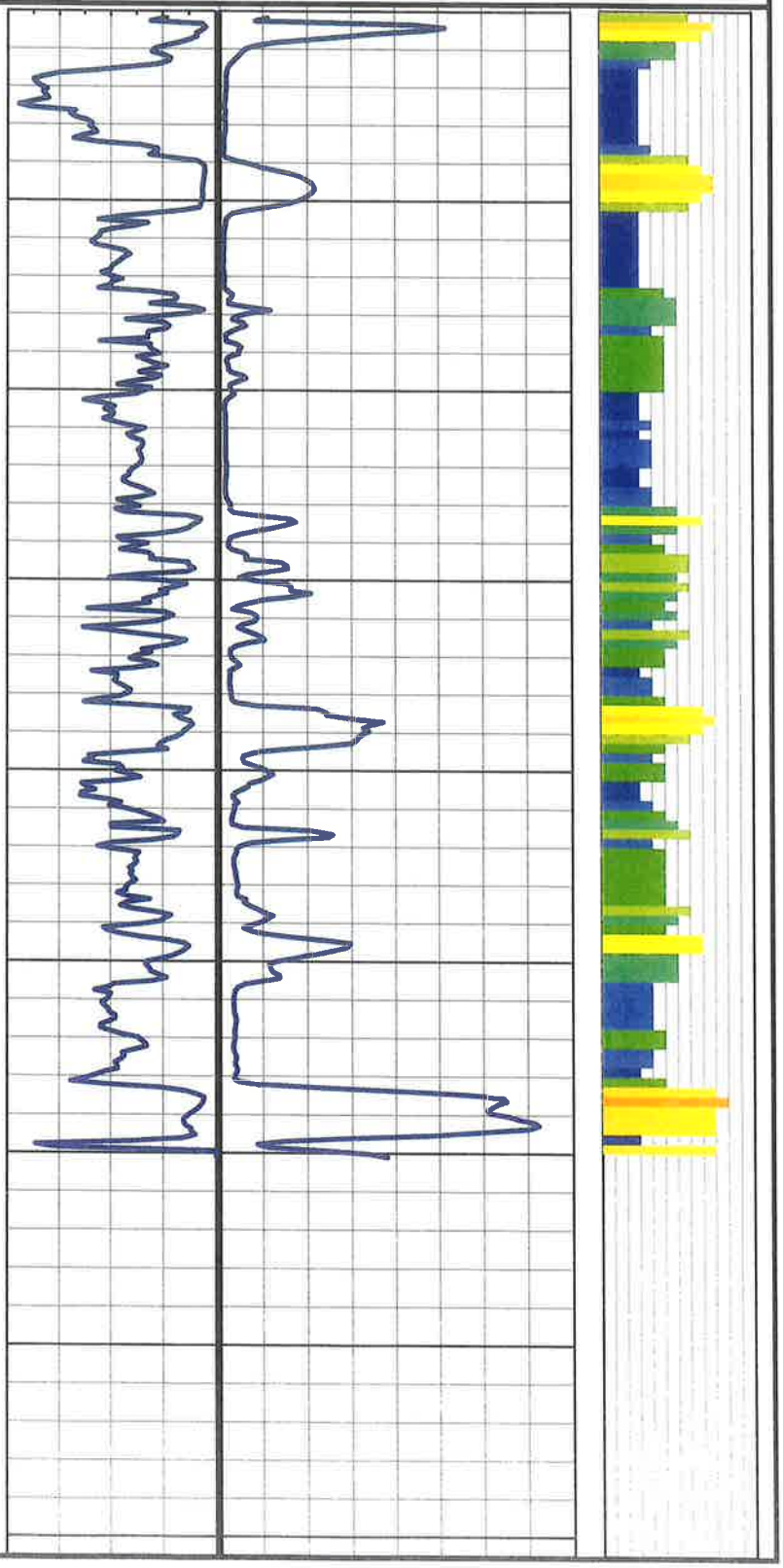
Note: The stratification lines shown represent the approximate boundaries between soil and/or rock types and the transitions may be gradual.

Earth Systems

CPT No : CPT-1
Project Name: Frontier High School Multiuse Building
Project No.: 304922-001
Location: See Site Exploration Plan

Cone Penetrometer: **Kehoe T&E**
Truck Mounted Electric Cone with 23-ton reaction weight
Date: 9/30/2021

DEPTH (FEET)	Interpreted Soil Stratigraphy Robertson & Campanella ('89)	Density/Consistency
	Silty Sand to Sandy Silt	dense
	Sand	very dense
	Sand to Silty Sand	dense
	Sandy Silt to Clayey Silt	medium dense
5	Sandy Silt to Clayey Silt	loose
	Silty Clay to Clay	stiff
	Clay	firm
	Clay	firm
	Clay	firm
10	Clay	firm
	Clay	firm
	Clay	firm
	Clay	firm
	Clay	firm
15	Silty Clay to Clay	firm
	Silty Sand to Sandy Silt	medium dense
	Sand to Silty Sand	medium dense
	Sand	medium dense
	Sand	medium dense
20	Sand to Silty Sand	medium dense
	Silty Sand to Sandy Silt	loose
	Clay	firm
	Clay	firm
	Clay	firm
25	Clay	soft
	Clay	soft
	Clay	soft
	Clay	firm
	Clay	firm
30	Clayey Silt to Silty Clay	stiff
	Sandy Silt to Clayey Silt	loose
	Sandy Silt to Clayey Silt	loose
	Sandy Silt to Clayey Silt	loose
	Silty Clay to Clay	firm
35	Clayey Silt to Silty Clay	stiff
	Clayey Silt to Silty Clay	very stiff
	Clayey Silt to Silty Clay	firm
	Clayey Silt to Silty Clay	stiff
	Clayey Silt to Silty Clay	very stiff
40	Clayey Silt to Silty Clay	stiff
	Clay	firm
	Clay	firm
	Clay	firm
	Silty Clay to Clay	firm
45	Clay	firm
	Silty Clay to Clay	firm
	Silty Clay to Clay	firm
	Silty Clay to Clay	firm
	Clay	firm
50	Clay	firm
	Silty Clay to Clay	firm
	Silty Clay to Clay	stiff
	Sandy Silt to Clayey Silt	loose
	Sand to Silty Sand	medium dense
55	Sandy Silt to Clayey Silt	very stiff
	Silty Clay to Clay	stiff
	Clayey Silt to Silty Clay	very stiff
	Silty Sand to Sandy Silt	medium dense
	Silty Sand to Sandy Silt	medium dense
60	Sandy Silt to Clayey Silt	medium dense
	Silty Sand to Sandy Silt	medium dense
	Sandy Silt to Clayey Silt	medium dense
	Clayey Silt to Silty Clay	very stiff
	Sandy Silt to Clayey Silt	loose
65	Silty Clay to Clay	very stiff
	Silty Sand to Sandy Silt	loose
	Sandy Silt to Clayey Silt	very stiff
	Clayey Silt to Silty Clay	stiff
	Clayey Silt to Silty Clay	very stiff
70	Clay	stiff
	Silty Clay to Clay	stiff
	Silty Clay to Clay	stiff
	Clayey Silt to Silty Clay	medium dense
	Sand to Silty Sand	medium dense
75	Sand	medium dense
	Sand to Silty Sand	medium dense
	Silty Sand to Sandy Silt	medium dense
	Clayey Silt to Silty Clay	hard
	Silty Clay to Clay	very stiff
80	Clayey Silt to Silty Clay	medium dense
	End of Sounding @ 0.2 feet	



Earth Systems

CONE PENETROMETER INTERPRETATION

(based on Robertson & Campanella, 1989)

Project: Frontier High School Multiuse Building Project No: 304922-001 Date: 09/30/21

CPT SOUNDING: CPT-1 Plot: 1 Density: 1 SPT N Program developed 2003 by Shelton L. Stringer, GE, Earth Systems Southwest

Est. GWT (feet): **10.0** Dr correlation: 0 Baldi Qc/N: 0 Jefferies & Davies Phi Correlation: 4 SPT N

Base Depth meters	Base Depth feet	Avg Tip Qc, tsf	Avg Friction Ratio, %	Soil Classification	USCS	Density or Consistency	Est. Density (pcf)	Qc to N	SPT N(60)	Total po tsf	p'o tsf	F	n	Cq	Norm. Qc1n	2.6 Ic	Clean Sand Qc1n	cs	Clean Sand $N_{1(60)}$	Rel. Dens. Dr (%)	Phi (deg.)	Nk: 17 Su (tsf)	OCR
0.15	0.5	104.98	1.61	Silty Sand to Sandy Silt	SM/ML	dense	110	5.3	20	0.014	0.014	1.61	0.58	1.70	168.7	1.89	199.4	34	40	99	37		
0.30	1.0	221.44	0.55	Sand	SP	very dense	100	6.4	35	0.040	0.040	0.55	0.50	1.70	355.8	1.33	355.8	59	71	100	42		
0.46	1.5	100.79	1.03	Sand to Silty Sand	SP/SM	dense	100	5.5	18	0.065	0.065	1.03	0.54	1.70	162.0	1.76	175.1	31	35	97	36		
0.61	2.0	31.71	2.23	Sandy Silt to Clayey Silt	ML	medium dense	110	4.4	7	0.091	0.091	2.23	0.72	1.70	50.9	2.36	109.8	12	22	49	31		
0.76	2.5	19.23	1.81	Sandy Silt to Clayey Silt	ML	loose	110	4.2	5	0.119	0.119	1.82	0.75	1.70	30.9	2.47	81.3	8	16	28	29		
0.91	3.0	10.25	3.39	Silty Clay to Clay	CL	stiff	110	3.4	3	0.146	0.146	3.44	0.87	1.70	16.5	2.86		3				0.59	20.7
1.07	3.5	7.79	6.55	Clay	CL/CH	firm	110	2.9	3	0.174	0.174	6.70	0.95	1.70	12.5	3.13		3				0.45	13.1
1.22	4.0	7.69	6.74	Clay	CL/CH	firm	110	2.8	3	0.201	0.201	6.92	0.95	1.70	12.4	3.15		3				0.44	11.2
1.37	4.5	7.06	6.54	Clay	CL/CH	firm	110	2.8	3	0.229	0.229	6.76	0.96	1.70	11.3	3.17		3				0.40	9.0
1.52	5.0	6.03	7.20	Clay	CL/CH	firm	110	2.6	2	0.256	0.256	7.52	0.99	1.70	9.7	3.25		2				0.34	6.8
1.68	5.5	6.73	5.31	Clay	CL/CH	firm	110	2.9	2	0.284	0.284	5.54	0.95	1.70	10.8	3.13		2				0.38	6.8
1.83	6.0	6.94	4.73	Clay	CL/CH	firm	110	3.0	2	0.311	0.311	4.95	0.94	1.70	11.2	3.09		2				0.39	6.4
1.98	6.5	5.51	5.04	Clay	CL/CH	firm	110	2.8	2	0.339	0.339	5.37	0.97	1.70	8.8	3.19		2				0.30	4.6
2.13	7.0	4.86	3.18	Clay	CL/CH	firm	120	2.9	2	0.368	0.368	3.44	0.95	1.70	7.8	3.12		2				0.26	3.7
2.29	7.5	5.54	2.15	Silty Clay to Clay	CL	firm	120	3.2	2	0.398	0.398	2.32	0.91	1.70	8.9	2.98		2				0.30	3.9
2.44	8.0	33.42	0.54	Silty Sand to Sandy Silt	SM/ML	medium dense	120	5.1	7	0.428	0.428	0.55	0.61	1.70	53.7	1.99	68.8	10	14	51	30		
2.59	8.5	76.83	0.43	Sand to Silty Sand	SP/SM	medium dense	120	5.7	13	0.458	0.458	0.43	0.51	1.53	111.1	1.66	111.1	20	22	81	33		
2.74	9.0	102.34	0.47	Sand	SP	medium dense	120	5.9	17	0.488	0.488	0.48	0.50	1.47	142.5	1.59	142.5	25	28	92	35		
2.90	9.5	104.47	0.50	Sand	SP	medium dense	120	5.8	18	0.518	0.518	0.51	0.50	1.43	141.2	1.61	141.2	25	28	91	35		
3.05	10.0	85.42	0.55	Sand to Silty Sand	SP/SM	medium dense	120	5.7	15	0.548	0.548	0.55	0.52	1.41	113.9	1.71	118.9	20	24	82	33		
3.20	10.5	32.90	1.45	Silty Sand to Sandy Silt	SM/ML	loose	120	4.6	7	0.578	0.562	1.47	0.69	1.55	48.1	2.26	88.4	10	18	46	30		
3.35	11.0	8.00	3.60	Clay	CL/CH	firm	120	3.2	3	0.608	0.576	3.90	0.91	1.70	12.9	2.98		3				0.44	3.8
3.51	11.5	5.99	3.84	Clay	CL/CH	firm	120	2.9	2	0.638	0.591	4.30	0.95	1.70	9.6	3.10		2				0.32	2.7
3.66	12.0	5.07	4.59	Clay	CL/CH	firm	120	2.7	2	0.668	0.605	5.28	0.99	1.70	8.1	3.21		2				0.26	2.2
3.81	12.5	4.86	4.02	Clay	CL/CH	soft	120	2.7	2	0.698	0.620	4.69	0.98	1.69	7.8	3.20		2				0.25	2.0
3.96	13.0	4.48	3.45	Clay	CL/CH	soft	120	2.7	2	0.728	0.634	4.12	0.98	1.66	7.0	3.20		2				0.23	1.8
4.11	13.5	4.32	3.93	Clay	CL/CH	soft	120	2.6	2	0.758	0.648	4.76	1.00	1.63	6.7	3.26		2				0.22	1.6
4.27	14.0	5.53	3.97	Clay	CL/CH	firm	120	2.8	2	0.788	0.663	4.63	0.97	1.58	8.2	3.17		2				0.29	2.1
4.42	14.5	5.48	4.16	Clay	CL/CH	firm	120	2.7	2	0.818	0.677	4.89	0.98	1.55	8.0	3.20		2				0.28	2.1
4.57	15.0	13.10	1.82	Clayey Silt to Silty Clay	ML/CL	stiff	120	3.7	4	0.848	0.692	1.95	0.82	1.42	17.6	2.69		4				0.73	5.3
4.72	15.5	17.76	1.63	Sandy Silt to Clayey Silt	ML	loose	120	4.0	4	0.878	0.706	1.71	0.78	1.37	23.0	2.56	71.3	5	14	16	28		
4.88	16.0	30.86	1.75	Sandy Silt to Clayey Silt	ML	loose	120	4.3	7	0.908	0.720	1.80	0.73	1.32	38.6	2.39	88.2	8	18	37	29		
5.03	16.5	25.54	1.86	Sandy Silt to Clayey Silt	ML	loose	120	4.1	6	0.938	0.735	1.94	0.75	1.32	31.8	2.48	84.6	7	17	29	29		
5.18	17.0	8.73	2.58	Silty Clay to Clay	CL	firm	120	3.2	3	0.968	0.749	2.90	0.90	1.37	11.3	2.95		3				0.47	3.1
5.33	17.5	17.49	3.14	Clayey Silt to Silty Clay	ML/CL	stiff	120	3.6	5	0.998	0.764	3.33	0.84	1.31	21.7	2.75		5				0.98	6.5
5.49	18.0	18.23	2.49	Clayey Silt to Silty Clay	ML/CL	very stiff	120	3.7	5	1.028	0.778	2.64	0.82	1.29	22.2	2.68		5				1.03	6.6
5.64	18.5	8.88	2.31	Clayey Silt to Silty Clay	ML/CL	firm	120	3.3	3	1.058	0.792	2.62	0.90	1.30	10.9	2.93		3				0.48	3.0
5.79	19.0	16.80	2.48	Clayey Silt to Silty Clay	ML/CL	stiff	120	3.7	5	1.088	0.807	2.66	0.83	1.25	19.9	2.72		5				0.94	5.8
5.94	19.5	20.60	3.08	Clayey Silt to Silty Clay	ML/CL	very stiff	120	3.7	6	1.118	0.821	3.26	0.83	1.23	24.0	2.71		6				1.16	7.1
6.10	20.0	14.42	2.74	Clayey Silt to Silty Clay	ML/CL	stiff	120	3.5	4	1.148	0.836	2.98	0.86	1.22	16.7	2.81		4				0.80	4.8
6.25	20.5	8.58	4.58	Clay	CL/CH	firm	120	2.8	3	1.178	0.850	5.31	0.96	1.23	10.0	3.14		3				0.45	2.6
6.40	21.0	6.37	4.00	Clay	CL/CH	firm	120	2.7	2	1.208	0.864	4.94	0.99	1.22	7.4	3.23		2				0.32	1.8
6.55	21.5	6.78	4.04	Clay	CL/CH	firm	120	2.7	3	1.238	0.879	4.95	0.99	1.20	7.7	3.22		3				0.35	1.9
6.71	22.0	7.17	3.00	Silty Clay to Clay	CL	firm	120	2.9	2	1.268	0.893	3.64	0.96	1.18	8.0	3.13		2				0.37	2.0
6.86	22.5	6.84	3.13	Clay	CL/CH	firm	120	2.8	2	1.298	0.908	3.87	0.97	1.16	7.5	3.16		2				0.35	1.8
7.01	23.0	7.11	2.85	Silty Clay to Clay	CL	firm	120	2.9	2	1.328	0.922	3.50	0.96	1.14	7.7	3.13		2				0.36	1.9
7.16	23.5	7.25	2.85	Silty Clay to Clay	CL	firm	120	2.9	3	1.358	0.936	3.51	0.96	1.12	7.7	3.13		3				0.37	1.9
7.32	24.0	7.96	3.00	Silty Clay to Clay	CL	firm	120	2.9	3	1.388	0.951	3.63	0.95	1.11	8.3	3.11		3				0.41	2.1
7.47	24.5	7.63	3.37	Clay	CL/CH	firm	120	2.8	3	1.418	0.965	4.14	0.97	1.09	7.9	3.16		3				0.39	1.9
7.62	25.0	6.99	3.22	Clay	CL/CH	firm	120	2.8	3	1.448	0.980	4.05	0.98	1.08	7.1	3.19		3				0.35	1.7
7.77	25.5	7.27	2.58	Silty Clay to Clay	CL	firm	120	2.9	3	1.478	0.994	3.24	0.96	1.06	7.3	3.13		3				0.37	1.7
7.92	26.0	11.29	3.31	Silty Clay to Clay	CL	stiff	120	3.1	4	1.508	1.008	3.82	0.92	1.05	11.2	3.02		4				0.60	2.9
8.08	26.5	37.71	2.23	Sandy Silt to Clayey Silt	ML	loose	120	4.1	9	1.538	1.023	2.32	0.75	1.03	36.6	2.48	97.7	9	20	35	30		
8.23	27.0	73.45	0.86	Sand to Silty Sand	SP/SM	medium dense	120	5.1	14	1.568	1.037	0.88	0.61	1.01	70.3	2.00	91.0	14	18	62	31		
8.38	27.5	25.34	2.48	Sandy Silt to Clayey Silt	ML	very stiff	120	3.8	7	1.598	1.052	2.65	0.81	1.01	24.1	2.66		7				1.43	6.8
8.53	28.0	10.34	3.08	Silty Clay to Clay	CL	stiff	120	3.0	3	1.628	1.066	3.65	0.94	0.99	9.7	3.06		3				0.55	2.5
8.69	28.5	24.52	2.87	Clayey Silt to Silty Clay	ML/CL	very stiff	120	3.7	7	1.658	1.080	3.08	0.83	0.98	22.8	2.72		7				1.38	6.3
8.84	29.0	58.78	1.52	Silty Sand to Sandy Silt	SM/ML	medium dense	120	4.6	13	1.688	1.095	1.56	0.68	0.98	54.3	2.24	95.9	12	19	51	31		
8.99	29.5	54.77	1.61	Silty Sand to Sandy Silt	SM/ML	medium dense	120	4.5	12	1.718	1.109	1.66	0.69	0.97	50.1	2.28	94.7	11	19	48	30		
9.14	30.0	47.81	2.37	Sandy Silt to Clayey Silt	ML	medium dense	120	4.2	11	1.748	1.124	2.46	0.74	0.96	43.2	2.44	107.6	11	22	42	30		
9.30	30.5	88.23	1.82	Silty Sand to Sandy Silt	SM/ML	medium dense	120	4.8	19	1.778	1.138	1.86	0.66	0.95	79.5	2.16	125.7	17	25	67	32		
9.45	31.0	56.61	2.53	Sandy Silt to Clayey Silt	ML	medium dense	120	4.3	13	1.808	1.152	2.61	0.73	0.94	50.3	2.41	118.3	12	24	48	31		
9.60	31.5	23.55	3.41	Clayey Silt to Silty Clay	ML/CL	very stiff	120	3.5	7	1.838	1.167	3.70	0.85	0.92	20.5	2.80		7				1.32	5.6
9.75	32.0	41.51	1.91	Sandy Silt to Clayey Silt	ML	loose	120	4.2	10	1.868	1.181	2.00	0.74	0.92	36.1	2.44	90.3	9	18	35	30		
9.91	32.5	25.92	4.16	Silty Clay to Clay	CL	very stiff	120	3.5	8	1.898	1.196	4.49	0.86	0.90	22.0	2.83		8				1.45	6.0
10.06	33.0	46.50	1.95	Silty Sand to Sandy Silt	SM/ML	loose	120	4.3	11	1.928	1.210	2.04	0.74	0.91	39.8	2.42	94.6	10	19	39	30		
10.21	33.5	19.99	2.10	Sandy Silt to Clayey Silt	ML	very stiff	120	3.6	6	1.958	1.224	2.33	0.84	0.88	16.7	2.75		6				1.10	4.4
10.36	34.0	13.37	2.91	Clayey Silt to Silty Clay	ML/CL	stiff	120	3.1	4	1.988	1.239	3.42	0.92	0.87	10.9	3.00		4				0.71	2.8
10.52	34.5	20.21	2.64	Clayey Silt to Silty Clay	ML/CL	very stiff	120	3.5	6	2.018	1.253	2.93	0.86	0.86	16.5	2.81		6				1.12	4.4
10.67	35.0	11.92	4.08	Clay	CL/CH	stiff	120	2.8	4	2.048	1.268	4.93	0.96	0.84	9.5	3.14		4				0.63	2.3
10.82	35.5	11.38	3.67	Silty Clay to Clay	CL	stiff	120	2.9	4	2.078	1.282	4.49	0.96	0.83	8.9	3.14		4				0.59	2.2
10.97	36.0	13.03	3.40	Silty Clay to Clay	CL	stiff	120	3.0	4	2.108	1.296	4.06	0.94	0.83	10.2	3.07		4				0.69	2.5
11.13	36.5	46.00	3.26	Clayey Silt to Silty Clay	ML/CL	medium dense	120	3.9	12	2.138	1.311	3.42	0.79	0.84	36.7	2.59	119.8	10	24	35	30		

Earth Systems

CONE PENETROMETER INTERPRETATION

(based on Robertson & Campanella, 1989)

Project: Frontier High School Multiuse Building Project No: 304922-001 Date: 09/30/21

CPT SOUNDING: CPT-1 Plot: 1 Density: 1 SPT N Program developed 2003 by Shelton L. Stringer, GE, Earth Systems Southwest

Est. GWT (feet): **10.0** Dr correlation: 0 Baldi Qc/N: 0 Jefferies & Davies Phi Correlation: 4 SPT N

Base Depth meters	Base Depth feet	Avg Tip Qc, tsf	Avg Friction Ratio, %	Soil Classification	USCS	Density or Consistency	Est. Density (pcf)	Qc to N	SPT N(60)	Total po tsf	p'o tsf	F	n	Cq	Norm. Qc1n	2.6 Ic	Clean Sand Qc1n	c_i $N_{1(60)}$	Clean Sand $N_{1(60)}$	Rel. Dens. Dr (%)	Phi (deg.)	Nk: 17 Su (tsf)	OCR
11.28	37.0	130.49	1.34	Sand to Silty Sand	SP/SM	medium dense	120	5.1	25	2.168	1.325	1.36	0.60	0.87	107.7	1.97	136.6	22	27	80	34		
11.43	37.5	172.14	0.97	Sand	SP	medium dense	120	5.5	31	2.198	1.340	0.98	0.55	0.88	143.1	1.79	157.0	27	31	92	35		
11.58	38.0	162.11	1.33	Sand to Silty Sand	SP/SM	medium dense	120	5.3	31	2.228	1.354	1.35	0.58	0.87	132.8	1.91	158.8	26	32	89	35		
11.73	38.5	139.74	2.05	Silty Sand to Sandy Silt	SM/ML	medium dense	120	4.9	29	2.258	1.368	2.08	0.64	0.85	112.1	2.09	161.9	24	32	82	35		
11.89	39.0	45.91	3.31	Clayey Silt to Silty Clay	ML/CL	hard	120	3.9	12	2.288	1.383	3.49	0.79	0.81	35.1	2.61		12				2.62	9.5
12.04	39.5	30.48	4.47	Silty Clay to Clay	CL	very stiff	120	3.4	9	2.318	1.397	4.84	0.87	0.79	22.6	2.85		9				1.71	6.0
12.19	40.0	54.42	3.54	Clayey Silt to Silty Clay	ML/CL	medium dense	120	4.0	14	2.348	1.412	3.70	0.78	0.80	41.0	2.58	131.1	12	26	40	31		
12.34	40.5	44.39	3.86	Clayey Silt to Silty Clay	ML/CL	hard	120	3.8	12	2.378	1.426	4.08	0.81	0.78	32.9	2.68		12				2.53	8.8
12.50	41.0	24.90	4.89	Clay	CL/CH	very stiff	120	3.2	8	2.408	1.440	5.41	0.90	0.76	17.8	2.96		8				1.38	4.7
12.65	41.5	17.65	4.32	Clay	CL/CH	stiff	120	3.0	6	2.438	1.455	5.01	0.93	0.74	12.4	3.06		6				0.95	3.1
12.80	42.0	16.58	3.46	Silty Clay to Clay	CL	stiff	120	3.1	5	2.468	1.469	4.06	0.92	0.74	11.6	3.02		5				0.89	2.9
12.95	42.5	14.16	2.22	Clayey Silt to Silty Clay	ML/CL	stiff	120	3.2	4	2.498	1.484	2.70	0.91	0.73	9.8	2.98		4				0.75	2.4
13.11	43.0	49.26	3.12	Sandy Silt to Clayey Silt	ML	medium dense	120	3.9	13	2.528	1.498	3.29	0.79	0.76	35.4	2.59	115.6	10	23	34	30		
13.26	43.5	106.28	1.82	Silty Sand to Sandy Silt	SM/ML	medium dense	120	4.8	22	2.558	1.512	1.86	0.66	0.79	79.4	2.16	125.7	18	25	67	33		
13.41	44.0	25.27	4.09	Silty Clay to Clay	CL	very stiff	120	3.3	8	2.588	1.527	4.56	0.89	0.72	17.2	2.92		8				1.40	4.5
13.56	44.5	17.41	3.01	Clayey Silt to Silty Clay	ML/CL	stiff	120	3.2	6	2.618	1.541	3.55	0.91	0.71	11.7	2.98		6				0.93	2.9
13.72	45.0	16.21	3.14	Clayey Silt to Silty Clay	ML/CL	stiff	120	3.1	5	2.648	1.556	3.75	0.93	0.70	10.7	3.03		5				0.86	2.6
13.87	45.5	18.09	3.20	Clayey Silt to Silty Clay	ML/CL	stiff	120	3.1	6	2.678	1.570	3.75	0.92	0.70	11.9	2.99		6				0.97	2.9
14.02	46.0	20.15	3.24	Clayey Silt to Silty Clay	ML/CL	very stiff	120	3.2	6	2.708	1.584	3.75	0.90	0.69	13.2	2.96		6				1.09	3.3
14.17	46.5	19.42	3.52	Clayey Silt to Silty Clay	ML/CL	very stiff	120	3.1	6	2.738	1.599	4.10	0.92	0.69	12.6	3.00		6				1.05	3.1
14.33	47.0	33.11	3.18	Clayey Silt to Silty Clay	ML/CL	very stiff	120	3.6	9	2.768	1.613	3.47	0.84	0.70	21.9	2.76		9				1.85	5.6
14.48	47.5	54.76	1.97	Silty Sand to Sandy Silt	SM/ML	medium dense	120	4.2	13	2.798	1.628	2.07	0.74	0.73	37.6	2.44	93.3	10	19	36	30		
14.63	48.0	38.21	3.09	Sandy Silt to Clayey Silt	ML	hard	120	3.7	10	2.828	1.642	3.34	0.82	0.70	25.1	2.71		10				2.15	6.5
14.78	48.5	55.37	3.56	Clayey Silt to Silty Clay	ML/CL	hard	120	3.9	14	2.858	1.656	3.75	0.80	0.70	36.6	2.62		14				3.16	9.5
14.94	49.0	137.51	1.34	Sand to Silty Sand	SP/SM	medium dense	120	5.1	27	2.888	1.671	1.37	0.61	0.76	98.3	2.01	128.5	21	26	76	34		
15.09	49.5	114.37	1.40	Sand to Silty Sand	SP/SM	medium dense	120	4.9	23	2.918	1.685	1.43	0.64	0.74	80.4	2.08	114.7	18	23	68	33		
15.24	50.0	65.89	2.48	Sandy Silt to Clayey Silt	ML	medium dense	120	4.2	16	2.948	1.700	2.60	0.75	0.70	43.7	2.45	111.2	12	22	42	31		

Earth Systems

1731-A Walter Street, Ventura, California 93003
PHONE: (805) 642-6727 FAX: (805) 642-1325

BORING NO: B-1
PROJECT NAME: Frontier HS Multi-use & Portable Bldgs
PROJECT NUMBER: 304922-001
BORING LOCATION: Per Plan

DRILLING DATE: October 8, 2021
DRILL RIG: SIMCO
DRILLING METHOD: Mud Rotary/Hollow-Stem Auger
LOGGED BY: A. Luna

Vertical Depth	Sample Type: Bulk	Sample Type: SPT	Sample Type: Mod. Calif.	PENETRATION RESISTANCE (BLOWS/6")	SYMBOL	USCS CLASS	UNIT DRY WT. (pcf)	MOISTURE CONTENT (%)	DESCRIPTION OF UNITS
0	X		■	22/15/11		CL/ ML	117.2	8.9	**ARTIFICIAL FILL:** Gray Clayey Silt to Silty Clay, very stiff, moist
5			■	4/6/7		CL	97.9	22.3	**ALLUVIUM:** Light Brown to Light Gray Brown fine Sandy Clay, stiff, moist to very moist
			■	2/3/5		SC	93.0	29.1	**ALLUVIUM:** Light Brown Clayey fine Sand, medium stiff, moist to very moist
10			■	4/8/12		SM			**ALLUVIUM:** Light Brown Silty fine Sand, medium dense, moist to very moist
			■	3/3/3		CH	76.4	44.8	**ALLUVIUM:** Light Brown Silty Clay, medium stiff, saturated
15			■	2/3/3		CL	81.5	41.7	**ALLUVIUM:** Brown fine Sandy Clay, medium stiff, saturated
			■	5/3/4		CL			**ALLUVIUM:** Gray Brown fine Sandy Clay, medium stiff, wet
20			■	5/5/5		CL	85.3	35.2	
25		▬		2/3/3		CL			**ALLUVIUM:** Brown fine Sandy Clay, medium stiff, wet
30		▬		5/10/10		SM			**ALLUVIUM:** Brown Silty fine Sand, medium dense, wet
35		▬		2/3/3		CH		46.2	**ALLUVIUM:** Gray Brown Silty Clay, medium stiff, saturated
		▬		7/9/12		CL			**ALLUVIUM:** Gray Brown Silty Clay, trace to little fine Sand, trace calcareous veining, very stiff, very moist

Note: The stratification lines shown represent the approximate boundaries between soil and/or rock types and the transitions may be gradual.

Earth Systems

1731-A Walter Street, Ventura, California 93003
PHONE: (805) 642-6727 FAX: (805) 642-1325

BORING NO: B-1
PROJECT NAME: Frontier HS Multi-us
PROJECT NUMBER: 304922-001
BORING LOCATION: Per Plan

DRILLING DATE: October 8, 2021
DRILL RIG: SIMCO
DRILLING METHOD: Mud Rotary/Hollow-Stem Auger
LOGGED BY: A. Luna

Vertical Depth	Sample Type: Bulk	Sample Type: SPT	Sample Type: Mod. Calif.	PENETRATION RESISTANCE (BLOWS/6")	SYMBOL	USCS CLASS	UNIT DRY WT. (pcf)	MOISTURE CONTENT (%)	DESCRIPTION OF UNITS
40		■		10/13/14		SM			**ALLUVIUM:** Brown Silty fine Sand, medium dense, wet
45		■		6/7/10		ML		35.6	**ALLUVIUM:** Dark Gray Brown fine Sandy Silt, stiff, moist
50		■		7/10/10					
55		■		4/5/7		CL			**ALLUVIUM:** Gray Brown Silty Clay, stiff, very moist
60									**Total Depth: 56.5 feet** **Groundwater Depth: Could Not Be Measured**
65									
70									
75									

Note: The stratification lines shown represent the approximate boundaries between soil and/or rock types and the transitions may be gradual.

APPENDIX B

Laboratory Testing
Tabulated Test Results
Individual Test Results

LABORATORY TESTING

A. Samples were reviewed along with field logs to determine which would be analyzed further. Those chosen for laboratory analyses were considered representative of soils that would be exposed and/or used during grading, and those deemed to be within the influence of proposed structures. Test results are presented in graphic and tabular form in this Appendix.

B. In-situ moisture content and dry unit weight for the ring samples were determined in general accordance with ASTM D 2937.

C. A maximum density test was performed to estimate the moisture-density relationship of typical soil materials. The test was performed in accordance with ASTM D 1557.

D. The relative strength characteristics of soils were determined from the results of a direct shear test on a remolded sample. The specimens were placed in contact with water at least 24 hours before testing, and were then sheared under normal loads ranging from 1 to 3 ksf in general accordance with ASTM D 3080.

E. Settlement characteristics were developed from the results of a one-dimensional consolidation test performed in general accordance with ASTM D 2435. The sample was loaded to 0.5 ksf, flooded with water, and then incrementally loaded to 1.0, 2.0, and 4.0 ksf. The sample was allowed to consolidate under each load increment. Rebound was measured under reverse alternate loading. Compression was measured by dial gauges accurate to 0.0001 inch. Results of the consolidation tests are presented in this Appendix in the form of percent consolidation versus log of pressure curves.

F. An expansion index test was performed on a bulk soil sample in accordance with ASTM D 4829. The sample was surcharged under 144 pounds per square foot at moisture content of near 50 percent saturation. The sample was then submerged in water for 24 hours, and the amount of expansion was recorded with a dial indicator.

G. The gradation characteristics of the bulk sample were evaluated by hydrometer (in accordance with ASTM D 7928) and sieve analysis procedures. The sample was soaked in water until individual soil particles were separated, then washed on the No. 200 mesh sieve, oven dried, weighed to calculate the percent passing the No. 200 sieve, and mechanically sieved. Additionally, a hydrometer analysis was performed to assess the distribution of the particles that passed the No. 200 screen. The hydrometer portion of the test was run using sodium hexametaphosphate as a dispersing agent.

H. A portion of the bulk sample was sent to another laboratory for analyses of soil pH, resistivity, chloride contents, and sulfate contents. Soluble chloride and sulfate contents were determined on a dry weight basis. Resistivity testing was performed in accordance with California Test Method 424, wherein the ratio of soil to water was 1:3.

Tabulated Test Results

REMOLDED SAMPLE

BORING AND DEPTH	B-1 @ 1'-5'	
USCS	SC	
MAXIMUM DENSITY (pcf)	121	123*
OPTIMUM MOISTURE (%)	11	11*
PEAK COHESION (psf)	480	
PEAK FRICTION ANGLE	26°	
ULTIMATE COHESION (psf)	200	
ULTIMATE FRICTION ANGLE	29°	
EXPANSION INDEX	53	
pH	8.3	
RESISTIVITY (ohms-cm)	4,200	
SOLUBLE CHLORIDES (mg/Kg)	4.7	
SOLUBLE SULFATES (mg/Kg)	200	
GRAIN SIZE DISTRIBUTION (%)		
GRAVEL	6.1	
SAND	46.3	
SILT	17.0	
CLAY (2μm to 5μm)	6.7	
CLAY (≤2μm)	23.9	

* = Corrected for Oversize (ASTM D4718)

Individual Test Results

File Number: VT-25450-01 Lab Number: 097608

MAXIMUM DENSITY / OPTIMUM MOISTURE

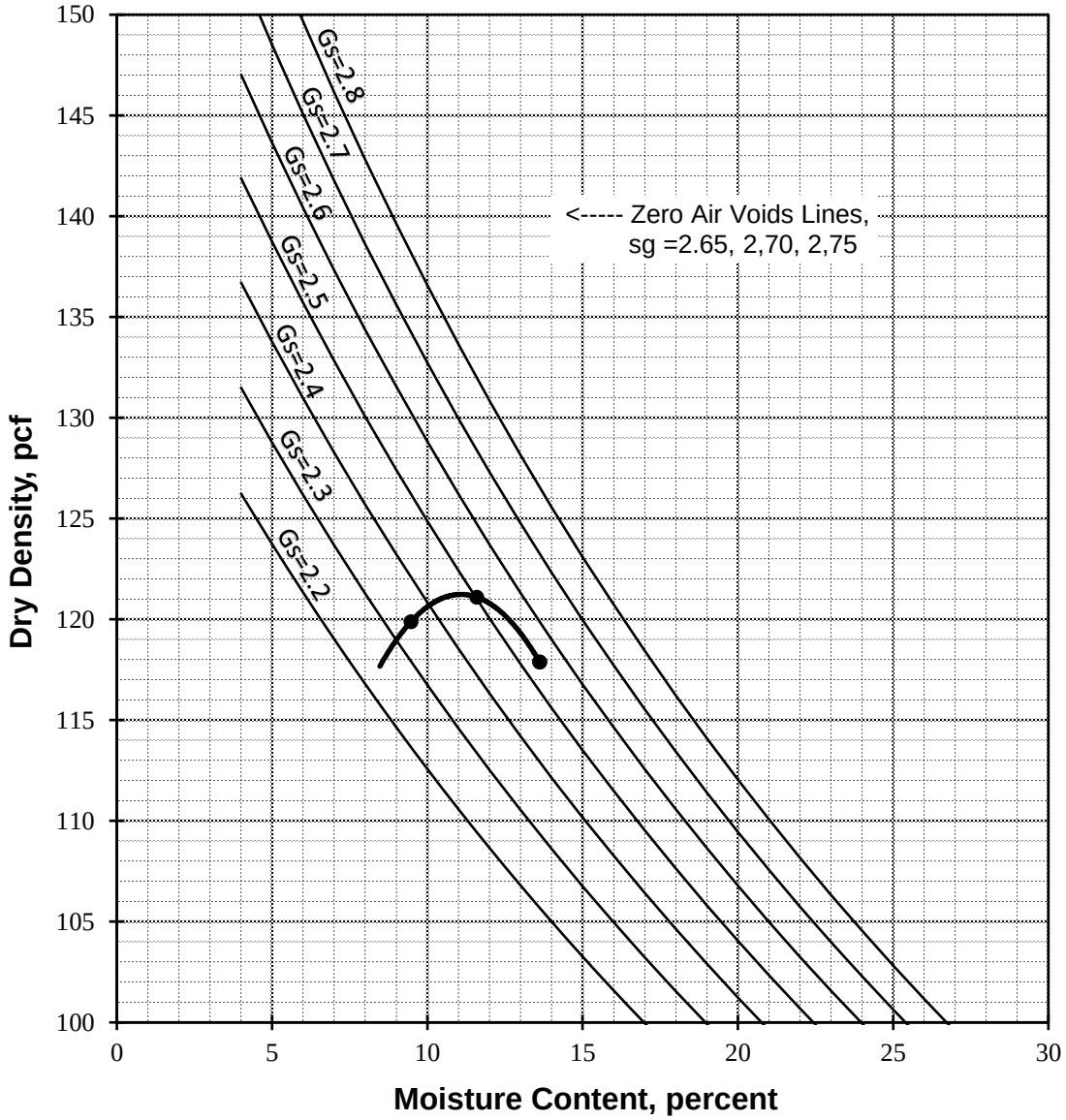
ASTM D 1557-12 (Modified)

Job Name: 550 Airport Way
Sample ID: B 1 @ 1'-5'
Location:
Description: Brown Clayey Sand
SG: 2.48

Procedure Used: A
Prep. Method: Moist
Rammer Type: Automatic

Maximum Density: 121 pcf
Optimum Moisture: 11%

Sieve Size	% Retained
3/4"	0.0
3/8"	0.0
#4	6.1



File Number: VT-25450-01 Lab Number: 097608

MAXIMUM DENSITY / OPTIMUM MOISTURE

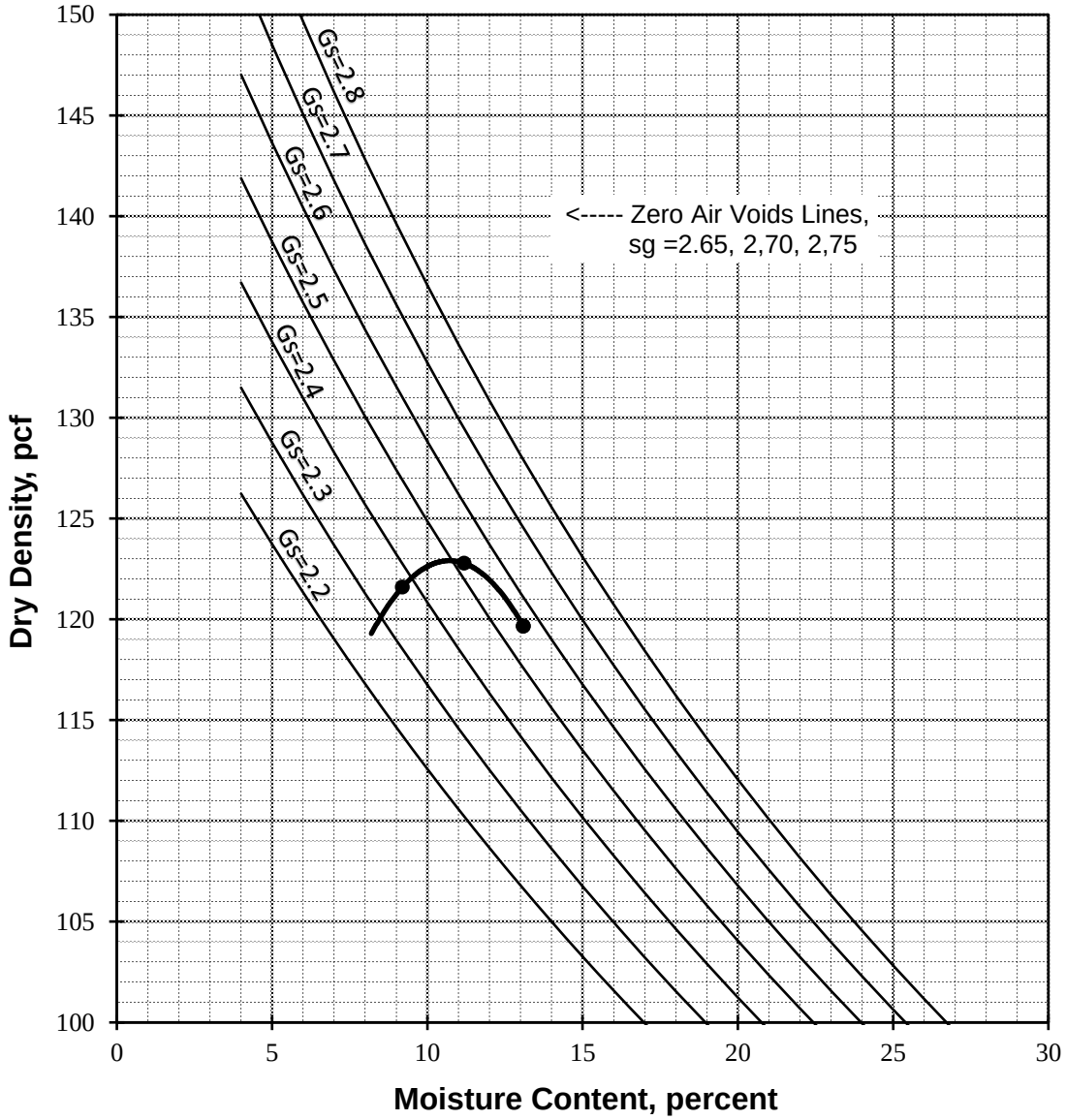
ASTM D 1557-12 (Modified)

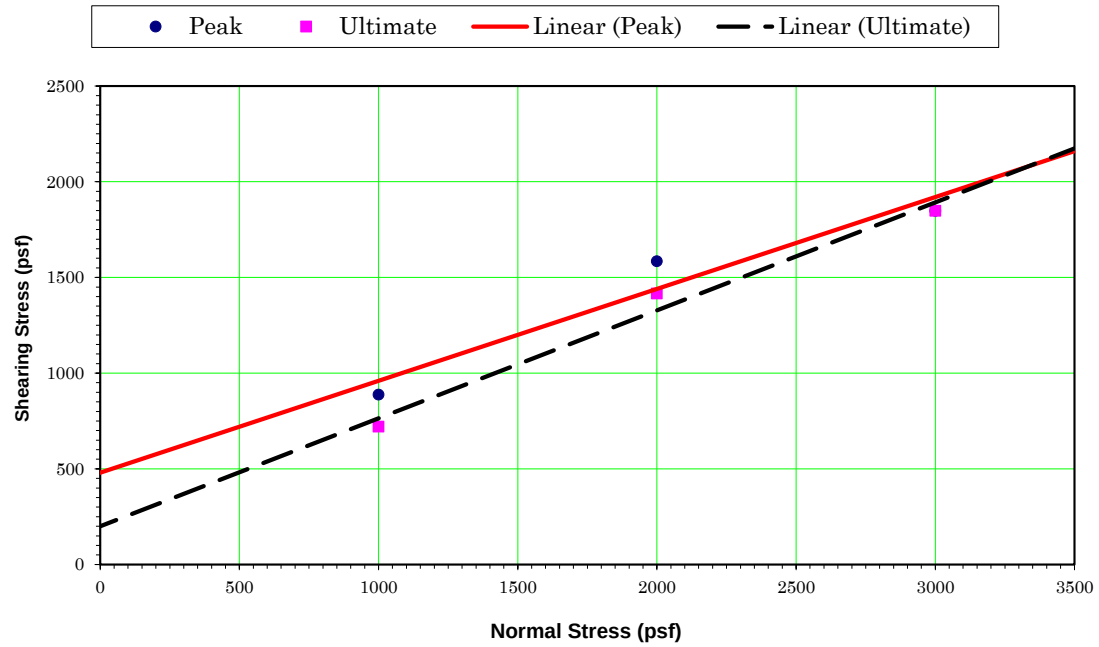
Job Name: 550 Airport Way
Sample ID: B 1 @ 1'-5'
Location:
Description: Brown Clayey Sand
SG: 2.50

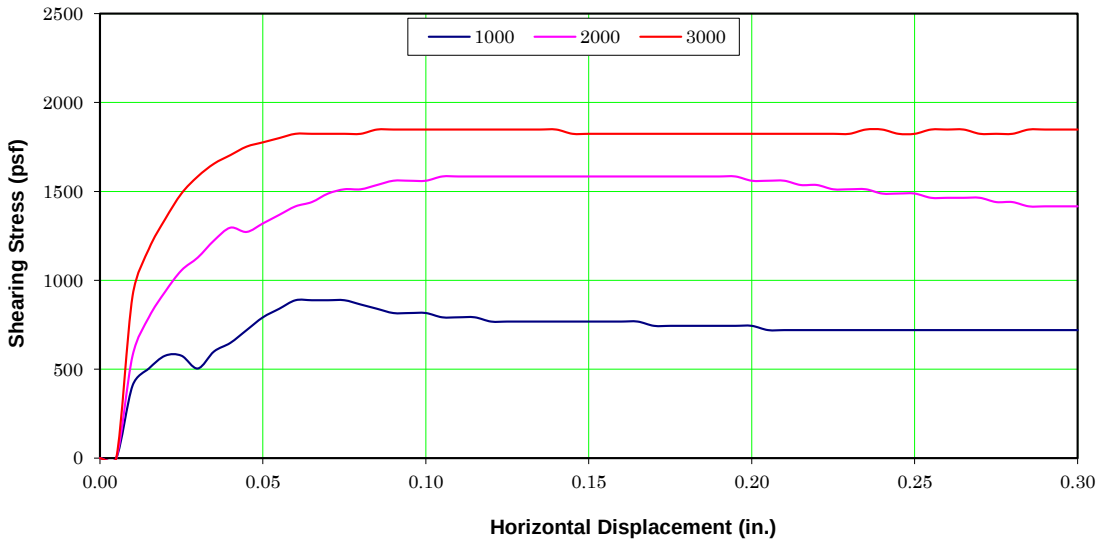
Procedure Used: A
Prep. Method: Moist
Rammer Type: Automatic

Maximum Density: 123 pcf
Optimum Moisture: 11%
Corrected for Oversize (ASTM D4718)

Sieve Size	% Retained
3/4"	0.0
3/8"	0.0
#4	6.1







DIRECT SHEAR DATA*

Sample Location: B 1 @ 1'-5'
Sample Description: Clayey Sand
Dry Density (pcf): 108.3
Intial % Moisture: 11.2
Average Degree of Saturation: 97.1
Shear Rate (in/min): 0.0076 in/min

Normal stress (psf)	1000	2000	3000
Peak stress (psf)	888	1584	1848
Ultimate stress (psf)	720	1416	1848

	Peak	Ultimate
ϕ Angle of Friction (degrees):	26	29
c Cohesive Strength (psf):	480	200

Test Type: Peak & Ultimate

* Test Method: ASTM D-3080

DIRECT SHEAR TEST

550 Airport Way

Earth Systems
Southern California

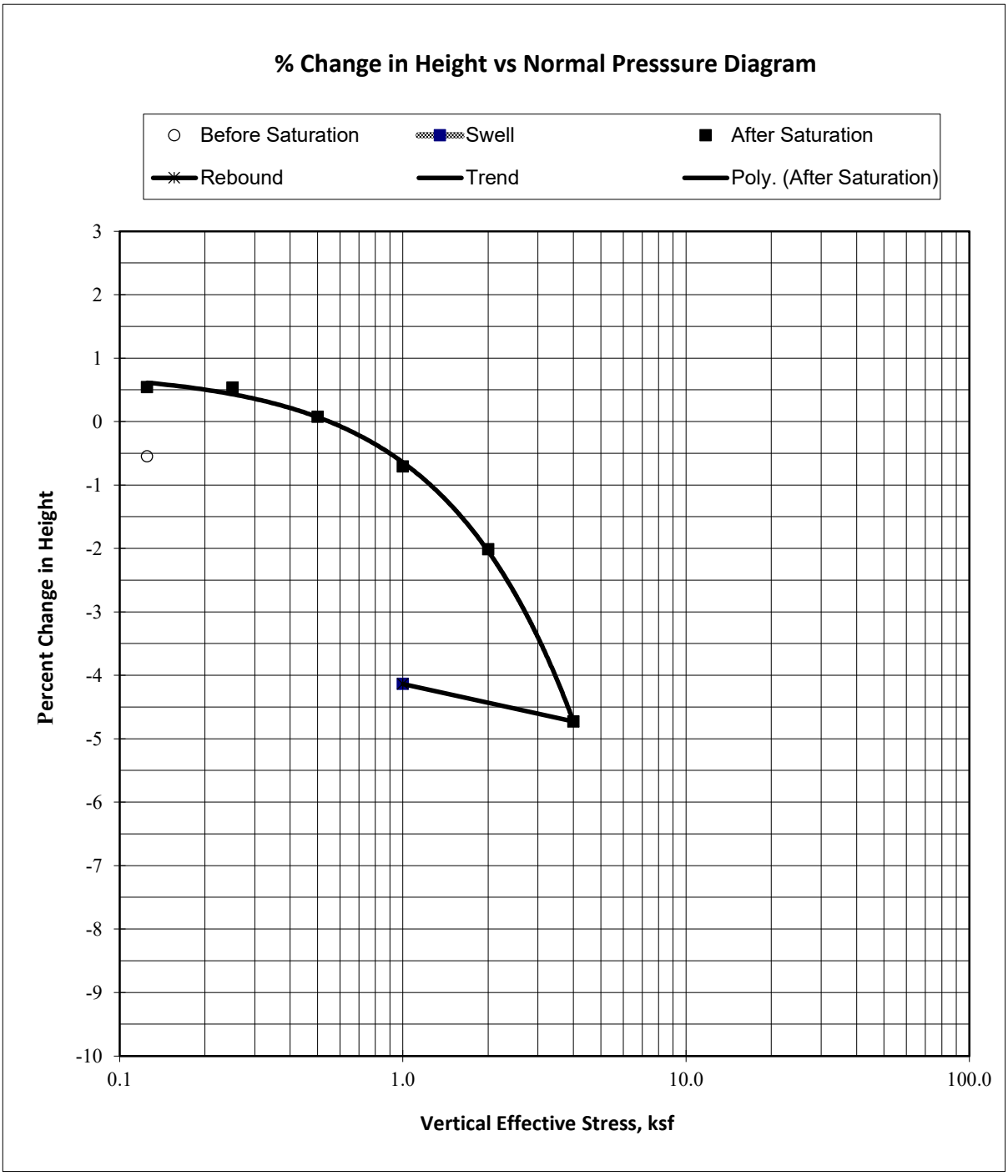
11/30/2017 | VT-25450-01

CONSOLIDATION TEST

ASTM D 2435-90

550 Airport Way
B-1 @ 2'
SC
Ring Sample

Initial Dry Density: 100.4 pcf
Initial Moisture, %: 21.4%
Specific Gravity: 2.67 (assume
Initial Void Ratio: 0.661

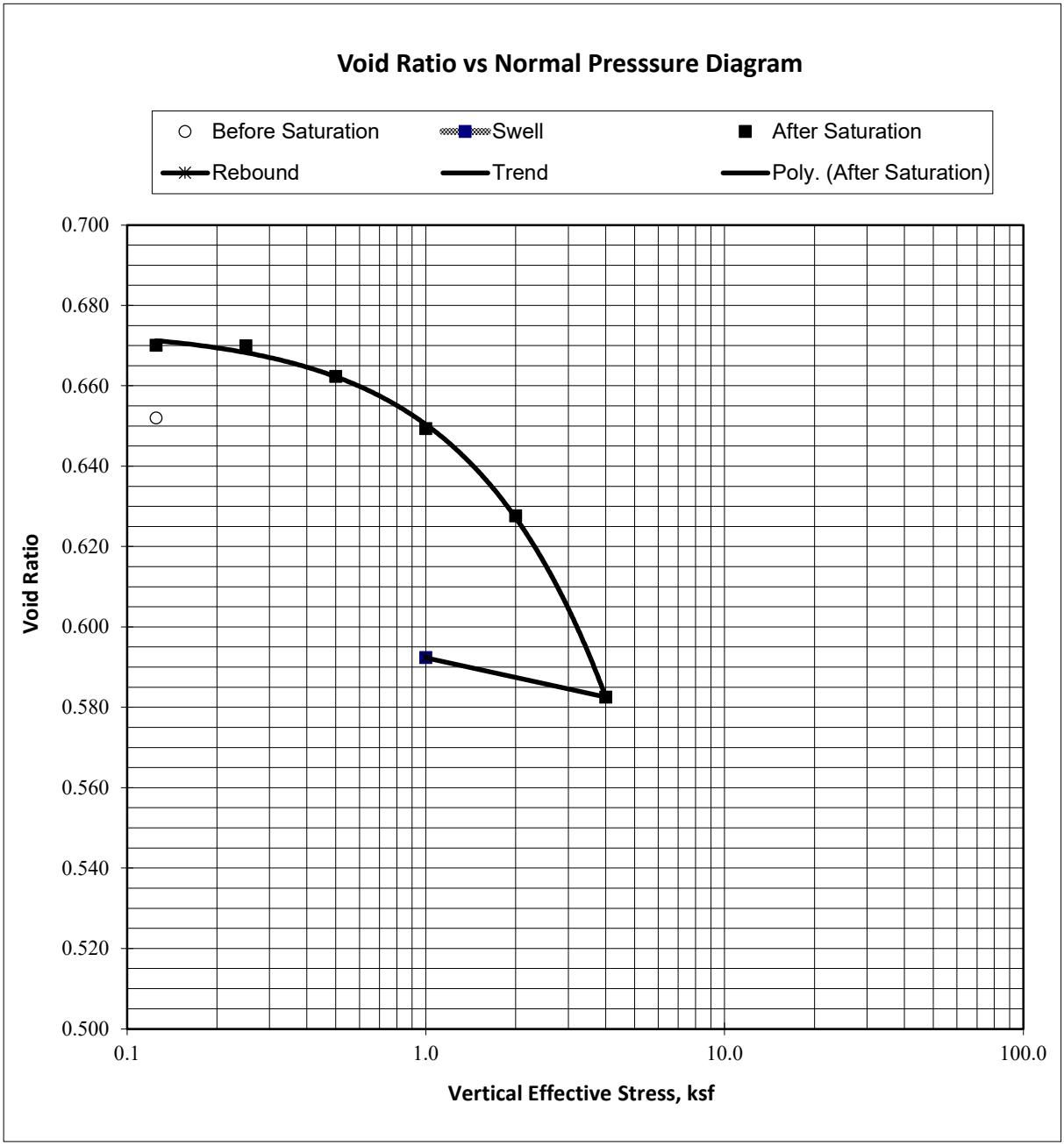


CONSOLIDATION TEST

ASTM D 2435-90

550 Airport Way
B-1 @ 2'
SC
Ring Sample

Initial Dry Density: 100.4
Initial Moisture, %: 21.4
Specific Gravity: 2.67 (assume
Initial Void Ratio: 0.661



File No.: VT-25450-01 November 30, 2017

EXPANSION INDEX

ASTM D-4829, UBC 18-2

Job Name: 550 Airport Way
Sample ID: B 1 @ 1'-5'
Soil Description: SC

Initial Moisture, %:	11.0
Initial Compacted Dry Density, pcf:	104.8
Initial Saturation, %:	49
Final Moisture, %:	22.1
Volumetric Swell, %:	5.3
Expansion Index:	**53** **Medium**

EI	UBC Classification
0-20	Very Low
21-50	Low
51-90	Medium
91-130	High
130+	Very High

MECHANICAL ANALYSIS

CTM 203-08

Job Name: 550 Airport Way
Job No.: VT-25450-01
Sample ID: **B 1 @ 01'-5'** Soil
Description: **SC**

Hydroscopic Moisture

Air Dry Wt, g:	100.0
Oven Dry Wt, g	100.0
% Moisture:	0.0

Air Dry Sample Wt., g:	476.5
Corrected Wt., g:	476.5

Sieve Analysis for +#10 Material

Sieve Size	Wt Ret	% Ret	% Passing
1/2 inch	0.0	0.00	100.00
3/8 inch	0.0	0.00	100.00
#4	29.0	6.09	93.91
#8	33.8	7.09	92.91
#10	39.4	8.27	91.73

Air Dry Hydro Sample Wt., g:	54.2
Corrected Wt., g:	54.2
Calculation Factor	0.5909

Hydrometer Analysis for <#10 Material

Start time: 7:41:00 AM

Short Hydro	Time of Reading	Hydro Reading	Temp. at Reading, °C	Correction Factor	Corrected Hydro Reading
20 sec	7:41:20 AM	35	20	6.9	28.1
1 hour	8:41:00 AM	25	20	6.9	18.1
6 hour	1:41:00 PM	21	20	6.9	14.1

% Gravel:	6.1
% Sand(2mm - 74µm):	46.3
% Silt(74µm- 5µm):	17.0
% Clay(5µm - 2µm):	6.7
% Clay(≤2µm):	23.9

CERTIFICATE OF ANALYSIS

Client: Earth Systems Southern California
CAS LAB NO: 172116-01
Sample ID: B1@0-5'
Analyst: GP

Date Sampled: 11/06/17
Date Received: 11/06/17
Sample Matrix: Soil

WET CHEMISTRY ANALYSIS SUMMARY

COMPOUND	RESULTS	UNITS	DF	PQL	METHOD	ANALYZED
pH (Corrosivity)	8.3	S.U.	1	---	9045	11/08/17
Resistivity*	4200	Ohms-cm	1	---	SM 120.1M	11/09/17
Chloride	4.7	mg/Kg	1	0.6	300.0M	11/09/17
Sulfate	200	mg/Kg	1	0.6	300.0M	11/09/17

*Sample was extracted using a 1:3 ratio of soil and DI water.

DF: Dilution Factor
PQL: Practical Quantitation Limit
BQL: Below Quantitation Limit
mg/Kg: Milligrams/Kilograms(ppm)

APPENDIX C

Table 1909.7 Foundations for Stud Bearing Walls - Minimum Requirements

Table 1809.7 Foundations for stud bearing walls—Minimum requirements [1, 10, 11, 12]

Weighted expansion index	Foundation for slab and raised floor systems [2, 5, 7]							Concrete slabs		Pre-moistening of soils under footings, piers and slabs [5, 6]	Restrictions on piers under raised floors
	No. of stories	Stem thickness [8]	Footing width [9]	Footing thickness	All perimeter footings [6]	Interior footings for slab and raised floors [6]	Reinforcement for continuous foundations [3, 8]	3-½" minimum thickness 4" with E.I. over 51			
					Depth below natural surface of ground and finish grade			Reinforcement [4]	Total thickness of sand		
		Inches									
0-20 Very low non expansive	1	6	12	6	12	12	1-#4 Top and bottom	#4 @ 48" o/c. each way or #3 @ 36" o/c. each way	2"	Moistening of ground prior to placing concrete is recommended.	Piers allowed for single floor loads only
	2	6	15	7	18	18					
	3	10	18	8	24	24					
21-50 Low	1	6	12	6	15	12	1-#4 Top and bottom		4"	3% over optimum moisture required to a depth of 18" below lowest adjacent grade. Testing required.	Piers allowed for single floor loads only
	2	8	15	7	18	18					
	3	10	18	8	24	24					
51-90 Medium	1	6	12	8	21	12	1-#4 Top and bottom	#3 @ 24" o.c. each way	4"	3% over optimum moisture required to a depth of 18" below lowest adjacent grade. Testing required.	Piers not allowed
	2	8	15	8	21	18	# 3 bars @ 24" o.c. each way 12" into footing, 36" into slab [10]				
	3	10	18	8	24	24					
91-130 High	1	6	12	8	27	12	2- # 4 Top & bottom	# 3 @ 24" o.c. each way	4"	3% over optimum moisture required to a depth of 18" below lowest adjacent grade. Testing required.	Piers not allowed
	2	8	15	8	27	18					
	3	10	18	8	27	24	# 3 bars @ 24" o.c. each way 12" into footing, 36" into slab [10]				
Above 130 very high	Special design by a licensed Architect or Engineer required										

16.04.100 - Table 1809.7 footnotes.

The Footnotes to Table 1809.7 are amended to read as follows:

1. Pre-moistening is required where specified in Table CBC 1809.7 in order to achieve maximum and uniform expansion of the soil prior to construction and thus limit structural distress caused by uneven expansion and shrinkage. Other systems, which do not include pre-moistening, may be approved by the Building Official, when such alternatives are shown to provide equivalent safeguards against the adverse effects of expansive soil.
2. Under-floor access crawl holes must be provided with curbs extending not less than six inches above adjacent grade to prevent surface water from entering the foundation area.
3. Reinforcement for continuous foundations must be placed not less than three inches above the bottom of the footing and not less than three inches below the top of the stem.
4. Slab reinforcement must be placed at mid-depth and continue to within two inches of the exterior face of the exterior footing walls.
5. Moisture content of soils must be maintained until foundations and piers are poured and a vapor barrier is installed. Test must be taken within 24 hours of each slab pour.
6. Crawl spaces under raised floors need not be pre-moistened except under interior footings. Interior footings which are not enclosed by a continuous perimeter foundation system, or equivalent concrete or masonry moisture barrier, must be designed and constructed as specified for perimeter footings in Table CBC 1809.7.
7. A grade beam not less than twelve-inches-by-twelve-inches in cross-sectional area, reinforced as specified for continuous foundations in Table CBC 1809.7, must be provided at garage-door openings.
8. Foundation stem walls which exceed a height of three times the stem thickness above lowest adjacent grade must be reinforced in accordance with Sections 18 and 19 in the CBC, or as required by engineering design, whichever is more restrictive.
9. Footing widths may be reduced upon submittal of calculations by a registered civil or structural engineer or licensed architect, but must be a minimum of 12 inches for one- and two-story structures and 15 inches for three-story structures.
10. Bent reinforcing bar between exterior footing and slab must be omitted when floor is designed as an independent, floating slab.
11. Fireplace footings must be reinforced with a horizontal grid located three inches above the bottom of the footing and consisting of not less than No. 4 bars at twelve inches on center each way. Vertical chimney reinforcing bars must be hooked under the grid.
12. Underground utility conduits must be installed prior to foundation inspection and must extend beyond the foundation.

(Ord. No. 1132, § 2, 11-16-2016, eff. 1-1-2017)

APPENDIX D

SEISMIC DESIGN

SEAOC/OSHPD Design Maps Summary Report
2019 California Building Code “General Procedure” Seismic Design Parameters
2019 California Building Code “Site Specific” Seismic Design Parameters
Fault Parameters

Gateway Community School Classroom Building

Latitude, Longitude: 34.2064, -119.0758



Date	8/26/2021, 8:13:32 AM
Design Code Reference Document	ASCE7-16
Risk Category	III
Site Class	D - Stiff Soil

Type	Value	Description
S_S	1.683	MCE_R ground motion. (for 0.2 second period)
S_1	0.623	MCE_R ground motion. (for 1.0s period)
S_{MS}	1.683	Site-modified spectral acceleration value
S_{M1}	null -See Section 11.4.8	Site-modified spectral acceleration value
S_{DS}	1.122	Numeric seismic design value at 0.2 second SA
S_{D1}	null -See Section 11.4.8	Numeric seismic design value at 1.0 second SA

Type	Value	Description
SDC	null -See Section 11.4.8	Seismic design category
F_a	1	Site amplification factor at 0.2 second
F_v	null -See Section 11.4.8	Site amplification factor at 1.0 second
PGA	0.736	MCE_G peak ground acceleration
F_{PGA}	1.1	Site amplification factor at PGA
PGA_M	0.81	Site modified peak ground acceleration
T_L	8	Long-period transition period in seconds
SsRT	1.683	Probabilistic risk-targeted ground motion. (0.2 second)
SsUH	1.884	Factored uniform-hazard (2% probability of exceedance in 50 years) spectral acceleration
SsD	2.241	Factored deterministic acceleration value. (0.2 second)
S1RT	0.623	Probabilistic risk-targeted ground motion. (1.0 second)
S1UH	0.699	Factored uniform-hazard (2% probability of exceedance in 50 years) spectral acceleration.
S1D	0.679	Factored deterministic acceleration value. (1.0 second)
PGAd	0.887	Factored deterministic acceleration value. (Peak Ground Acceleration)
C_{RS}	0.893	Mapped value of the risk coefficient at short periods
C_{R1}	0.892	Mapped value of the risk coefficient at a period of 1 s

Table F-5 - General Procedure Seismic Design Values

2019 California Building Code (CBC) (ASCE 7-16) Seismic Design Parameters

(Values presented should only be used by a Structural Engineer to determine if the exception in 11.4.8 (ASCE 7-16) can be used)

				CBC Reference	ASCE 7-16 Reference
Seismic Design Category		**D**			
Site Class		**D**		Table 1613.5.6	Table 11.6-1
Latitude:		34.206		Table 1613.5.2	Table 20.3-1
Longitude:		-119.076			
Maximum Considered Earthquake (MCE) Ground Motion					
Short Period Spectral Reponse	S_S	**1.683**	**g**	Figure 1613.5	Figure 22-1
1 second Spectral Response	S_1	**0.623**	**g**	Figure 1613.5	Figure 22-2
Site Coefficient	F_a	1.00		Table 1613.5.3(1)	Table 11.4-1
Site Coefficient	F_v	1.70		Table 1613.5.3(2)	Table 11-4.2
	S_{MS}	1.683	g	$= F_a*S_S$	
	S_{M1}	1.059	g	$= F_v*S_1$	
Design Earthquake Ground Motion					
Short Period Spectral Reponse	S_{DS}	**1.122**	**g**	$= 2/3*S_{MS}$	
1 second Spectral Response	S_{D1}	**0.706**	**g**	$= 2/3*S_{M1}$	

Site Specific Evaluation May Be Required Due to Site Class = D or E and S1>=0.2. The Presented SDS and SD1 are NOT Valid Unless the Exception of ASCE7-16, Section 11.4.8 Applies

To	0.13	sec	$= 0.2*S_{D1}/S_{DS}$
Ts (11.4.8 ASCE 7-16 Exception Assumed)	0.63	sec	$= S_{D1}/S_{DS}$
Risk Category	III		Table 1604.5
Seismic Importance Factor	1.25		
F_{PGA}	1.10		
PGA_M	**0.81**		
Vertical Coefficient (C_V)	1.44		Table 11.9-1

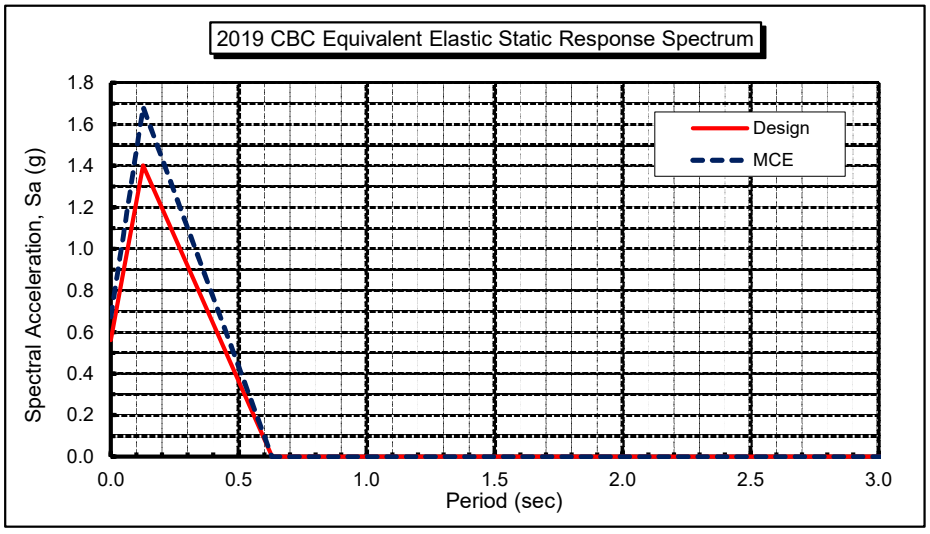


Table 11.5-1 Design

Period T (sec)	Sa (g)
0.00	0.561
0.05	0.895
0.13	1.403
0.63	0.000
0.80	0.000
1.00	0.000
1.20	0.000
1.40	0.000
1.60	0.000
1.80	0.000
2.00	0.000
2.20	0.000
2.40	0.000
2.60	0.000
2.80	0.000
3.00	0.000

34.2064 -119.0758 Lat/Long

Site Specific Spectral Response Values
Probabilistic and Deterministic Response Spectra for MCE compared to Code Spectra for 5% Viscous Damping Ratio

Natural Period T (seconds)	GeoMean Probab. 2% in 50 year MCE Spectrum (1) 2475-year (ASCE 21.2.1)	Max Rotated Probab. 2% in 50 year MCEr Spectrum (2) 2475-year (ASCE 21.2.1.1)	Max 84th Percentile Determ. MCE Spectrum (3) (ASCE 21.2.2)	Determ. Lower Limit MCE Spectrum (4) (3) * 1.00=Scaling (ASCE 21.2.2)	Determ. MCE Spectrum (5) Max (3),(4) (ASCE 21.2.2)	Site Specific MCE, Ground Response (SaM) (6) Min (2),(5) (ASCE 21.2.3)	Site Specific MCE Spectrum Comparator (6b) Max (6),1.5*(8) (ASCE 21.2.3)	2019 CBC MCE Spectrum (7)	Site Specific Design Spectrum (Sa) (8) (ASCE 21.3)	2019 CBC Design Spectrum (9) 2/3*(7)
0.00	0.778	0.764	0.908	0.908	0.908	0.764	0.764	0.673	0.509	0.449
0.05	1.028	1.009	0.990	0.990	0.990	0.990	0.990	0.946	0.660	0.631
0.10	1.278	1.255	1.354	1.354	1.354	1.255	1.255	1.219	0.837	0.813
0.15	1.496	1.469	1.669	1.669	1.669	1.469	1.469	1.492	0.980	0.994
0.20	1.714	1.683	1.900	1.900	1.900	1.683	1.683	1.683	1.122	1.122
0.30	1.966	1.975	2.175	2.175	2.175	1.975	1.975	1.683	1.317	1.122
0.40	1.947	1.955	2.207	2.207	2.207	1.955	1.955	1.683	1.303	1.122
0.50	1.927	2.021	2.122	2.122	2.122	2.021	2.021	1.683	1.347	1.122
0.75	1.628	1.707	1.765	1.765	1.765	1.707	1.707	1.683	1.138	1.122
1.00	1.329	1.541	1.508	1.508	1.508	1.508	1.508	0.000	1.006	0.000
1.50	1.021	1.183	1.059	1.059	1.059	1.059	1.059	0.000	0.706	0.000
2.00	0.712	0.858	0.790	0.790	0.790	0.790	0.790	0.000	0.527	0.000
3.00	0.449	0.561	0.491	0.491	0.491	0.491	0.491	0.000	0.327	0.000
4.00	0.304	0.393	0.318	0.318	0.318	0.318	0.318	0.000	0.212	0.000
5.00	0.222	0.297	0.211	0.211	0.211	0.211	0.249	0.000	0.166	0.000
8.00	0.146	0.196	0.115	0.115	0.115	0.115	0.156	0.000	0.104	0.000
10.00	0.138	0.184	0.051	0.051	0.051	0.051	0.125	0.000	0.083	0.000

C_{RS}:	0.893	
C_{R1}:	0.892	
Site Specific To:	0.175	$= 0.2*S_{D1}/S_{DS}$
Site Specific Ts:	0.873	$= S_{D1}/S_{DS}$

The value of Fa used in Column (3) is defined within ASCE 21.2.2 Supplement 1. This Fa value only applies within Column (3).

Site Coefficients		
F_{PGA}	1.10	
F_a	1.00	
F_v	2.50	

Mapped MCE Acceleration Values		
PGA	0.736	g
S_S	1.683	g
S_1	0.623	g

Site Class	**D**
Risk Category	**III**

Site-Specific Design Acceleration Values		
PGA_M	**0.778**	**g**
S_{DS}	**1.213**	**g**
S_{D1}	**1.059**	**g**

Site-Specific MCE_R, 5% damped, Spectral Response Acceleration Parameter		
S_{MS}	**1.819**	**g**
S_{M1}	**1.589**	**g**

Probabilistic spectrum from 2014 USGS Ground Motion Mapping Program adjusted for site conditions and scaled to represent maximum response in a horizontal plane, in accordance with ASCE 7-16 Section 21.2

Risk Coefficients have been applied to Column (2); If Method 1 was utilized the Risk Coefficients, CRS and CR1 are presented above, if Method 2 was utilized the Risk Coefficients were obtained from the USGS Risk Targeted Ground Motion Calculator (https://earthquake.usgs.gov/designmaps/rtgm).

Reference: ASCE 7-16, Chapters 21.2, 21.3, 21.4, 21.5, 11.4, and 11.8

Calculation Utilized ASCE7-16, Section 21.2.1.1 - Method 1

Short-Period Seismic Design Category:	1-Second Period Seismic Design Category:
D	D

Vertical Coefficient (C_V)
1.44

1 g = 980.6 cm/sec^2 =32.2 ft/sec^2
PSV (ft/sec) = $32.2(S_a)T/(2p)$

Key: Probab. = Probabilistic, Determ. = Deterministic, MCE = Maximum Considered Earthquake

Fault Parameters

Fault Section Name	Distance (miles)	Distance (km)	Upper Seis. Depth (km)	Lower Seis. Depth (km)	Avg Dip Angle (deg.)	Avg Dip Direction (deg.)	Avg Rake (deg.)	Trace Length (km)	Fault Type	**Mean Mag**	Mean Return Interval (years)	Slip Rate (mm/yr)
Simi-Santa Rosa FM3.1, 3.2	1.3	2.1	1.0	12.1	60	346	30	39	B	**6.8**		1
Oak Ridge (Onshore) FM3.1, 3.2	5.7	9.1	1.0	19.4	65	159	90	50	B	**7.4**		4
Ventura-Pitas Point FM3.1, 3.2	8.3	13.4	1.0	15.0	64	353	60	59	B	**6.9**		1
Malibu Coast (Extension), alt 1, FM3.1	10.2	16.4	0.0	7.8	74	4	30	35	B'	**6.5**		
Malibu Coast (Extension), alt 2 FM3.2	10.2	16.4	0.0	16.6	74	4	30	35	B'	**6.9**		
Oak Ridge (Offshore) FM3.2	11.7	18.8	0.0	7.9	32	180	90	38	B	**6.9**		3
Malibu Coast, alt 1, FM3.1	13.7	22.1	0.0	7.8	75	3	30	38	B	**6.6**		0.3
Malibu Coast, alt 2 FM3.2	13.7	22.1	0.0	16.6	74	3	30	38	B	**6.9**		0.3
San Cayetano FM3.1, 3.2	15.1	24.3	0.0	16.0	42	3	90	42	B	**7.2**		6
Sisar FM3.1, 3.2	15.6	25.1	0.0	17.4	29	168	na	20	B'	**7.0**		
Red Mountain FM3.1, 3.2	15.9	25.6	0.0	14.1	56	2	90	101	B	**7.4**		2
Anacapa-Dume, alt 1, FM3.1	16.2	26.0	0.0	15.5	45	354	60	51	B	**7.2**		3
Anacapa-Dume, alt 2, FM3.2	16.2	26.0	1.2	11.4	41	352	60	65	B	**7.2**		3
Channel Islands Thrust FM3.1, 3.2	16.4	26.4	5.0	12.3	20	354	90	59	B	**7.3**		1.5
Mission Ridge-Arroyo Parida-Santa Ana FM3.1, 3	18.3	29.4	0.0	7.6	70	176	90	69	B	**6.8**		0.4
Santa Cruz Island FM3.1, 3.2	18.7	30.1	0.0	13.3	90	188	30	69	B	**7.1**		1
Santa Susana, alt 1, FM3.1	20.5	33.0	0.0	16.3	55	9	90	27	B	**6.8**		5
Santa Susana, alt 2 FM3.2	20.8	33.5	0.0	10.6	53	10	90	43	B'	**6.8**		
Channel Islands Western Deep Ramp FM3.1, 3.2	21.2	34.0	4.8	12.5	21	204	90	62	B'	**7.3**		
North Channel FM3.2	21.4	34.4	1.1	4.5	26	10	90	51	B	**6.7**		1
Northridge Hills FM3.1, 3.2	22.1	35.6	0.0	14.9	31	19	90	25	B'	**7.0**		
Santa Ynez (East) FM3.1, 3.2	23.0	37.0	0.0	13.3	70	172	0	68	B	**7.2**		2
Pitas Point (Lower)-Montalvo, FM3.1	23.1	37.1	0.4	12.7	16	359	90	30	B	**7.3**		2.5
Del Valle FM3.1, 3.2	24.0	38.6	0.0	18.8	73	195	90	9	B'	**6.3**		
San Pedro Basin FM3.1, 3.2	24.3	39.1	0.8	12.3	88	51	na	69	B'	**7.0**		
Holser, alt 1, FM 3.1	24.4	39.3	0.0	18.6	58	187	90	20	B	**6.7**		0.4
Holser, alt 2 FM3.2	24.4	39.3	0.0	18.5	58	182	90	17	B'	**6.7**		
Santa Monica Bay FM3.1, 3.2	24.7	39.8	2.3	18.0	20	44	na	17	B'	**7.0**		
Northridge FM3.1, 3.2	25.3	40.8	7.4	16.8	35	201	90	33	B	**6.8**		1.5
Pine Mtn FM3.1, 3.2	25.6	41.3	0.0	16.3	45	5	na	62	B'	**7.3**		
Santa Cruz Catalina Ridge alt 1, FM3.1	27.2	43.9	0.0	11.0	90	na	na	114	B'	**7.2**		
Santa Cruz Catalina Ridge Alt2 FM3.2	27.2	43.9	0.0	11.0	90	38	na	137	B'	**7.3**		
Compton FM3.1, 3.2	29.4	47.3	5.2	15.6	20	34	90	65	B'	**7.5**		
Pitas Point (Upper) FM3.2	29.9	48.1	1.4	10.0	42	15	90	35	B	**6.8**		1
Mission Hills FM3.1, 3.2	30.0	48.2	0.0	14.5	55	na	na	13	B'	**6.5**		
San Pedro Escarpment FM3.1, 3.2	31.6	50.8	1.0	16.0	17	38	na	27	B'	**7.3**		
Santa Monica, alt 1, FM3.1	32.1	51.7	0.0	17.9	75	343	30	14	B	**6.5**		1
San Gabriel FM3.1, 3.2	32.5	52.3	0.0	14.7	61	39	180	71	B	**7.3**		1
Santa Monica, alt 2 FM3.2	32.6	52.4	0.0	11.6	50	338	30	28	B	**6.7**		1
Santa Susana East (connector) FM3.1, 3.2	34.1	54.9	0.0	16.3	55	na	na	8	B'	**6.3**		

Reference: USGS OFR 2013-1165 (CGS SP 228)

Based on Site Coordinates of 34.2064 Latitude, -119.0758 Longitude

Mean Magnitude for Type A Faults based on 0.1 weight for unsegmented section, 0.9 weight for segmented model (weighted by probability of each scenario with section listed as given on Table 3 of Appendix G in OFR 2008-1437). Mean magntude is average of Ellworths-B and Hanks & Bakun moment area relationship.

APPENDIX E

Results of Liquefaction and Dry Sand
Seismic Induced Settlement Analysis

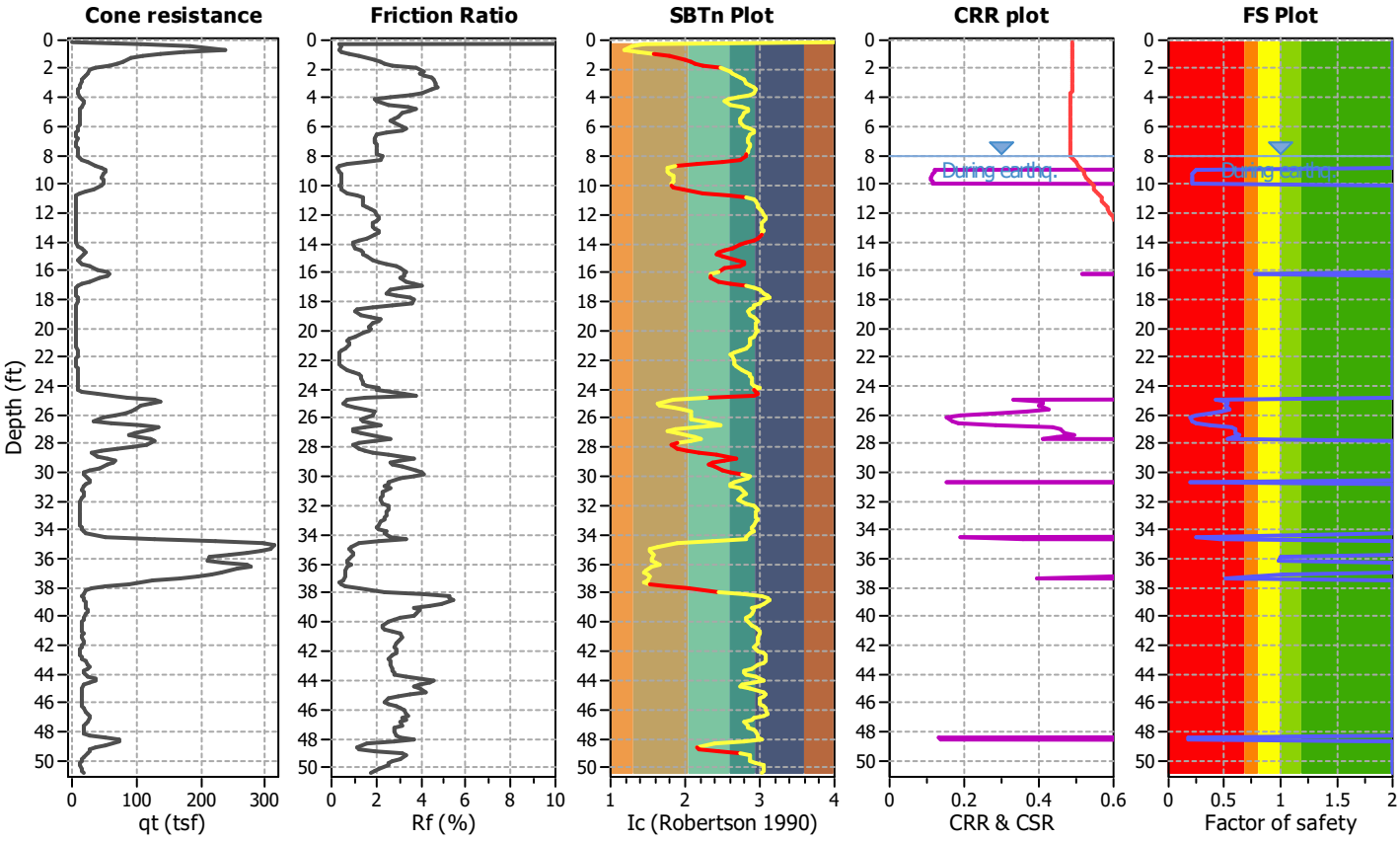
Earth Systems Southern California
1731-A Walter Street, Ventura, California 93003
Phone: (805)642-6727
Fax: (805)642-1325

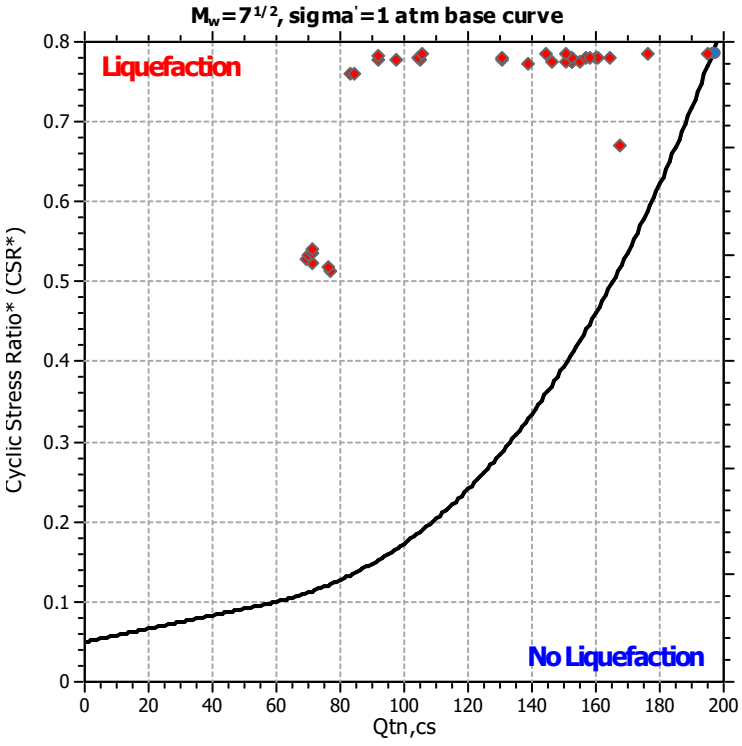
LIQUEFACTION ANALYSIS REPORT

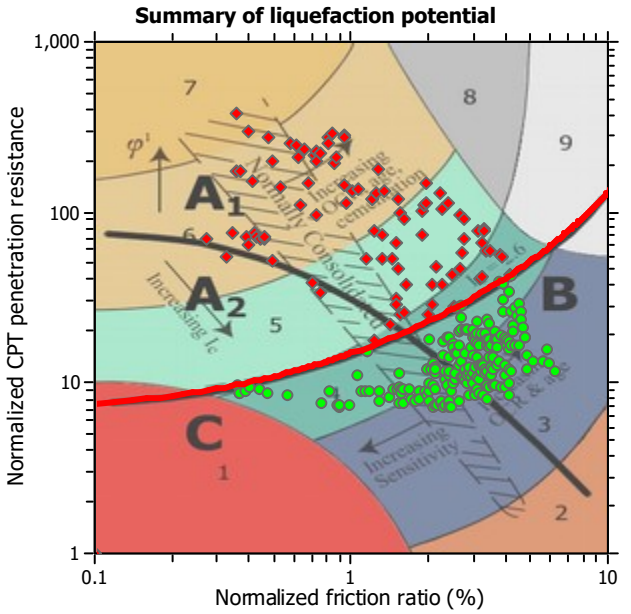
Project title : 300852-003 Gateway Community School
Location : Camarillo, California
CPT file : CPT-1

Input parameters and analysis data

Analysis method:	NCEER (1998)	G.W.T. (in-situ):	8.00 ft	Use fill:	No	Clay like behavior applied:	Sands only
Fines correction method:	NCEER (1998)	G.W.T. (earthq.):	8.00 ft	Fill height:	N/A	Limit depth applied:	No
Points to test:	Based on Ic value	Average results interval:	3	Fill weight:	N/A	Limit depth:	N/A
Earthquake magnitude M_w:	7.40	Ic cut-off value:	2.60	Trans. detect. applied:	Yes	MSF method:	Method based
Peak ground acceleration:	0.78	Unit weight calculation:	Based on SBT	K_σ applied:	Yes		

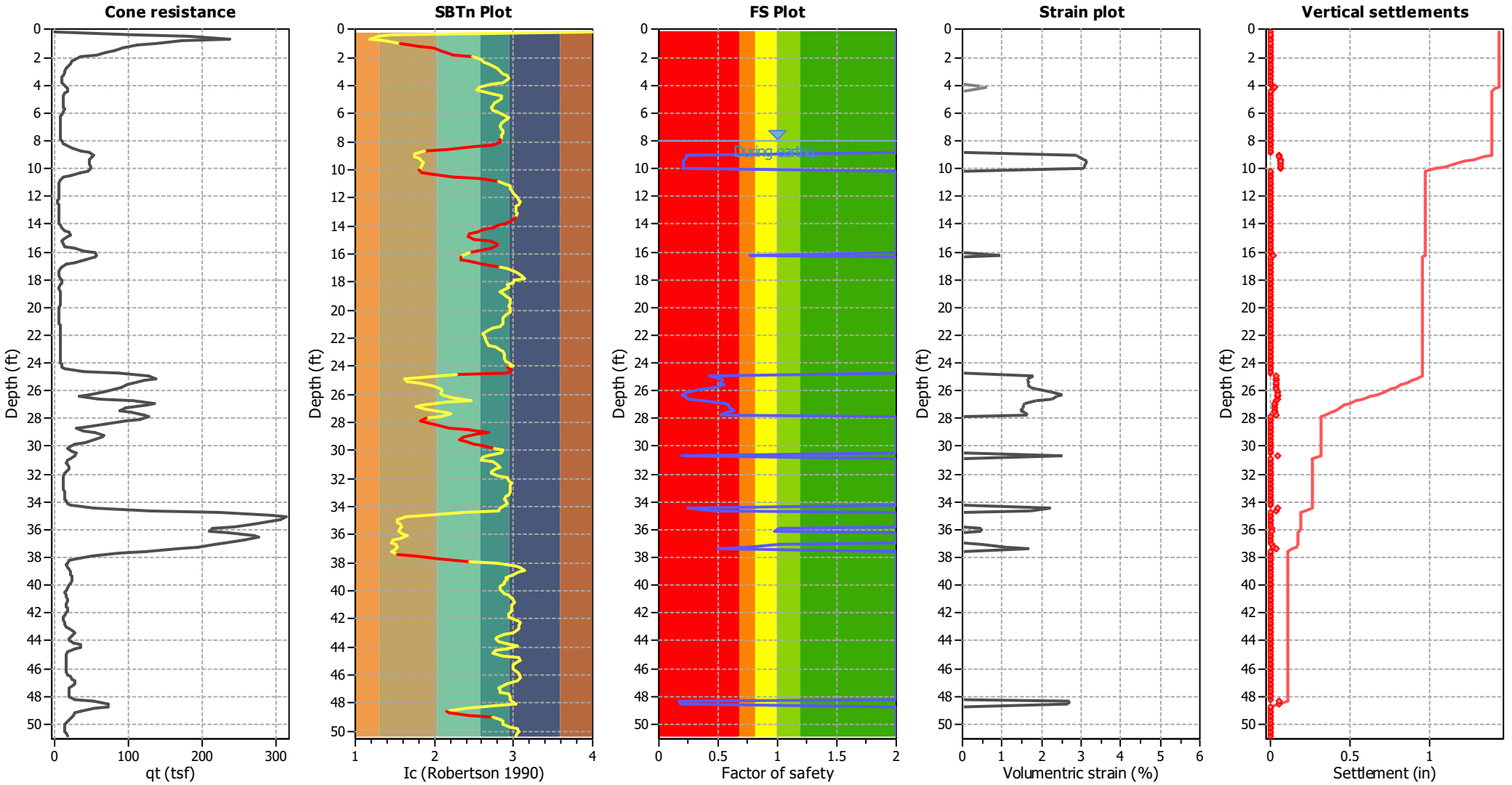






Zone A_1: Cyclic liquefaction likely depending on size and duration of cyclic loading
Zone A_2: Cyclic liquefaction and strength loss likely depending on loading and ground geometry
Zone B: Liquefaction and post-earthquake strength loss unlikely, check cyclic softening
Zone C: Cyclic liquefaction and strength loss possible depending on soil plasticity, brittleness/sensitivity, strain to peak undrained strength and ground geometry

Estimation of post-earthquake settlements



Abbreviations

q_t:	Total cone resistance (cone resistance q_c corrected for pore water effects)
I_c:	Soil Behaviour Type Index
FS:	Calculated Factor of Safety against liquefaction
Volumentric strain:	Post-liquefaction volumentric strain

:: Post-earthquake settlement of dry sands ::

Depth (ft)	Ic	Q_{tn}	Kc	$Q_{tn,cs}$	$N_{1,60}$ (blows)	G_{max} (tsf)	CSR	Shear, γ (%)	$e_{vd(15)}$ (%)	N_c	e_v (%)	Settle. (in)
0.16	4.06	0.29	26.61	7.81	0	0	0.49	0.000	0.00	0.00	0.00	0.000
0.33	1.46	172.35	1.00	172.35	30	611	0.49	0.002	0.00	14.23	0.00	0.000
0.49	1.29	294.78	1.00	294.78	48	848	0.49	0.002	0.00	14.23	0.00	0.000
0.66	1.18	380.95	1.00	380.95	60	950	0.49	0.002	0.00	14.23	0.00	0.000
0.82	1.36	278.40	1.00	278.40	47	878	0.49	0.003	0.00	14.23	0.00	0.000
0.98	1.57	221.50	1.00	221.50	40	908	0.49	0.004	0.00	14.23	0.00	0.000
1.15	1.80	178.36	1.11	197.36	0	0	0.49	0.000	0.00	0.00	0.00	0.000
1.31	1.99	147.18	1.29	190.07	0	0	0.49	0.000	0.00	0.00	0.00	0.000
1.48	2.07	129.78	1.41	182.55	0	0	0.49	0.000	0.00	0.00	0.00	0.000
1.64	2.14	113.28	1.52	172.51	0	0	0.49	0.000	0.00	0.00	0.00	0.000
1.80	2.24	90.90	1.78	161.92	0	0	0.49	0.000	0.00	0.00	0.00	0.000
1.97	2.49	56.84	2.70	153.29	0	0	0.49	0.000	0.00	0.00	0.00	0.000
2.13	2.60	43.13	3.31	142.69	0	0	0.49	0.000	0.00	0.00	0.00	0.000
2.30	2.62	38.15	3.45	131.64	0	0	0.49	0.000	0.00	0.00	0.00	0.000
2.46	2.67	33.51	3.82	127.87	0	0	0.49	0.000	0.00	0.00	0.00	0.000
2.63	2.75	29.05	4.35	126.45	0	0	0.49	0.000	0.00	0.00	0.00	0.000
2.79	2.79	25.96	4.71	122.17	0	0	0.49	0.000	0.00	0.00	0.00	0.000
2.95	2.83	23.39	5.00	117.03	0	0	0.49	0.000	0.00	0.00	0.00	0.000
3.12	2.87	20.66	5.40	111.51	0	0	0.49	0.000	0.00	0.00	0.00	0.000
3.28	2.92	18.09	5.86	105.96	0	0	0.49	0.000	0.00	0.00	0.00	0.000
3.45	2.94	16.32	6.07	99.13	0	0	0.49	0.000	0.00	0.00	0.00	0.000
3.61	2.93	15.62	5.96	93.07	0	0	0.49	0.000	0.00	0.00	0.00	0.000
3.77	2.87	16.16	5.43	87.80	0	0	0.49	0.000	0.00	0.00	0.00	0.000
3.94	2.72	19.89	4.17	82.84	0	0	0.49	0.000	0.00	0.00	0.00	0.000
4.10	2.57	25.25	3.13	78.92	21	365	0.49	0.691	0.65	14.23	0.64	0.025
4.27	2.53	28.41	2.94	83.43	22	393	0.49	0.500	0.45	14.23	0.44	0.017
4.43	2.61	27.10	3.39	91.97	0	0	0.49	0.000	0.00	0.00	0.00	0.000
4.59	2.76	22.08	4.46	98.57	0	0	0.49	0.000	0.00	0.00	0.00	0.000
4.76	2.85	18.51	5.20	96.22	0	0	0.49	0.000	0.00	0.00	0.00	0.000
4.92	2.85	17.52	5.24	91.79	0	0	0.49	0.000	0.00	0.00	0.00	0.000
5.09	2.79	19.07	4.69	89.49	0	0	0.49	0.000	0.00	0.00	0.00	0.000
5.25	2.75	20.18	4.39	88.57	0	0	0.48	0.000	0.00	0.00	0.00	0.000
5.41	2.74	20.21	4.26	86.08	0	0	0.48	0.000	0.00	0.00	0.00	0.000
5.58	2.72	20.18	4.18	84.26	0	0	0.48	0.000	0.00	0.00	0.00	0.000
5.74	2.73	20.28	4.25	86.28	0	0	0.48	0.000	0.00	0.00	0.00	0.000
5.91	2.79	18.91	4.71	89.03	0	0	0.48	0.000	0.00	0.00	0.00	0.000
6.07	2.87	15.82	5.46	86.30	0	0	0.48	0.000	0.00	0.00	0.00	0.000
6.23	2.93	12.78	6.02	77.03	0	0	0.48	0.000	0.00	0.00	0.00	0.000
6.40	2.92	11.28	5.87	66.18	0	0	0.48	0.000	0.00	0.00	0.00	0.000
6.56	2.87	11.18	5.45	60.96	0	0	0.48	0.000	0.00	0.00	0.00	0.000
6.73	2.84	11.71	5.15	60.33	0	0	0.48	0.000	0.00	0.00	0.00	0.000
6.89	2.84	11.97	5.09	60.93	0	0	0.48	0.000	0.00	0.00	0.00	0.000
7.05	2.85	11.86	5.18	61.46	0	0	0.48	0.000	0.00	0.00	0.00	0.000
7.22	2.86	11.65	5.30	61.79	0	0	0.48	0.000	0.00	0.00	0.00	0.000
7.38	2.86	11.80	5.29	62.46	0	0	0.48	0.000	0.00	0.00	0.00	0.000
7.55	2.85	12.11	5.20	62.97	0	0	0.48	0.000	0.00	0.00	0.00	0.000
7.71	2.84	12.22	5.15	62.94	0	0	0.48	0.000	0.00	0.00	0.00	0.000
7.87	2.82	12.75	5.00	63.70	0	0	0.48	0.000	0.00	0.00	0.00	0.000

:: Post-earthquake settlement of dry sands :: (continued)

Depth (ft)	Ic	Q_{tn}	Kc	$Q_{tn,cs}$	$N_{1,60}$ (blows)	G_{max} (tsf)	CSR	Shear, γ (%)	$e_{vd(15)}$ (%)	N_c	e_v (%)	Settle. (in)

Total estimated settlement: 0.04

Abbreviations

Q_{tn}: Equivalent clean sand normalized cone resistance
K_c: Fines correction factor
$Q_{tn,cs}$: Post-liquefaction volumentric strain
G_{max}: Small strain shear modulus
CSR: Soil cyclic stress ratio
γ: Cyclic shear strain
$e_{vd(15)}$: Volumetric strain after 15 cycles
N_c: Equivalent number of cycles
e_v: Volumetric strain
Settle.: Calculated settlement

:: Post-earthquake settlement due to soil liquefaction ::

Depth (ft)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (in)	Depth (ft)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (in)
8.04	69.88	2.00	0.00	1.00	0.00	8.20	73.76	2.00	0.00	1.00	0.00
8.37	69.95	2.00	0.00	1.00	0.00	8.53	61.24	2.00	0.00	1.00	0.00
8.69	55.27	2.00	0.00	1.00	0.00	8.86	69.06	2.00	0.00	1.00	0.00
9.02	76.71	0.24	2.90	1.00	0.06	9.19	76.15	0.23	2.92	1.00	0.06
9.35	71.43	0.22	3.08	1.00	0.06	9.51	69.34	0.21	3.15	1.00	0.06
9.68	70.28	0.21	3.12	1.00	0.06	9.84	71.18	0.21	3.09	1.00	0.06
10.01	71.26	0.21	3.09	1.00	0.06	10.17	64.88	2.00	0.00	1.00	0.00
10.34	51.86	2.00	0.00	1.00	0.00	10.50	58.86	2.00	0.00	1.00	0.00
10.66	56.82	2.00	0.00	1.00	0.00	10.83	53.75	2.00	0.00	1.00	0.00
10.99	49.49	2.00	0.00	1.00	0.00	11.16	47.02	2.00	0.00	1.00	0.00
11.32	47.47	2.00	0.00	1.00	0.00	11.48	49.62	2.00	0.00	1.00	0.00
11.65	51.85	2.00	0.00	1.00	0.00	11.81	52.51	2.00	0.00	1.00	0.00
11.98	53.41	2.00	0.00	1.00	0.00	12.14	54.06	2.00	0.00	1.00	0.00
12.30	54.03	2.00	0.00	1.00	0.00	12.47	52.49	2.00	0.00	1.00	0.00
12.63	51.24	2.00	0.00	1.00	0.00	12.80	52.06	2.00	0.00	1.00	0.00
12.96	53.61	2.00	0.00	1.00	0.00	13.12	55.57	2.00	0.00	1.00	0.00
13.29	55.90	2.00	0.00	1.00	0.00	13.45	54.39	2.00	0.00	1.00	0.00
13.62	50.67	2.00	0.00	1.00	0.00	13.78	46.65	2.00	0.00	1.00	0.00
13.94	44.10	2.00	0.00	1.00	0.00	14.11	46.54	2.00	0.00	1.00	0.00
14.27	52.54	2.00	0.00	1.00	0.00	14.44	64.29	2.00	0.00	1.00	0.00
14.60	72.92	2.00	0.00	1.00	0.00	14.76	74.28	2.00	0.00	1.00	0.00
14.93	72.19	2.00	0.00	1.00	0.00	15.09	70.12	2.00	0.00	1.00	0.00
15.26	68.88	2.00	0.00	1.00	0.00	15.42	77.38	2.00	0.00	1.00	0.00
15.58	93.60	2.00	0.00	1.00	0.00	15.75	120.54	2.00	0.00	1.00	0.00
15.91	147.40	2.00	0.00	1.00	0.00	16.08	164.23	2.00	0.00	1.00	0.00
16.24	167.33	0.77	0.96	1.00	0.02	16.40	158.30	2.00	0.00	1.00	0.00
16.57	146.22	2.00	0.00	1.00	0.00	16.73	129.92	2.00	0.00	1.00	0.00
16.90	108.47	2.00	0.00	1.00	0.00	17.06	81.20	2.00	0.00	1.00	0.00
17.22	66.59	2.00	0.00	1.00	0.00	17.39	61.64	2.00	0.00	1.00	0.00
17.55	63.75	2.00	0.00	1.00	0.00	17.72	71.04	2.00	0.00	1.00	0.00
17.88	82.07	2.00	0.00	1.00	0.00	18.05	83.12	2.00	0.00	1.00	0.00
18.21	73.59	2.00	0.00	1.00	0.00	18.37	57.15	2.00	0.00	1.00	0.00
18.54	46.44	2.00	0.00	1.00	0.00	18.70	45.08	2.00	0.00	1.00	0.00
18.87	50.49	2.00	0.00	1.00	0.00	19.03	56.89	2.00	0.00	1.00	0.00
19.19	62.02	2.00	0.00	1.00	0.00	19.36	60.13	2.00	0.00	1.00	0.00

:: Post-earthquake settlement due to soil liquefaction :: (continued)

Depth (ft)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (in)	Depth (ft)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (in)
19.52	56.42	2.00	0.00	1.00	0.00	19.69	54.00	2.00	0.00	1.00	0.00
19.85	54.37	2.00	0.00	1.00	0.00	20.01	53.20	2.00	0.00	1.00	0.00
20.18	49.58	2.00	0.00	1.00	0.00	20.34	44.26	2.00	0.00	1.00	0.00
20.51	39.91	2.00	0.00	1.00	0.00	20.67	38.57	2.00	0.00	1.00	0.00
20.83	38.72	2.00	0.00	1.00	0.00	21.00	39.00	2.00	0.00	1.00	0.00
21.16	37.34	2.00	0.00	1.00	0.00	21.33	35.11	2.00	0.00	1.00	0.00
21.49	33.42	2.00	0.00	1.00	0.00	21.65	32.26	2.00	0.00	1.00	0.00
21.82	32.95	2.00	0.00	1.00	0.00	21.98	32.26	2.00	0.00	1.00	0.00
22.15	31.74	2.00	0.00	1.00	0.00	22.31	31.62	2.00	0.00	1.00	0.00
22.47	33.72	2.00	0.00	1.00	0.00	22.64	39.75	2.00	0.00	1.00	0.00
22.80	44.58	2.00	0.00	1.00	0.00	22.97	48.80	2.00	0.00	1.00	0.00
23.13	49.80	2.00	0.00	1.00	0.00	23.29	50.46	2.00	0.00	1.00	0.00
23.46	50.57	2.00	0.00	1.00	0.00	23.62	51.49	2.00	0.00	1.00	0.00
23.79	52.60	2.00	0.00	1.00	0.00	23.95	58.89	2.00	0.00	1.00	0.00
24.11	61.75	2.00	0.00	1.00	0.00	24.28	80.24	2.00	0.00	1.00	0.00
24.44	95.50	2.00	0.00	1.00	0.00	24.61	88.61	2.00	0.00	1.00	0.00
24.77	108.54	2.00	0.00	1.00	0.00	24.93	138.91	0.43	1.78	1.00	0.04
25.10	152.27	0.53	1.66	1.00	0.03	25.26	152.77	0.53	1.65	1.00	0.03
25.43	150.82	0.51	1.67	1.00	0.03	25.59	154.84	0.55	1.63	1.00	0.03
25.76	146.24	0.48	1.71	1.00	0.03	25.92	130.42	0.37	1.88	1.00	0.04
26.08	105.21	0.24	2.24	1.00	0.04	26.25	91.61	0.19	2.51	1.00	0.05
26.41	97.70	0.21	2.38	1.00	0.05	26.58	104.46	0.24	2.25	1.00	0.04
26.74	130.52	0.37	1.88	1.00	0.04	26.90	156.88	0.56	1.58	1.00	0.03
27.07	159.82	0.59	1.54	1.00	0.03	27.23	160.93	0.60	1.52	1.00	0.03
27.40	164.38	0.63	1.48	1.00	0.03	27.56	158.07	0.57	1.56	1.00	0.03
27.72	152.58	0.53	1.65	1.00	0.03	27.89	150.01	2.00	0.00	1.00	0.00
28.05	143.24	2.00	0.00	1.00	0.00	28.22	135.60	2.00	0.00	1.00	0.00
28.38	122.13	2.00	0.00	1.00	0.00	28.54	115.75	2.00	0.00	1.00	0.00
28.71	119.82	2.00	0.00	1.00	0.00	28.87	122.07	2.00	0.00	1.00	0.00
29.04	128.28	2.00	0.00	1.00	0.00	29.20	141.64	2.00	0.00	1.00	0.00
29.36	150.69	2.00	0.00	1.00	0.00	29.53	153.73	2.00	0.00	1.00	0.00
29.69	142.67	2.00	0.00	1.00	0.00	29.86	120.96	2.00	0.00	1.00	0.00
30.02	98.38	2.00	0.00	1.00	0.00	30.18	86.66	2.00	0.00	1.00	0.00
30.35	90.01	2.00	0.00	1.00	0.00	30.51	95.11	2.00	0.00	1.00	0.00
30.68	91.62	0.19	2.51	1.00	0.05	30.84	85.85	2.00	0.00	1.00	0.00
31.00	74.78	2.00	0.00	1.00	0.00	31.17	72.43	2.00	0.00	1.00	0.00
31.33	75.53	2.00	0.00	1.00	0.00	31.50	77.18	2.00	0.00	1.00	0.00
31.66	76.28	2.00	0.00	1.00	0.00	31.82	73.60	2.00	0.00	1.00	0.00
31.99	71.51	2.00	0.00	1.00	0.00	32.15	69.26	2.00	0.00	1.00	0.00
32.32	68.52	2.00	0.00	1.00	0.00	32.48	68.10	2.00	0.00	1.00	0.00
32.64	68.11	2.00	0.00	1.00	0.00	32.81	66.95	2.00	0.00	1.00	0.00
32.97	65.62	2.00	0.00	1.00	0.00	33.14	63.86	2.00	0.00	1.00	0.00
33.30	63.65	2.00	0.00	1.00	0.00	33.47	64.04	2.00	0.00	1.00	0.00
33.63	65.34	2.00	0.00	1.00	0.00	33.79	69.43	2.00	0.00	1.00	0.00
33.96	71.70	2.00	0.00	1.00	0.00	34.12	80.37	2.00	0.00	1.00	0.00
34.28	96.72	2.00	0.00	1.00	0.00	34.45	105.66	0.24	2.23	1.00	0.04
34.61	144.24	0.46	1.73	1.00	0.03	34.78	210.19	2.00	0.00	1.00	0.00
34.94	276.84	2.00	0.00	1.00	0.00	35.11	294.19	2.00	0.00	1.00	0.00

:: Post-earthquake settlement due to soil liquefaction :: (continued)

Depth (ft)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (in)	Depth (ft)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (in)
35.27	286.39	2.00	0.00	1.00	0.00	35.43	273.76	2.00	0.00	1.00	0.00
35.60	251.87	2.00	0.00	1.00	0.00	35.76	225.85	2.00	0.00	1.00	0.00
35.93	196.88	1.01	0.47	1.00	0.01	36.09	194.85	0.98	0.48	1.00	0.01
36.25	216.59	2.00	0.00	1.00	0.00	36.42	248.26	2.00	0.00	1.00	0.00
36.58	253.46	2.00	0.00	1.00	0.00	36.75	234.45	2.00	0.00	1.00	0.00
36.91	210.19	2.00	0.00	1.00	0.00	37.07	197.25	1.01	0.47	1.00	0.01
37.24	176.07	0.75	1.10	1.00	0.02	37.40	150.54	0.51	1.67	1.00	0.03
37.57	118.99	2.00	0.00	1.00	0.00	37.73	106.10	2.00	0.00	1.00	0.00
37.89	107.89	2.00	0.00	1.00	0.00	38.06	116.20	2.00	0.00	1.00	0.00
38.22	109.34	2.00	0.00	1.00	0.00	38.39	100.38	2.00	0.00	1.00	0.00
38.55	97.86	2.00	0.00	1.00	0.00	38.71	99.24	2.00	0.00	1.00	0.00
38.88	96.89	2.00	0.00	1.00	0.00	39.04	94.77	2.00	0.00	1.00	0.00
39.21	97.35	2.00	0.00	1.00	0.00	39.37	97.88	2.00	0.00	1.00	0.00
39.53	96.82	2.00	0.00	1.00	0.00	39.70	89.99	2.00	0.00	1.00	0.00
39.86	83.62	2.00	0.00	1.00	0.00	40.03	76.23	2.00	0.00	1.00	0.00
40.19	69.35	2.00	0.00	1.00	0.00	40.35	66.09	2.00	0.00	1.00	0.00
40.52	65.85	2.00	0.00	1.00	0.00	40.68	70.01	2.00	0.00	1.00	0.00
40.85	74.73	2.00	0.00	1.00	0.00	41.01	77.72	2.00	0.00	1.00	0.00
41.18	78.00	2.00	0.00	1.00	0.00	41.34	75.44	2.00	0.00	1.00	0.00
41.50	73.56	2.00	0.00	1.00	0.00	41.67	75.14	2.00	0.00	1.00	0.00
41.83	76.79	2.00	0.00	1.00	0.00	42.00	74.81	2.00	0.00	1.00	0.00
42.16	68.73	2.00	0.00	1.00	0.00	42.32	64.42	2.00	0.00	1.00	0.00
42.49	62.92	2.00	0.00	1.00	0.00	42.65	63.98	2.00	0.00	1.00	0.00
42.82	65.52	2.00	0.00	1.00	0.00	42.98	70.15	2.00	0.00	1.00	0.00
43.14	77.91	2.00	0.00	1.00	0.00	43.31	85.00	2.00	0.00	1.00	0.00
43.47	87.93	2.00	0.00	1.00	0.00	43.64	84.20	2.00	0.00	1.00	0.00
43.80	83.17	2.00	0.00	1.00	0.00	43.96	95.45	2.00	0.00	1.00	0.00
44.13	106.29	2.00	0.00	1.00	0.00	44.29	115.68	2.00	0.00	1.00	0.00
44.46	111.92	2.00	0.00	1.00	0.00	44.62	104.22	2.00	0.00	1.00	0.00
44.78	89.04	2.00	0.00	1.00	0.00	44.95	75.96	2.00	0.00	1.00	0.00
45.11	70.76	2.00	0.00	1.00	0.00	45.28	66.98	2.00	0.00	1.00	0.00
45.44	65.34	2.00	0.00	1.00	0.00	45.60	66.48	2.00	0.00	1.00	0.00
45.77	69.30	2.00	0.00	1.00	0.00	45.93	71.42	2.00	0.00	1.00	0.00
46.10	72.44	2.00	0.00	1.00	0.00	46.26	73.58	2.00	0.00	1.00	0.00
46.42	78.55	2.00	0.00	1.00	0.00	46.59	83.31	2.00	0.00	1.00	0.00
46.75	89.69	2.00	0.00	1.00	0.00	46.92	91.42	2.00	0.00	1.00	0.00
47.08	90.67	2.00	0.00	1.00	0.00	47.24	84.03	2.00	0.00	1.00	0.00
47.41	76.25	2.00	0.00	1.00	0.00	47.57	73.47	2.00	0.00	1.00	0.00
47.74	75.17	2.00	0.00	1.00	0.00	47.90	77.78	2.00	0.00	1.00	0.00
48.06	82.80	2.00	0.00	1.00	0.00	48.23	86.37	2.00	0.00	1.00	0.00
48.39	83.36	0.18	2.71	1.00	0.05	48.56	84.40	0.18	2.69	1.00	0.05
48.72	88.68	2.00	0.00	1.00	0.00	48.89	92.60	2.00	0.00	1.00	0.00
49.05	99.84	2.00	0.00	1.00	0.00	49.21	92.85	2.00	0.00	1.00	0.00
49.38	86.60	2.00	0.00	1.00	0.00	49.54	77.65	2.00	0.00	1.00	0.00
49.71	70.59	2.00	0.00	1.00	0.00	49.87	63.51	2.00	0.00	1.00	0.00
50.03	57.65	2.00	0.00	1.00	0.00	50.20	54.78	2.00	0.00	1.00	0.00
50.36	53.37	2.00	0.00	1.00	0.00	50.53	-1.00	2.00	0.00	1.00	0.00
50.69	-1.00	2.00	0.00	1.00	0.00	50.85	-1.00	2.00	0.00	1.00	0.00

:: Post-earthquake settlement due to soil liquefaction :: (continued)

Depth (ft)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (in)	Depth (ft)	$Q_{tn,cs}$	FS	e_v (%)	DF	Settlement (in)

Total estimated settlement: 1.40

Abbreviations

$Q_{tn,cs}$:	Equivalent clean sand normalized cone resistance
FS:	Factor of safety against liquefaction
e_v (%):	Post-liquefaction volumentric strain
DF:	e_v depth weighting factor
Settlement:	Calculated settlement