QUATTROCCHI KWOK
ARCHITECTS

Project Manual

for the

Terra Linda High School
Ceramics Studio Kiln Room

December 6, 2022

DSA File Number: 21-H1
DSA Application Number: 01-120279
PTN Number: 65466-42

Owner:
San Rafael City Schools
310 Nova Albion Way
San Rafael, CA 94903

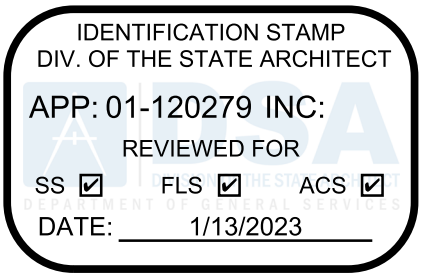
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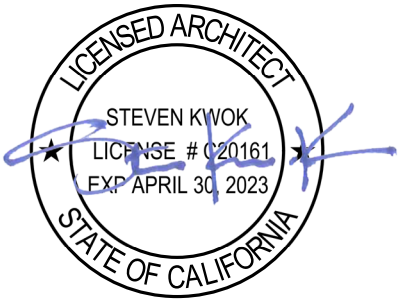
Architect's Project No.: 1959.00

DOCUMENT 00 0107

PROFESSIONAL SEALS AND DSA IDENTIFICATION STAMP

DIVISION OF THE STATE ARCHITECT IDENTIFICATION STAMP





Date: 12/05/2022

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END OF SECTION

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PROJECT/CONTRACT NUMBER: _____

[Description of Project]

SAN RAFAEL CITY SCHOOLS

_____, 20__

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SCHEDULES

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NOTICE TO BIDDERS

1. Notice is hereby given that the governing board ("Board") of the San Rafael City Schools ("District") will receive sealed bids for the following project, Bid No. _____, Bid Package _____ ("Project" or "Contract"):

   Terra Linda HS Ceramics Studio Kiln Rm

   The Project consists of:

   _____

2. To bid on this Project, the Bidder is required to possess one or more of the following State of California contractors' license(s)**:**

   A, B, and/or C-__

   The Bidder's license(s) must remain active and in good standing throughout the term of the Contract.

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.

4. Contract Documents will be available on or after _____, 20__, for review at the District Facilities Office, and may be downloaded from the District's website, www.XXXXX.XXX, using the [**"*Facilities Projects and Information*"]** link. In addition, Contract Documents are available for bidders' review at the following builders' exchanges:

   A. Builder's Exchange of _____ County (___) ____ - _____
   B. _____

5. Contract Documents are also available for purchase for _____ dollars ($_____) at the District Facilities Office. This fee is refundable if the Contract Documents are returned in clean condition back to the District Facilities Office no later than ten (10) calendar days after the date of the bid opening.

6. Sealed bids will be received until _____a.m./p.m., _____, 20___, at the District Facilities Office, 310 Nova Albion Way, San Rafael, California 94903 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.

7. 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 non-responsive and returned unopened to the bidder.

   [OR]

Pursuant to Public Contract Code section 20111.6, only prequalified bidders will be eligible to submit a bid for contracts $1 million or more using or planning to use state bond funds. Any bid submitted by a bidder who is not prequalified shall be non-responsive and returned unopened to the bidder. Moreover, any bid listing subcontractors holding C-4, C-7, C-10, C-16, C-20, C-34, C-36, C-38, C-42, C-43 or C-46 licenses who have not been prequalified shall be deemed nonresponsive.

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

9. A bid bond by an admitted surety insurer on the form provided by the District a cashier's check or a certified check, drawn to the order of the San Rafael City Schools, 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 District for the performance of the services as stipulated in the bid.

10. A mandatory/voluntary pre-bid conference and site visit will be held on _____ _____, 20___, at __.m. at _____, California. All participants are required to sign in front of the _____ Building, _____ _____, California. The site visit is expected to take approximately _____. Failure to attend or tardiness will render bid ineligible.

11. 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.

12. Pursuant to Education Code section 17550, the District is requiring the Bidder to purchase and to remove from the school grounds all old materials required by the specifications to be removed from any existing school building on the same school grounds and not required for school purposes and to state in his or her bid the amount which he or she will deduct from the price bid for the work as the purchase price of the old materials. The board shall let the contract to any responsible bidder whose net bid is the lowest, or shall reject all bids.

13. The District has elected to provide an owner-controlled or wrap-up insurance program ("OCIP"). The successful Bidder and its subcontractors shall be required to participate in and comply with the OCIP.

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

15. 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.

16. 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 District, pursuant to section 1770 et seq. of the California Labor Code. Prevailing wage rates are also available from the District or on the Internet at: <http://www.dir.ca.gov>.

17. 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 successful Bidder shall comply with all requirements of Division 2, Part 7, Chapter 1, Articles 1-5 of the Labor Code.

18. The District has entered into a Project Labor Agreement that is applicable to this Project. A copy of the Project Labor Agreement is available for review at the District Facilities Office and may be downloaded from the District's website, www.XXXXX.XXX, using the [**"*Facilities Projects and Information*"]** link. The successful bidder and all subcontractors will be required to agree to be bound by the Project Labor Agreement.

19. The Contractor and all Subcontractors under the Contractor shall comply with applicable federal, State, and local requirements relating to COVID-19 or other public health emergency/epidemic/pandemic including, if required, preparing, posting, and implementing a Social Distancing Protocol. Contractor shall further comply with the California Department of Public Health's August 11, 2021, Order requiring workers on District sites to be fully vaccinated against COVID-19, or else subject to weekly testing for COVID-19.

20. The District's Board has found and determined that the following item(s) shall be used on this Project based on the purpose(s) indicated. (Public Contract Code section 3400(c).) A particular material, product, thing, or service is designated by specific brand or trade name for the following purpose(s):

    (1) In order that a field test or experiment may be made to determine the product's suitability for future use: _____.

    (2) In order to match other products in use on a particular public improvement either completed or in the course of completion: _____.

    (3) In order to obtain a necessary item that is only available from one source: _____.

    (4) In order to respond to an emergency declared by a local agency: _____.

21. This Project is funded in whole or in part with federal funds, and therefore the Contractor shall comply with the Davis-Bacon Act, applicable reporting requirements, and any other applicable requirements for federal funding. This Project is also subject to Buy American requirements.

22. The District shall award the Contract, if it awards it at all, to the lowest responsive responsible bidder based on:

    A. The base bid amount only.

[OR]

B. The base bid amount plus the following alternates:

[AS EXAMPLES ONLY: "all alternates;" or "additive alternate no. 1 only."**]**

[OR]

C. Up to a total Project fund amount [of $_____] **[OR]** [to be stated before bids are opened], **[THIS AMOUNT NEED NOT BE STATED HERE BUT MUST BE STATED PRIOR TO OPENING ANY BIDS]** including the additive alternates or deductive alternates needed, in the stated order, to be equal to or less than that amount:

[AS EXAMPLES ONLY: "additive alternate no. 1; and deductive alternate no. 3."**]**

[OR]

D. Based on a process that conceals the identity of bidders from the District until the bids have been ranked.

23. The Board reserves the right to reject any and all bids and/or waive any irregularity in any bid received. If the District 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.

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.

San Rafael City Schools ("District") will evaluate information submitted by the apparent low Bidder and, if incomplete or unsatisfactory to District, Bidder's bid may be rejected at the sole discretion of District.

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

   Terra Linda High School Ceramics Studio Kiln Room

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. The District has prequalified bidders 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.

   [OR]

   The District has prequalified bidders pursuant to Public Contract Code section 20111.6 for contracts $1 million or more using or planning to use state bond funds. 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. Moreover, any bid listing subcontractors holding C-4, C-7, C-10, C-16, C-20, C-34, C-36, C-38, C-42, C-43 or C-46 licenses who have not been prequalified shall be deemed nonresponsive.

4. District 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 District 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 District 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 District forms. Bids not submitted on the District'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 District a re-formatted, re-typed, altered, modified, or otherwise recreated version of the Bid Form and Proposal or other District-provided document.

9. Bids shall be clearly written and without erasure or deletions. District 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. District 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 District'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.

    f. Federal Debarment Certification.

    g. Federal Byrd Anti-Lobbying Certification, if contract value is $100,000 or more.

    h. OCIP Insurance forms

11. Bidders must submit with their bids cash, a cashier's check or a certified check payable to District, 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 District. 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, District may deposit Bid Bond, cash, cashier's check, or certified check for collection, and proceeds thereof may be retained by District as liquidated damages for failure of Bidder to enter into Contract, in the sole discretion of District. It is agreed that calculation of damages District 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 District 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. If a mandatory pre-bid conference and site visit ("Site Visit") is required as referenced in the Notice to Bidders, then Bidders must submit the Site Visit Certification with their Bid. District will transmit to all prospective Bidders of record such Addenda as District 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 District 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 District, 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 District's principal office. Prevailing wage rates are also available on the internet at http://www.dir.ca.gov.

Since the Project is funded in whole or in part with federal funds, the Contractor and all Subcontractors under the Contractor shall comply with the Davis-Bacon Act, applicable reporting requirements, and any other applicable requirements for federal funding. If a conflict exists with a state requirement, the more stringent provision shall control.

18. The District has entered into a Project Labor Agreement that is applicable to this Project. A copy of the Project Labor Agreement is available for review at the District Facilities Office and may be downloaded from the District's website, www.XXXXX.XXX, using the [**"*Facilities Projects and Information*"**] link. The successful bidder and all subcontractors will be required to agree to be bound by the Project Labor Agreement.

19. Pursuant to Education Code section 17550, the District is requiring the Bidder to purchase and to remove from the school grounds all old materials required by the specifications to be removed from any existing school building on the same school grounds and not required for school purposes and to state in his or her bid the amount which he or she will deduct from the price bid for the work as the purchase price of the old materials. The board shall let the contract to any responsible bidder whose net bid is the lowest, or shall reject all bids.

20. The District has elected to provide an owner-controlled or wrap-up insurance program ("OCIP"). The policy limits, known exclusions, and the length of time the policy is intended to remain in effect provided by the OCIP are described in the OCIP Manual. The District will require all bidders at a minimum to have no serious and willful violations of Labor Code section 6300 et seq., have a workers' compensation experience modification factor of 1.00 or less, and have an injury prevention program instituted pursuant to Labor Code sections 3201.5 or 6401.7 .

21. Section 17076.11 of the Education Code requires school districts using funds allocated pursuant to the State of California School Facility Program for the construction and/or modernization of school building(s) 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 on projects that receive state funding or demonstrate its good faith effort to solicit DVBE participation in this Contract. In order to meet this requirement by demonstrating a good faith effort, Bidder must advertise for DVBE-certified subcontractors and suppliers before submitting its Bid. For any project that is at least partially state-funded, the lowest responsive responsible Bidder awarded the Contract must submit certification of compliance with the procedures for implementation of DVBE contracting goals with its signed Agreement. DVBE Certification form is attached. Do not submit this form with your Bid.

22. 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 District 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 District 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 District is/are acceptable to Bidder;

e. Bidder has made a complete disclosure in writing to the District of all facts bearing upon any possible interest, direct or indirect, that Bidder believes any representative of the District or other officer or employee of the District 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, District 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 District-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. District is not responsible for the completeness of such information for bidding or construction; nor is District responsible in any way for any conclusions or opinions that the Bidder has drawn from such information; nor is the District responsible for subsurface conditions that are not specifically shown (for example, District is not responsible for soil conditions in areas contiguous to areas where a subsurface condition is shown).

h. Conditions Shown in Reports and Drawings Supplied for Informational Purposes: Reference is made to the document entitled Geotechnical Data, and the document entitled Existing Conditions, for identification of:

(1) Subsurface Conditions: Those reports of explorations and tests of subsurface conditions at or contiguous to the Site that have been utilized by Architect in preparing the Contract Documents; and

(2) Physical Conditions: Those drawings of physical conditions in or relating to existing surface or subsurface structures at or contiguous to the Site that has been utilized by Architect in preparing the Contract Documents.

(3) These reports and drawings are **not** Contract Documents and, except for any "technical" data regarding subsurface conditions specifically identified in Geotechnical Data and Existing Conditions, and underground facilities data, Bidder may not in any manner rely on the information in these reports and drawings. Subject to the foregoing, Bidder must make its own independent investigation of all conditions affecting the Work and must not rely on information provided by District.

23. 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 District 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 District 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. District 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. Within 35 days after the date of the Notice of Award, the Successful Bidder shall submit data substantiating the request(s) for all substitution(s) containing sufficient information to assess acceptability of product or system and impact on Project, including, without limitation, the requirements specified in the Special Conditions and the Specifications. Insufficient information shall be grounds for rejection of substitution.

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

d. Substitutions may be requested after Contract has been awarded only if indicated in and in accordance with requirements specified in the Special Conditions and the Specifications.

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

25. All questions about the meaning or intent of the Contract Documents are to be directed via email to the District to _____. Interpretations or clarifications considered necessary by the District in response to such questions will be issued in writing by Addenda and emailed, faxed, mailed, or delivered to all parties recorded by the District as having received the Contract Documents or posted on the District's website at _____. 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.

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

27. 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 District.

28. 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 District'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.

29. The District 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 District shall select the Bidder to whom to award the Contract by lot.

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

31. Bidders in contention for contract awards shall be required to attend a Post-Bid interview, which will be set within three (3) calendar days following bid opening. A duly authorized representative of the apparent low bidder is required to attend the Post Bid Interview, in person. The apparent low bidder's authorized representative(s) must have (1) knowledge of how the bid submitted was prepared, (2) the person responsible for supervising performance of the Work, and (3) the authority to bind the apparent low bidder. Failure to attend the Post Bid Interview as scheduled will be considered just cause for the District to reject the Bid as nonresponsive.

32. Any bid protest by any Bidder regarding any other bid must be submitted in writing to the District, before 5:00 p.m. of the **THIRD (3rd)** 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 District 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.

33. 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 District to reject the bid as nonresponsive.

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

b. Escrow of Bid Documentation: This must include all required documentation. See the document titled Escrow Bid Documentation for more information.

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

d. 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.

e. Insurance Certificates and Endorsements as required.

f. Workers' Compensation Certification.

g. Prevailing Wage and Related Labor Requirements Certification.

h. Disabled Veteran Business Enterprise Participation Certification.

i. Drug-Free Workplace Certification.

j. Tobacco-Free Environment Certification.

k. Hazardous Materials Certification.

l. Lead-Based Materials Certification.

m. Imported Materials Certification.

n. Criminal Background Investigation/Fingerprinting Certification.

o. Buy American Certification.

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

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

34. Time for Completion: District 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 District 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 District 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 District within **TEN (10)** calendar days after receipt by Contractor of District'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 District, the District shall only be obligated to pay Contractor for the Work that Contractor had performed at the time of notification of postponement and which the District 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, District shall have the authority to award the Contract to the next lowest responsive responsible bidder.

35. District 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 District believes that it would not be in the best interest of the District 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 District. District 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.

36. It is the policy of the District 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.

37. Prior to the award of Contract, District reserves the right to consider the responsibility of the Bidder. District may conduct investigations as District 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 District's satisfaction within the prescribed time.

38. Bidder expressly acknowledges that it is familiar with and capable of complying with applicable federal, State, and local requirements relating to COVID-19 or other public health emergency/epidemic/pandemic including, if required, preparing, posting, and implementing a Social Distancing Protocol, and such costs shall be included in the bid as an allowance. Any unused portion of the allowance designated for COVID-19 or other public health emergency/epidemic/pandemic compliance will revert back to the District documented by a deductive change order.

END OF DOCUMENT

DOCUMENT 00 21 13.1

BIDDER INFORMATION AND FORMS

[INTENTIONALLY LEFT BLANK UNLESS PROVIDED IN SPECIAL CONDITIONS – SEPARATE PREQUALIFICATION PROCESS RECOMMENDED]

END OF DOCUMENT

DOCUMENT 00 31 19

EXISTING CONDITIONS

1. Summary

This document describes existing conditions at or near the Project, and use of information available regarding existing conditions. This document is **not** part of the Contract Documents. See General Conditions for definition(s) of terms used herein.

2. Reports and Information on Existing Conditions

a. Documents providing a general description of the Site and conditions of the Work may have been collected by the San Rafael City Schools ("District"), its consultants, contractors, and tenants. These documents may, but are not required to, include previous contracts, contract specifications, tenant improvement contracts, as-built drawings, utility drawings, and information regarding underground facilities.

b. Information regarding existing conditions may be inspected at the District offices or the Construction Manager's offices, if any, and copies may be obtained at cost of reproduction and handling upon Bidder's agreement to pay for such copies. These reports, documents, and other information are **not** part of the Contract Documents. These reports, documents, and other information do **not** excuse Contractor from fulfilling Contractor's obligation to independently investigate any or all existing conditions or from using reasonable prudent measures to avoid damaging existing improvements.

c. Information regarding existing conditions may also be included in the Project Manual, but shall **not** be considered part of the Contract Documents.

d. Prior to commencing this Work, Contractor and the District'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 District within fourteen (14) days of the survey.

e. Contractor may also document any pre-existing conditions in writing, provided that both the Contractor and the District's representative agree on said conditions and sign a memorandum documenting the same.

f. The reports and other data or information regarding existing conditions and underground facilities at or contiguous to the Project are the following:

(1) Original Construction Drawings.
(2) Survey of Site.
(3) Geotechnical Report(s).
(4) Hazardous Material Report(s).
(5) Videotaped Survey(s).

3. Use of Information

a. Information regarding existing conditions was obtained only for use of District and its consultants, contractors, and tenants for planning and design and is **not** part of the Contract Documents.

b. District does not warrant, and makes no representation regarding, the accuracy or thoroughness of any information regarding existing conditions. Bidder represents and agrees that in submitting a bid it is not relying on any information regarding existing conditions supplied by District.

c. Under no circumstances shall District be deemed to warrant or represent existing above-ground conditions, as-built conditions, or other actual conditions, verifiable by independent investigation. These conditions are verifiable by Bidder by the performance of its own independent investigation that Bidder must perform as a condition to bidding and Bidder should not and shall not rely on this information or any other information supplied by District regarding existing conditions.

d. Any information shown or indicated in the reports and other data supplied herein with respect to existing underground facilities at or contiguous to the Project may be based upon information and data furnished to District by the District's employees and/or consultants or builders of such underground facilities or others. District does not assume responsibility for the completeness of this information, and Bidder is solely responsible for any interpretation or conclusion drawn from this information.

e. District shall be responsible only for the general accuracy of information regarding underground facilities, and only for those underground facilities that are owned by District, and only where Bidder has conducted the independent investigation required of it pursuant to the Instructions to Bidders, and discrepancies are not apparent.

4. Investigations/Site Examinations

a. Before submitting a bid, each Bidder is responsible for conducting or obtaining any additional or supplementary examinations, investigations, explorations, tests, studies, and data concerning conditions (surface, subsurface, and underground facilities) at or contiguous to the Site or otherwise, that 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 or that Bidder deems necessary to determine its Bid for performing and furnishing the Work in accordance with the time, price, and other terms and conditions of Contract Documents.

b. On request, District will provide each Bidder access to the Site to conduct such examinations, investigations, explorations, tests, and studies, as each Bidder deems necessary for submission of a bid. Bidders must fill all holes and clean up and restore the Site to its former condition upon completion of its explorations, investigations, tests, and studies. Such investigations and Site examinations may be performed during any and all Site visits indicated in the Notice to Bidders and only under the provisions of the Contract

Documents, including, but not limited to, proof of insurance and obligation to indemnify against claims arising from such work, and District's prior approval.

END OF DOCUMENT

DOCUMENT 00 31 32

GEOTECHNICAL DATA

1. Summary

This document describes geotechnical data at or near the Project that is in the District's possession available for Contractor's review, and use of data resulting from various investigations. This document is **not** part of the Contract Documents. See General Conditions for definition(s) of terms used herein.

2. Geotechnical Reports

a. Geotechnical reports may have been prepared for and around the Site and/or in connection with the Work by soil investigation engineers hired by San Rafael City Schools ("District"), and its consultants, contractors, and tenants.

b. Geotechnical reports may be inspected at the District offices or the Construction Manager's offices, if any, and copies may be obtained at cost of reproduction and handling upon Bidder's agreement to pay for such copies. These reports are **not** part of the Contract Documents.

c. The reports and drawings of physical conditions that may relate to the Project are the following:

_____

3. Use of Data

a. Geotechnical data were obtained only for use of District and its consultants, contractors, and tenants for planning and design and are **not** a part of Contract Documents.

b. Except as expressly set forth below, District does not warrant, and makes no representation regarding, the accuracy or thoroughness of any geotechnical data. Bidder represents and agrees that in submitting a bid it is not relying on any geotechnical data supplied by District, except as specifically allowed below.

c. Under no circumstances shall District be deemed to make a warranty or representation of existing above ground conditions, as-built conditions, geotechnical conditions, or other actual conditions verifiable by independent investigation. These conditions are verifiable by Bidder by the performance of its own independent investigation that Bidder should perform as a condition to bidding and Bidder must not and shall not rely on information supplied by District.

4. Limited Reliance Permitted on Certain Information

a. Reference is made herein for identification of:

Reports of explorations and tests of subsurface conditions at or contiguous to the Site that have been utilized by District in preparation of the Contract Documents.

Drawings of physical conditions in or relating to existing subsurface structures (except underground facilities) that are at or contiguous to the Site and have been utilized by District in preparation of the Contract Documents.

b. Bidder may rely upon the general accuracy of the "technical data" contained in the reports and drawings identified above, but only insofar as it relates to subsurface conditions, provided Bidder has conducted the independent investigation required pursuant to Instructions to Bidders, and discrepancies are not apparent. The term "technical data" in the referenced reports and drawings shall be limited as follows:

(1) The term "technical data" shall include actual reported depths, reported quantities, reported soil types, reported soil conditions, and reported material, equipment or structures that were encountered during subsurface exploration. The term "technical data" does not include, and Bidder may not rely upon, any other data, interpretations, opinions or information shown or indicated in such drawings or reports that otherwise relate to subsurface conditions or described structures.

(2) The term "technical data" shall not include the location of underground facilities.

(3) Bidder may not rely on the completeness of reports and drawings for the purposes of bidding or construction. Bidder may rely upon the general accuracy of the "technical data" contained in such reports or drawings.

(4) Bidder is solely responsible for any interpretation or conclusion drawn from any "technical data" or any other data, interpretations, opinions, or information provided in the identified reports and drawings.

5. Investigations/Site Examinations

a. Before submitting a bid, each Bidder is responsible for conducting or obtaining any additional or supplementary examinations, investigations, explorations, tests, studies, and data concerning conditions (surface, subsurface, and underground facilities) at or contiguous to the Site or otherwise, that 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 or that Bidder deems necessary to determine its Bid for performing and furnishing the Work in accordance with the time, price, and other terms and conditions of Contract Documents.

b. On request, District will provide each Bidder access to the Site to conduct such examinations, investigations, explorations, tests, and studies, as each Bidder deems necessary for submission of a bid. Bidders must fill all holes and clean up and restore the Site to its former condition upon completion of its explorations, investigations, tests, and studies. Such investigations and Site examinations may be performed during any and all Site visits indicated in the Notice to Bidders and only under the provisions of the Contract Documents, including, but not limited to, proof of insurance and obligation to indemnify against claims arising from such work, and District's prior approval.

END OF DOCUMENT

DOCUMENT 00 41 13

BID FORM AND PROPOSAL

To: Governing Board of the San Rafael City Schools ("District" 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 Bid No. _ _____, for the following project known as:

Terra Linda High School Ceramics Studio Kiln Room

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

_____ dollars $ _____

BASE BID

Bidder acknowledges and agrees that the Base Bid accounts for any and all Allowance(s), Total Cost for Unit Prices, and OCIP excluded costs.

Additive/Deductive Alternates:

Alternate #1

_____ dollars $ _____
Additive/Deductive

Descriptions of alternates are primarily scope definitions and do not necessarily detail the full range of materials and processes needed to complete the construction.

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Additional Detail Regarding Calculation of Base Bid

1. **Unit Prices**. The Bidder's Base Bid includes the following unit prices, which the Bidder must provide and the District may, at its discretion, utilize in valuing additive and/or deductive change orders (Unit Prices shall include all labor, materials, services, profit, overhead, insurance, bonds, taxes, and all other incidental costs of Contractor, subcontractors, and suppliers):

   SCHEDULE OF UNIT PRICES

Item No.	Description	Unit of Measure	Estimated Quantity	Unit Price	Total Cost = Unit Price x Estimated Quantity (Included in Base Bid)
				$_____	$_____
				$_____	$_____

   Where scope of Work is decreased, all Work pertaining to the item, whether specifically stated or not, shall be omitted, and where scope of Work is increased, all work pertaining to that item required to render same ready for use on the Project in accordance with intentions of the Drawings and Specifications shall be included in the above agreed-upon price amount.

2. **Allowance**. The Bidder's Base Bid and each alternate shall include a ten percent (10%) allowance for Unforeseen Conditions and complying with applicable federal, State, and local requirements relating to COVID-19 or other public health emergency/epidemic/pandemic.

   The above allowance shall only be allocated for unforeseen items or COVID-19 or other public health emergency/epidemic/pandemic compliance relating to the Work. Contractor shall not bill for or be due any portion of this allowance unless the District has identified specific work, Contractor has submitted a price for that work or the District has proposed a price for that work, the District has accepted the cost for that work, and the District has prepared an Allowance Expenditure Directive incorporating that work. Contractor hereby authorizes the District to execute a unilateral deductive change order at or near the end of the Project for all or any portion of the allowance not allocated. Any unused portion of the allowance will revert back to the District documented by a deductive change order.

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3. **Purchase Price of Old Material.** Bidder specifically acknowledges and understands that if it is awarded the Contract, that pursuant to Education Code section 17550, that it will purchase and remove from the school grounds all old materials required by the specifications to be removed from any existing school building on the same school grounds and not required for school purposes and to state in his or her bid the amount which he or she will deduct from the price bid for the work as the purchase price of the old materials. The deducted amount must be shown separately below:

Deducted Purchase Price of Old Material

_____ dollars $ _____ Deductive

4. **OCIP.** Bidder specifically acknowledges and understands that if it is awarded the Contract, that it and its subcontractors shall participate in and comply with the owner-controlled or wrap-up insurance program (OCIP). Bidder and all of its subcontractors are required to exclude the cost of insurance provided by the OCIP from its bid price for the proposed scope of work, including subcontracted work whether or not the subcontractor is identified at the time of the bid. The excluded amount must be shown separately below:

Excluded Cost of Insurance

_____ dollars $ _____ Deductive

5. 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 District, and agrees that its Proposal, if accepted by the District, will be the basis for the Bidder to enter into a contract with the District in accordance with the intent of the Contract Documents.

6. The undersigned has notified the District 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.

7. 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.

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

9. It is understood that the District 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.

10. The following documents are attached hereto:

- Bid Bond on the District's form or other security
- Designated Subcontractors List
- Site Visit Certification
- Non-Collusion Declaration
- Iran Contracting Act Certification
- OCIP Insurance forms

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

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

12. Bidder acknowledges that the license required for performance of the Work is a _____ _____ license.

13. Bidder 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.

14. 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.

15. Bidder hereby certifies that its bid includes sufficient funds to permit Bidder to comply with all local, state or federal labor laws or regulations during the Project, including payment of prevailing wage, and that Bidder will comply with the provisions of Labor Code section 2810(d) if awarded the Contract

16. [Bidder agrees to comply with all requirements of the Project Labor Agreement].

17. Bidder specifically acknowledges and understands that if it is awarded the Contract, that it shall perform the Work of the Project while complying with the Davis Bacon Act, applicable reporting requirements, and any and all other applicable requirements for federal funding. If a conflict exists, the more stringent requirement shall control.

18. 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.

19. 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.

20. Bidder expressly acknowledges that it is familiar with and capable of complying with applicable federal, State, and local requirements relating to COVID-19 or other public health emergency/epidemic/pandemic including, if required, preparing, posting, and implementing a Social Distancing Protocol.

21. 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 District 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.

22. 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 District 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: _____

Signature: _____

Print Name: _____

Title: _____

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: _____

No.: _____ Class:_____ Expiration Date: _____

No.: _____ Class:_____ Expiration Date: _____

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 San Rafael City Schools ("District") of Marin 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 District for all Work specifically described in the accompanying bid for the following project: Terra Linda High School Ceramics Studio Kiln Room ("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 District'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 District 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)

PROJECT: Terra Linda High School Ceramics Studio Kiln Room

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: _____

DIR Registration #: _____

Portion of Work: _____

Subcontractor Name: _____

CA Cont. Lic. #: _____ Location: _____

DIR Registration #: _____

Portion of Work: _____

Subcontractor Name: _____

CA Cont. Lic. #: _____ Location: _____

DIR Registration #: _____

Portion of Work: _____

Subcontractor Name: _____

CA Cont. Lic. #: _____ Location: _____

DIR Registration #: _____

Portion of Work: _____

Subcontractor Name: _____

CA Cont. Lic. #: _____ Location: _____

DIR Registration #: _____

Portion of Work: _____

Subcontractor Name: _____

CA Cont. Lic. #: _____ Location: _____

DIR Registration #: _____

Portion of Work: _____

Subcontractor Name: _____

CA Cont. Lic. #: _____ Location: _____

DIR Registration #: _____

Portion of Work: _____

Subcontractor Name: _____

CA Cont. Lic. #: _____ Location: _____

DIR Registration #: _____

Portion of Work: _____

Date: _____

Proper Name of Bidder: _____

Signature: _____

Print Name: _____

Title: _____

END OF DOCUMENT

DOCUMENT 00 45 01

SITE VISIT CERTIFICATION

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

PROJECT: Terra Linda High School Ceramics Studio Kiln Room

Check option that applies:

_____ I certify that I visited the Site of the proposed Work, received the attached _____ pages of information, 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, received the attached _____ pages of information, 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 San Rafael City Schools, its Architect, its Engineers, 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: _____

ATTACHMENTS:

1.

2.

3.

END OF DOCUMENT

DOCUMENT 00 45 19

NON-COLLUSION DECLARATION
(Public Contract Code Section 7106)

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.: _____ between the San Rafael City Schools ("District") 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

PROJECT/CONTRACT NO.: _____ between the San Rafael City Schools ("District") and _____ ("Contractor" or "Bidder") ("Contract" or "Project").

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

PROJECT/CONTRACT NO.: _____ between the San Rafael City Schools ("District") and _____ ("Contractor" or "Bidder") ("Contract" or "Project").

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.

I hereby certify that I will also conform to the Federal Labor Standards Provisions regarding minimum wages, withholding, payrolls and basic records, apprentice and trainee employment requirements, equal employment opportunity requirements, Copeland Act requirements, Davis-Bacon and Related Act requirements, Contract Work Hours and Safety Standards Act requirements, and any and all other applicable requirements for federal funding for all Work on the above Project.

Date: _____

Proper Name of Contractor: _____

Signature: _____

Print Name: _____

Title: _____

END OF DOCUMENT

DOCUMENT 00 45 46.02

DISABLED VETERAN BUSINESS ENTERPRISE PARTICIPATION CERTIFICATION

PROJECT/CONTRACT NO.: _____between the San Rafael City Schools ("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 after good faith efforts	Make good faith efforts, including contacts, advertisement and DVBE solicitation	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

PROJECT/CONTRACT NO.: _____ between the San Rafael City Schools ("District") and _____ ("Contractor" or "Bidder") ("Contract" or "Project").

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

Contractor must also comply with the provisions of Health & Safety Code section 11362.3 which prohibits the consumption or possession of cannabis or cannabis products in any public place, including school grounds, and specifically on school grounds while children are present.

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 District determines that I have either (a) made a false certification herein, or (b) violated this certification by failing to carry out the requirements of section 8355, that the Contract awarded herein is subject to 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 and Health and Safety Code section 11362.3.

Date: _____

Proper Name of Contractor: _____

Signature: _____

Print Name: _____

Title: _____

END OF DOCUMENT

DOCUMENT 00 45 46.04

TOBACCO-FREE ENVIRONMENT CERTIFICATION

PROJECT/CONTRACT NO.: _____ between the San Rafael City Schools ("District") and _____ ("Contractor" or "Bidder") ("Contract" or "Project").

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., Business and Professions Code section 22950 et seq., and District Board policies, all District sites, including the Project site, are tobacco-free environments. Smoking and the use of tobacco products by all persons is prohibited on or in District property. District property includes school buildings, school grounds, school-owned vehicles and vehicles owned by others while on District property. The prohibition on smoking includes the use of any electronic smoking device that creates an aerosol or vapor, in any manner or in any form, and the use of any oral smoking device for the purpose of circumventing the prohibition of tobacco smoking. Further, Health & Safety Code section 11362.3 prohibits the smoking or use of cannabis or cannabis products in any place where smoking tobacco is prohibited.

I acknowledge that I am aware of the District's policy regarding tobacco-free environments at District 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

PROJECT/CONTRACT NO.: _____ between San Rafael City Schools ("District") and _____ ("Contractor" or "Bidder") ("Contract" or "Project").

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 District.

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 District'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 District.

6. Contractor has read and understood the document titled Hazardous Materials Procedures & Requirements, and shall comply with all the provisions outlined therein. Contractor certifies that it is knowledgeable of, and shall comply with, all laws applicable to the Work including, but not limited to, all federal, state, and local laws, statutes, standards, rules, regulations, and ordinances applicable to the Work.

Date: _____

Proper Name of Contractor: _____

Signature: _____

Print Name: _____

Title: _____

END OF DOCUMENT

DOCUMENT 00 45 46.06

LEAD-BASED MATERIALS CERTIFICATION

PROJECT/CONTRACT NO.: _____ between the San Rafael City Schools ("District") 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 District 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 District, 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 District. 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 District that all painted surfaces (interior as well as exterior) within the District 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 District 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 District. 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 District, 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 District.

The Contractor shall provide the District with any sample results prior to beginning Work, during the Work, and after the completion of the Work. The District 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 DISTRICT 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

PROJECT/CONTRACT NO.: _____ between the San Rafael City Schools ("District") and _____ ("Contractor" or "Bidder") ("Contract" or "Project").

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 District 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

PROJECT/CONTRACT NO.: _____between the San Rafael City Schools ("District") and _____ ("Contractor" or "Bidder") ("Contract" or "Project").

The undersigned does hereby certify to the District that I am a representative of the Contractor currently under contract with the District; 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 (check all that apply):

☐ Pursuant to Education Code section 45125.2(a), 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, Subcontractors or suppliers and District pupils at all times; and/or

☐ Pursuant to Education Code section 45125.2(a), 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 ("DOJ") 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' or suppliers' employees is:

Name: _____

Title: _____

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

☐ Pursuant to Education Code section 45125.2(a), the District will take appropriate steps to protect the safety of any pupils that may come in contact with Contractor's employees, subcontractors or suppliers so that the fingerprinting and criminal background investigation requirements of Education Code section 45125.2 shall not apply to Contractor under the Contract.

☐ The Work on the Contract is either (i) at an unoccupied school site and no employee of Contractor and/or subcontractor or supplier of any tier of the Contract shall come in contact with the District pupils or (ii) if Contractor's employees or any subcontractor or supplier of any tier of the Contract interacts with pupils, such interaction shall only take place under the immediate supervision and control of the pupil's parent or guardian or a school employee, so that the fingerprinting and criminal background investigation requirements of Education Code section 45125.1 shall not apply to Contractor under the Contract.

☐ 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 District pupils in the course of providing services pursuant to the Contract, and the DOJ has determined (A) that none of those employees has been convicted of a felony, as that term is defined in Education Code section 45122.1 and/or (B) that the prohibition does not apply to an employee as provided by Education Code section 45125.1(e)(2) or (3). When the Contractor performs the criminal background check, it shall immediately provide any subsequent arrest and conviction information it receives to the District pursuant to the subsequent arrest service. No work shall commence until the Department of Justice ascertains that Contractor's employees and any subcontractors' employees have not been convicted of a felony as defined in Government 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 District pupils during the course and scope of the Contract is attached hereto as ATTACHMENT "A;" and/or

☐ The Contractor is a sole proprietor and intends to comply with the fingerprinting requirements of Education Code section 45125.1(h) with respect to all Contractor's employees who may have contact with District pupils in the course of providing services pursuant to the Contract, and hereby agrees to the District's preparation and submission of fingerprints such that the DOJ may determine (A) that none of those employees has been convicted of a felony, as that term is defined in Education Code section 45122.1 and/or (B) that the prohibition does not apply to an employee as provided by Education Code section 45125.1(e)(2) or (3). No work shall commence until the Department of Justice ascertains that Contractor's employees and any subcontractors' employees have not been convicted of a felony as defined in Government Code Section 45122.1.

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

[CONTINUED ON NEXT PAGE]

ATTACHMENT "A"

List of Employees/Subcontractors

Name/Company: _____

Name/Company: _____

Name/Company: _____

Name/Company: _____

Name/Company: _____

Name/Company: _____

Name/Company: _____

Name/Company: _____

Name/Company: _____

Name/Company: _____

Name/Company: _____

Name/Company: _____

Name/Company: _____

Name/Company: _____

Name/Company: _____

Name/Company: _____

Name/Company: _____

If further space is required for the list of employees/subcontractors, attach additional copies of this page.

Date: _____

Proper Name of Contractor: _____

Signature: _____

Print Name: _____

Title: _____

END OF DOCUMENT

DOCUMENT 00 45 46.09

BUY AMERICAN CERTIFICATION

PROJECT/CONTRACT NO.: _____ between the San Rafael City Schools ("District") 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 46.10

ROOFING PROJECT CERTIFICATION

PROJECT/CONTRACT NO.: _____ between the San Rafael City Schools ("District") and _____ ("Contractor" or "Bidder") ("Contract" or "Project").

Pursuant to Public Contract Code section 3000, et seq. this form shall be executed by all contractors, materials manufacturers, or vendors involved in a bid or proposal for the repair or replacement of a roof of a public school building where the project is either for repair of more than 25% of the roof or that has a total cost more than $21,000 ("roofing project") and submitted to the District when the award is made.

Certification of: □ Contractor □ Materials Manufacturer
□ Vendor □ Other _____

I, _____, _____, certify that I have not
[Name] [Name of Firm]
offered, given, or agreed to give, received, accepted, or agreed to accept, any gift, contribution, or any financial incentive whatsoever to or from any person in connection with the roofing project contract. As used in this certification, "person" means any natural person, business, partnership, corporation, union, committee, club, or other organization, entity, or group of individuals.

Furthermore, I, _____, _____, certify that
[Name] [Name of Firm]
I do not have, and throughout the duration of the contract, I will not have, any financial relationship in connection with the performance of this contract with any architect, engineer, roofing consultant, materials manufacturer, distributor, or vendor that is not disclosed below.

I, _____, _____, have the following
[Name] [Name of Firm]
financial relationships with an architect, engineer, roofing consultant, materials manufacturer, distributor, or vendor, or other person in connection with the following roofing project contract (provide Name and Address of Building, and Contract Date and Number):

_____

_____

_____

_____

_____

_____

_____

By my signature below, I hereby certify that, to the best of my knowledge, the contents of this disclosure are true, or are believed to be true. I further certify on behalf of the Firm that I am aware of section 3000 et seq. of the California Public Contract Code, and the sections referenced therein regarding the penalties for providing false information or failing to disclose a financial relationship in this disclosure. 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 46.11

FEDERAL DEBARMENT CERTIFICATION

PROJECT/CONTRACT NO.: _____between the San Rafael City Schools ("District") and _____ ("Contractor" or "Bidder") ("Contract" or "Project").

1. Bidder certifies to the best of its knowledge and belief, that it and its principals:

a. Are not presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded by any Federal department or Board;

b. Have not within a three-year period preceding this bid been convicted of or had a civil judgment rendered against them for commission of fraud or a criminal offense in connection with obtaining, attempting to obtain, or performing a public (Federal, State or local) transaction or contract under a public transaction; violation of Federal or State antitrust statutes or commission of embezzlement, theft, forgery, bribery, falsification or destruction of records, making false statements, or receiving stolen property;

c. Are not presently indicted for or otherwise criminally or civilly charged by a governmental entity (Federal, State or local) with commission of any of the offenses enumerated in paragraph (1)(b) of this certification; and

d. Have not within a three-year period preceding this application/proposal had one or more public transactions (Federal, State or local) terminated for cause or default.

2. Where Bidder is unable to certify to any of the statements in this certification, Bidder shall attach an explanation to this certification.

3. Bidder agrees to include the following certification in all subcontracts, for all lower tiers:

"Debarment and Suspension Certification – By submission of its proposal, the contractor (or vendor, or consultant, depending on the transaction) certifies to the best of its knowledge and belief that it and its principals are not presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from covered transactions by any Federal department or agency in accordance with 2 CFR 200.213 and 2 CFR 180."

Date: _____

Proper Name of Contractor: _____

Signature: _____

Print Name: _____

Title: _____

END OF DOCUMENT

DOCUMENT 00 45 46.12

BYRD ANTI-LOBBYING CERTIFICATION

Applicable to Grants, Subgrants, Cooperative Agreements, and Contracts Exceeding $100,000 in Federal Funds

Submission of this certification is a prerequisite for making or entering into this transaction and is imposed by section 1352, Title 31, U.S. Code. This certification is a material representation of fact upon which reliance was placed when this transaction was made or entered into. Any person who fails to file the required certification shall be subject to a civil penalty of not less than $10,000 and not more than $100,000 for each such failure.

The undersigned certifies, to the best of their knowledge and belief, that:

(1) No Federal appropriated funds have been paid or will be paid, by or on behalf of the undersigned, to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the awarding of any Federal grant, the making of any Federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment or modification of any Federal contract, grant, loan, or cooperative agreement.

(2) If any funds other than Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with this Federal contract, grant, loan, or cooperative agreement, the undersigned shall complete and submit Standard Form-LLL, "Disclosure of Lobbying Activities," in accordance with its instructions.

(3) The undersigned shall require that the language of this certification be included in the award documents of all sub-awards at all tiers (including subcontracts, sub-grants, and contracts under grants, loans, and cooperative agreements) and that all sub- recipients shall certify and disclose accordingly.

This certification is a material representation of fact upon which reliance was placed when this transaction was made or entered into. Submission of this certification is a prerequisite for making or entering into this transaction imposed by section 1352, title 31, United States Code. Any person who fails to file the required certification shall be subject to a civil penalty of not less than $10,000 and not more than $100,000 for each such failure.

_____
Contractor

_____
Address

_____
Certified by: (type or print)

_____
Title

_____
Signature

_____
Date

Disclosure of Lobbying Activities

Approved by OMB
0348-004

Complete this form to disclose lobbying activities pursuant to 31 U.S.C. 1352
(See following page for public burden disclosure)

1. Type of Federal Action: ☐ contract ☐ grant ☐ cooperative agreement loan ☐ loan guarantee ☐ loan insurance	**2. Status of Federal Action:** ☐ proposal/offer/application ☐ initial award ☐ post-award	**3. Report Type:** ☐ initial filing ☐ material change For material change only: **Year_____quarter ____** **Date of last report_____**

4. Name and Address of Reporting Entity: **_____Prime _____Subawardee** **Tier_____, if Known:** **Congressional District**, *if known*:	**5. If Reporting Entity in No. 4 is Subawardee,** Enter Name and Address of Prime: **Congressional District**, if known:
6. Federal Department/Agency:	**7. Federal Program Name/Description:** CFDA Number, *if applicable*: _____
8. Federal Action Number, *if known:*	**9. Award Amount,** *if known:* $
10a. Name and Address of Lobbying Registrant *(if individual, last name, first name, MI):*	**10b. Individuals Performing** Services *(including address if different from No. 10a)* *(last name, first name, MI):*
11. Information requested through this form is authorized by title 31 U.S.C. section 1352. This disclosure of lobbying activities is a material representation of fact upon which reliance was placed by the tier above when this transaction was made or entered into. This disclosure is required pursuant to 31 U.S.C. 1352. This information will be reported to the Congress semi-annually and will be available for public inspection. Any person who fails to file the required disclosure shall be subject to a civil penalty of not less than $10,000 and not more than $100,000 for each such failure.	**Signature: _____** **Print Name: _____** **Title: _____** **Telephone No.: _____ Date: ___**
Federal Use Only	**Authorized for Local Reproduction** **Standard Form - LLL (Rev. 7-97)**

INSTRUCTIONS FOR COMPLETION OF SF-LLL, DISCLOSURE OF LOBBYING ACTIVITIES

This disclosure form shall be completed by the reporting entity, whether subawardee or prime Federal recipient, at the initiation or receipt of a covered Federal action, or a material change to a previous filing, pursuant to Title 31, U.S.C. section 1352. The filing of a form is required for each payment or agreement to make payment to any lobbying entity for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with a covered Federal action. Complete all items that apply for both the initial filing and material change report. Refer to the implementing guidance published by the Office of Management and Budget for additional information.

1. Identify the type of covered Federal action for which lobbying activity is and/or has been secured to influence the outcome of a covered Federal action.

2. Identify the status of the covered Federal action.

3. Identify the appropriate classification of this report. If this is a follow up report caused by a material change to the information previously reported, enter the year and quarter in which the change occurred. Enter the date of the last previously submitted report by this reporting entity for this covered Federal action.

4. Enter the full name, address, city, State and zip code of the reporting entity. Include Congressional District, if known. Check the appropriate classification of the reporting entity that designates if it is, or expects to be, a prime or subaward recipient. Identify the tier of the subawardee, e.g., the first subawardee of the prime is the 1st tier. Subawards include but are not limited to subcontracts, subgrants and contract awards under grants.

5. If the organization filing the report in item 4 checks "Subawardee," then enter the full name, address, city, State and zip code of the prime Federal recipient. Include Congressional District, if known.

6. Enter the name of the federal agency making the award or loan commitment. Include at least one organizational level below agency name, if known. For example, Department of Transportation, United States Coast Guard.

7. Enter the Federal program name or description for the covered Federal action (item 1). If known, enter the full Catalog of Federal Domestic Assistance (CFDA) number for grants, cooperative agreements, loans, and loan commitments.

8. Enter the most appropriate Federal identifying number available for the Federal action identified in item 1 (e.g., Request for Proposal (RFP) number; Invitations for Bid (IFB) number; grant announcement number; the contract, grant, or loan award number; the application/proposal control number assigned by the Federal agency). Included prefixes, e.g., "RFP-DE-90-001."

9. For a covered Federal action where there has been an award or loan commitment by the Federal agency, enter the Federal amount of the award/loan commitment for the prime entity identified in item 4 or 5.

10. (a) Enter the full name, address, city, State and zip code of the lobbying registrant under the Lobbying Disclosure Act of 1995 engaged by the reporting entity identified in item 4 to influence the covered Federal action.

(b) Enter the full names of the individual(s) performing services, and include full address if different from 10(a). Enter Last Name, First Name, and Middle Initial (MI).

11. The certifying official shall sign and date the form, print his/her name, title, and telephone number.

According to the Paperwork Reduction Act, as amended, no persons are required to respond to a collection of information unless it displays a valid OMB control Number. The valid OMB control number for this information collection is OMB No. 0348-0046. Public reporting burden for this collection of information is estimated to average 10 minutes per response, including time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding the burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to the Office of Management and Budget, Paperwork Reduction Project (0348-0046), Washington, DC 20503.

END OF DOCUMENT

DOCUMENT 00 45 49

REGISTERED SUBCONTRACTORS LIST
(Labor Code Section 1771.1)

PROJECT: Terra Linda High School Ceramics Studio Kiln Room

Date Submitted (for Updates): _____

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: _____

DIR Registration #: _____

Portion of Work: _____

Subcontractor Name: _____

DIR Registration #: _____

Portion of Work: _____

Subcontractor Name: _____

DIR Registration #: _____

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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: _____

Date: _____

Name of Contractor: _____

Signature: _____

Print Name: _____

Title: _____

END OF DOCUMENT

DOCUMENT 00 45 90

POST BID INTERVIEW

PART 1 – GENERAL

1.01 SUMMARY

If requested by the District, this Section requires the apparent low bidder to attend and participate in a Post Bid Interview with the Construction Manager, prior to award of any contract by the District. The Post Bid Interview will be scheduled by the Construction Manager within three (3) calendar days after the date of bid.

1.02 REQUIRED ATTENDANCE

A. A duly authorized representative of the apparent low bidder is required to attend the Post Bid Interview, in person.

B. The apparent low bidder's authorized representative(s) must have (1) knowledge of how the bid submitted was prepared, (2) the person responsible for supervising performance of the Work, and (3) the authority to bind the apparent low bidder.

C. Failure to attend the Post Bid Interview as scheduled will be considered just cause for the District to reject the Bid as nonresponsive.

1.03 POST BID INTERVIEW PROCEDURE

A. The Construction Manager will review the Bid with the attendees.

B. The Construction Manager will review the Contract Documents with the attendees, including but not limited to:

(1) Insurance

(2) Bonding

(3) Addenda

(4) Pre-Bid Clarifications

(5) Scope of Work

(6) Bid Packages Descriptions

(7) Bid Alternates

(8) Contract Plans

(9) Contract Specifications

(10) Project Schedule and Schedule Requirements

(11) Critical Dates Requirement for Other Bid Packages

(12) Prevailing Wage Requirements

(13) Liquidated Damages

(14) Required Documentation for Contract Administration

(15) Contract Coordination Requirements

1.04 POST BID INTERVIEW DOCUMENTATION

The Construction Manager will document the Post Bid Interview on the form attached to this Section. Both the apparent low bidder and the Construction Manager are required to sign the Post Bid Interview Documentation.

[REMAINDER OF PAGE INTENTIONALLY LEFT BLANK]

POST BID INTERVIEW

CONSTRUCTION MANAGER

[Name]
[Address 1]
[Address 2]
[Phone] [Fax]

BIDDER: _____

DATE: _____ TIME: _____ PHONE: _____

I. INTRODUCTIONS:

A. Present

_____ CONTRACTOR	_____ CONTRACTOR
_____	_____
_____ [CM]	_____ [CM]

II. PROPOSED CONTRACT:

III. PURPOSE OF INTERVIEW IS TO ASSURE A MUTUAL UNDERSTANDING OF THE FOLLOWING:

A. Do you acknowledge submission of a complete and accurate bid? Yes No

B. Do you acknowledge the Bid Document submittal timelines after NOA and NTP and can you meet those timelines? Yes No

C. Do you acknowledge the requirements for the escrow of bid documents? Yes No

D. Are you comfortable with your listed subcontractors? Yes No

IV. CONTRACTUAL REQUIREMENTS:

A. Do you understand you are a prime contractor? Yes No

B. Can you meet specified insurance requirements? Yes No

1. Do any of your policies that require Additional Insured endorsements exceed the minimum coverage requirements? Yes No

2. Are you requesting that the District accept an Excess Liability Insurance Policy to meet the policy limit? Yes No

3. Will there be a gap between the per occurrence amount of any underlying policy and the start of the coverage under the Umbrella or Excess Liability Insurance Policy? Yes No

C. Will you provide the Performance Bond and Labor and Material Bond for 100% of the Contract Price as stipulated? Yes No

1. Cost for bonds: _____% Yes No

2. Is the cost of your bonds in your base bid? Yes No

3. Is your surety licensed to issue bonds in California? Yes No

D. Do you understand the fingerprinting requirements? Yes No

E. Is it understood that all workers must be paid prevailing wage? Yes No

F. Is it understood that all subcontractors of every tier must be registered as a public works contractor with the Department of Industrial Relations? Yes No

V. SCOPE OF WORK:

A. Acknowledged Receipt of Addenda #1-__ Yes No

B. Are the costs for addenda items included in your bid? (if applicable) Yes No

C. Do you have a complete understanding of your Scope of Work under the proposed Agreement? Yes No

D. You have re-reviewed the documents and understand the Scope of the Work. Are there any items that require clarification? Yes No

If yes, please identify them.

1. _____

_____

2. _____

_____

3. _____

_____

Is (are) there additional cost(s) for the above item(s)? Yes No

E. Is the cost for allowance included in your bid? Yes No

F. Have you reviewed bid alternative(s) #1-___? (if applicable) Yes No

G. Are the costs for bid alternatives included in your bid? Yes No

H. Are the plans and specifications clear and understandable to your satisfaction? Yes No

I. Do you acknowledge that the time to submit notice of requests for substitution of specified materials has expired? Yes No

VI. SCHEDULE:

A. Do you acknowledge and agree to the stipulated completion dates and milestones in the contract? Yes No

1. Will you provide a detailed construction schedule to _____ within the required ten (10) days of the Notice to Proceed, per the contract? Yes No

2. Can you meet the submittal deadline? Yes No

3. It is understood that the Project schedule is critical and that that weekend and overtime work may be required to meet the milestones. Yes No

4. It is understood that if rain does occur, then all dewatering and protection of work is required, per the contract. Yes No
If not, what do you believe must change and why? _____

_____

_____

B. Identify critical materials, deliveries, long lead items and other dependencies, including Owner Furnished items that could affect the completion of your work. Yes No

1. _____
2. _____
3. _____
4. _____
5. _____

C. Do you understand that there is going to be maintenance and other construction taking place on site during the course of the project? Yes No

VII. EXECUTION OF WORK

A. Do you understand the access to the site? Yes No

B. Do you understand the staging area restrictions? Yes No

C. Have you included protection of [asphalt, floors, and roofs]? Yes No

D. Do you understand that the site is occupied by students, teachers, administrators, parents, etc.? Yes No

VIII. CONTRACTOR COMMENTS/SUGGESTIONS:

1. _____
2. _____
3. _____
4. _____
5. _____

IX. CONTRACTOR

You agree the information contained herein is part of your contractual obligations. Your signature acknowledges your agreement to perform all Work in the Contract Documents, and that costs for all Work are included in your bid.

The foregoing information is true and accurate, and I am authorized to sign as an officer of the company I am representing.

[Company Name]

_____

Signature _____ Title: _____

Date: _____

X. CONSTRUCTION MANAGER

Signature _____ Title: _____

Date: _____

Title of Document: POST BID INTERVIEW
Number of Pages: _____
Date of Document: _____

END OF DOCUMENT

DOCUMENT 00 51 00

NOTICE OF AWARD

Dated: _____ 20__

To: _____ (Contractor)

_____
(Address)

From: Governing Board ("Board") of the San Rafael City Schools ("District")

Re: _____, Project No. _____ ("Project").

Contractor has been awarded the Contract for the above-referenced Project on _____ _____, 20__, by action of the District's Board.

The Contract Price is _____ Dollars ($_____), and includes alternates _____.

Three (3) copies of each of the Contract Documents (except Drawings) accompany this Notice of Award. Three (3) sets of the Drawings will be delivered separately or otherwise made available. Additional copies are available at cost of reproduction.

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 three (3) copies, each bearing an original signature.

b. Escrow of Bid Documentation: This must include all required documentation. See the document titled Escrow Bid Documentation for more information.

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

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

e. Insurance Certificates and Endorsements as required.

f. Workers' Compensation Certification.

g. Prevailing Wage and Related Labor Requirements Certification.

h. Disabled Veteran Business Enterprise Participation Certification.

i. Drug-Free Workplace Certification.

j. Tobacco-Free Environment Certification.

k. Hazardous Materials Certification.

l. Lead-Based Materials Certification.

m. Imported Materials Certification.

n. Criminal Background Investigation/Fingerprinting Certification.

o. Buy American Certification.

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

q. COVID-19 Vaccination/Testing Certification

Failure to comply with these conditions within the time specified will entitle District 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 District may have against the Contractor.

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

SAN RAFAEL CITY SCHOOLS

BY: _____

NAME: _____

TITLE: _____

END OF DOCUMENT

DOCUMENT 00 52 13

AGREEMENT

THIS AGREEMENT IS MADE AND ENTERED INTO THIS _____ DAY OF _____ _____, 20___, by and between the San Rafael City Schools ("District") 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:

Terra Linda High School Ceramics Studio Kiln Room

("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 District 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 District 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 District 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 the case of a 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 District with the functionally complete and operable Project described in the Drawings and Specifications. In no case shall a document calling for lower quality and/or quantity material or workmanship control. The decision of the District in the matter shall be final.

4. **Time for Completion**: It is hereby understood and agreed that the Work under this Contract shall be completed within _____ (____)

consecutive calendar days ("Contract Time") from the date specified in the District's Notice to Proceed.

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 District for all loss and damage that the District may suffer on account thereof. The Contractor shall coordinate its Work with the Work of all other contractors. The District 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 District will sustain in the event of and by reason of Contractor's delay; therefore, Contractor agrees that it shall pay to the District the sum of _____ dollars ($_____) per day as liquidated damages for each and every day's delay beyond the time herein prescribed in completion of 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 District, the District 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 District'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 District 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 District 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 District and its agents and authorized representatives harmless from all liability of every kind and nature arising from accident, negligence, or any cause whatsoever.

8. **Limitation Of District Liability:** District's financial obligations under this Contract shall be limited to the payment of the compensation provided in this Contract. Notwithstanding any other provision of this Contract, in no event shall District be liable, regardless of whether any claim is based on contract or tort, for any special, consequential, indirect or incidental damages, including, but not limited to, lost profits or revenue, lost bonding capacity, arising out of or in connection with this Contract for the services performed in connection with this Contract.

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

10. **Prosecution of Work**: If the Contractor should neglect to prosecute the Work properly or fail to perform any provisions of this Contract, the District, 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.

11. **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.

12. **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 District, 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.

13. **Classification of Contractor's License**: Contractor hereby acknowledges that it currently holds valid Type _____ 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.

14. **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.

15. **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 District, 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.

16. **Labor Compliance Monitoring and Enforcement**: 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 District may not issue payment.

17. **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 District 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:

_____ Dollars

($_____),

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 District and subject to additions and deductions as provided in the Contract. This amount supersedes any previously stated and/or agreed to amount(s).

18. **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.

19. **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.

20. **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.

21. **Authority of Signatories**: Each party has the full power and authority to enter into and perform this Contract, and the person signing this Contract on behalf of each party has been properly authorized and empowered to enter into this Contract. This Contract may be executed in one or more counterparts, each of which shall be deemed an original. For this Agreement, and for all Contract Documents requiring a signature, a facsimile or electronic signature shall be deemed to be the equivalent of the actual original signature. All counterparts so executed shall constitute one Contract binding all the Parties hereto.

[SIGNATURES ON FOLLOWING PAGE]

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

[CONTRACTOR NAME]	**SAN RAFAEL CITY SCHOOLS**
_____	_____
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: _____, 20___

TO: _____
("Contractor")

ADDRESS: _____

PROJECT:_____

PROJECT/CONTRACT NO.: _____ between the San Rafael City Schools and Contractor ("Contract").

You are notified that the Contract Time under the above Contract will commence to run on _____, 20___. By that date, you are to start performing your obligations under the Contract Documents. In accordance with the Agreement executed by Contractor, the date of completion is _____, 20___.

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. Registered Subcontractors List: A complete subcontractors list for all tiers, 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.

SAN RAFAEL CITY SCHOOLS

BY: _____

NAME: _____

TITLE: _____

END OF DOCUMENT

DOCUMENT 00 56 00

ESCROW BID DOCUMENTATION

1. Requirement to Escrow Bid Documentation

a. Contractor shall submit, within **SEVEN (7)** calendar days after the date of the Notice of Award, one copy of all documentary information received or generated by Contractor in preparation of bid prices for this Contract, as specified herein. This material is referred to herein as "Escrow Bid Documentation." The Escrow Bid Documentation of the Contractor will be held in escrow for the duration of the Contract.

b. Contractor agrees, as a condition of award of the Contract, that the Escrow Bid Documentation constitutes all written information used in the preparation of its bid, and that no other written bid preparation information shall be considered in resolving disputes or claims. Contractor also agrees that nothing in the Escrow Bid Documentation shall change or modify the terms or conditions of the Contract Documents.

c. The Escrow Bid Documentation will not be opened by District except as indicated herein. The Escrow Bid Documentation will be used only for the resolution of change orders and claims disputes.

d. Contractor's submission of the Escrow Bid Documentation, as with the bonds and insurance documents required, is considered an essential part of the Contract award. Should the Contractor fail to make the submission within the allowed time specified above, District may deem the Contractor to have failed to enter into the Contract, and the Contractor shall forfeit the amount of its bid security, accompanying the Contractor's bid, and District may award the Contract to the next lowest responsive responsible bidder.

e. NO PAYMENTS WILL BE MADE, NOR WILL DISTRICT ACCEPT PROPOSED CHANGE ORDERS UNTIL THE ABOVE REQUIRED INFORMATION IS SUBMITTED AND APPROVED.

f. The Escrow Bid Documentation shall be submitted in person by an authorized representative of the Contractor to the District.

2. Ownership of Escrow Bid Documentation

a. The Escrow Bid Documentation is, and shall always remain, the property of Contractor, subject to review by District, as provided herein.

b. Escrow Bid Documentation constitute trade secrets, not known outside Contractor's business, known only to a limited extent and only by a limited number of employees of Contractor, safeguarded while in Contractor's possession, extremely valuable to Contractor, and could be extremely

valuable to Contractor's competitors by virtue of reflecting Contractor's contemplated techniques of construction. Subject to the provisions herein, District agrees to safeguard the Escrow Bid Documentation, and all information contained therein, against disclosure to the fullest extent permitted by law.

3. Format and Contents of Escrow Bid Documentation

a. Contractor may submit Escrow Bid Documentation in its usual cost-estimating format; a standard format is not required. The Escrow Bid Documentation shall be submitted in the language (e.g., English) of the specification.

b. Escrow Bid Documentation must clearly itemize the estimated costs of performing the work of each bid item contained in the bid schedule, separating bid items into sub-items as required to present a detailed cost estimate and allow a detailed cost review. The Escrow Bid Documentation shall include all subcontractor bids or quotes, supplier bids or quotes, quantity takeoffs, crews, equipment, calculations of rates of production and progress, copies of quotes from subcontractors and suppliers, and memoranda, narratives, add/deduct sheets, and all other information used by the Contractor to arrive at the prices contained in the bid proposal. Estimated costs should be broken down into Contractor's usual estimate categories such as direct labor, repair labor, equipment ownership and operation, expendable materials, permanent materials, and subcontract costs as appropriate. All labor rates must be broken down to specify any and all burden costs including, but not limited to, health and welfare pay, vacation and holiday pay, pension contributions, training rates, benefits of any kind, insurance of any kind, workers' compensation, liability insurance, truck expenses, supply expenses of any kind, payroll taxes, and any other taxes of any kind. Plant and equipment and indirect costs should be detailed in the Contractor's usual format. The Contractor's allocation of indirect costs, contingencies, markup, and other items to each bid item shall be identified.

c. All costs shall be identified. For bid items amounting to less than $10,000, estimated unit costs are acceptable without a detailed cost estimate, provided that labor, equipment, materials, and subcontracts, as applicable, are included and provided that indirect costs, contingencies, and markup, as applicable, are allocated.

d. Bid Documentation provided by District should not be included in the Escrow Bid Documentation unless needed to comply with the following requirements.

4. Submittal of Escrow Bid Documentation

a. The Escrow Bid Documentation shall be submitted by the Contractor in a sealed container within **SEVEN (7)** calendar days after the date of the Notice of Award. The container shall be clearly marked on the outside with the Contractor's name, date of submittal, project name and the words "Escrow

Bid Documentation – Intended to be opened in the presence of Authorized Representatives of Both District and Contractor".

b. By submitting Escrow Bid Documentation, Contractor represents that the material in the Escrow Bid Documentation constitutes all the documentary information used in preparation of the bid and that the Contractor has personally examined the contents of the Escrow Bid Documentation container and has found that the documents in the container are complete.

c. If Contractor's proposal is based upon subcontracting any part of the work, each subcontractor whose total subcontract price exceeds 5 percent of the total contract price proposed by Contractor, shall provide separate Escrow Documents to be included with those of Contractor. Those documents shall be opened and examined in the same manner and at the same time as the examination described above for Contractor.

d. If Contractor wishes to subcontract any portion of the Work after award, District retains the right to require Contractor to submit Escrow Documents for the Subcontractor before the subcontract is approved.

5. Storage, Examination and Final Disposition of Escrow Bid Documentation

a. The Escrow Bid Documentation will be placed in escrow, for the life of the Contract, in a mutually agreeable institution. The cost of storage will be paid by Contractor for the duration of the project until final Contract payment. The storage facilities shall be the appropriate size for all the Escrow Bid Documentation and located conveniently to both District's and Contractor's offices.

b. The Escrow Bid Documentation shall be examined by both District and Contractor, at any time deemed necessary by either District or Contractor, to assist in the negotiation of price adjustments and change orders or the settlement of disputes and claims. In the case of legal proceedings, Escrow Bid Documentation shall be used subject to the terms of an appropriate protective order if requested by Contractor and ordered by a court of competent jurisdiction. Examination of the Escrow Bid Documentation is subject to the following conditions:

(1) As trade secrets, the Escrow Bid Documentation is proprietary and confidential to the extent allowed by law.

(2) District and Contractor shall each designate, in writing to the other party **SEVEN (7)** calendar days prior to any examination, the names of representatives who are authorized to examine the Escrow Bid Documentation. No other person shall have access to the Escrow Bid Documentation.

(3) Access to the documents may take place only in the presence of duly designated representatives of the District and Contractor. If

Contractor fails to designate a representative or appear for joint examination on **SEVEN (7)** calendar days' notice, then the District representative may examine the Escrow Bid Documents alone upon an additional **THREE (3)** calendar days' notice if a representative of the Contractor does not appear at the time set.

(4) If a subcontractor has submitted sealed information to be included in the Escrow Bid Documents, access to those documents may take place only in the presence of a duly designated representative of the District, Contractor and that subcontractor. If that subcontractor fails to designate a representative or appear for joint examination on **SEVEN (7)** calendar days' notice, then the District representative and/or the Contractor may examine the Escrow Bid Documentation without that subcontractor present upon an additional **THREE (3)** calendar days' notice if a representative of that subcontractor does not appear at the time set.

c. The Escrow Bid Documentation will be returned to Contractor at such time as the Contract has been completed and final settlement has been achieved.

END OF DOCUMENT

DOCUMENT 00 57 00

ESCROW AGREEMENT IN LIEU OF RETENTION
(Public Contact Code Section 22300)

(Note: Contractor must use this form.)

This Escrow Agreement in Lieu of Retention ("Escrow Agreement") is made and entered into this _____ day of _____, 20___, by and between the San Rafael City Schools ("District"), whose address is 310 Nova Albion Way, San Rafael, California 94903, and _____ ("Contractor"), whose address is _____ _____ , and _____ ("Escrow Agent"), a state or federally chartered bank in the state of California, whose address is _____.

For the consideration hereinafter set forth, District, Contractor, and Escrow Agent agree as follows:

1. Pursuant to section 22300 of Public Contract Code of the State of California, which is hereby incorporated by reference, Contractor has the following two (2) options:

   ☐ Deposit securities with Escrow Agent as a substitute for retention earnings required to be withheld by District pursuant to the Construction Contract No.___ entered into between District and Contractor for the _____ _____ Project, in the amount of _____ Dollars ($_____) dated, _____, 20_____, (the "Contract"); **or**

   ☐ On written request of Contractor, District shall make payments of the retention earnings for the above referenced Contract directly to Escrow Agent.

   When Contractor deposits the securities as a substitute for Contract earnings (first option), Escrow Agent shall notify District within ten (10) calendar days of the deposit. The market value of the securities at the time of substitution and at all times from substitution until the termination of the Escrow Agreement shall be at least equal to the cash amount then required to be withheld as retention under the terms of the Contract between District and Contractor.

   Securities shall be held in the name of San Rafael City Schools, and shall designate Contractor as beneficial owner.

2. District shall make progress payments to Contractor for those funds which otherwise would be withheld from progress payments pursuant to Contract provisions, provided that Escrow Agent holds securities in form and amount specified above.

3. When District makes payment of retentions earned directly to Escrow Agent, Escrow Agent shall hold them for the benefit of Contractor until the time that the escrow created under this Escrow Agreement is terminated. Contractor may direct the investment of the payments into securities. All terms and conditions of this Escrow Agreement and the rights and responsibilities of the Parties shall be equally applicable and binding when District pays Escrow Agent directly.

4. Contractor shall be responsible for paying all fees for the expenses incurred by Escrow Agent in administering the Escrow Account, and all expenses of District. The District will charge Contractor $_____ for each of District's deposits to the escrow account. These expenses and payment terms shall be determined by District, Contractor, and Escrow Agent.

5. Interest earned on securities or money market accounts held in escrow and all interest earned on that interest shall be for sole account of Contractor and shall be subject to withdrawal by Contractor at any time and from time to time without notice to District.

6. Contractor shall have the right to withdraw all or any part of the principal in the Escrow Account only by written notice to Escrow Agent accompanied by written authorization from District to Escrow Agent that District consents to withdrawal of amount sought to be withdrawn by Contractor.

7. District shall have the right to draw upon the securities and/or withdraw amounts from the Escrow Account in the event of default by Contractor. Upon seven (7) days' written notice to Escrow Agent from District of the default, if applicable, Escrow Agent shall immediately convert the securities to cash and shall distribute the cash as instructed by District. Escrow Agent shall not be authorized to determine the validity of any notice of default given by District pursuant to this paragraph, and shall promptly comply with District's instructions to pay over said escrowed assets. Escrow Agent further agrees to not interplead the escrowed assets in response to a conflicting demand.

8. Upon receipt of written notification from District certifying that the Contract is final and complete, and that Contractor has complied with all requirements and procedures applicable to the Contract, Escrow Agent shall release to Contractor all securities and interest on deposit less escrow fees and charges of the Escrow Account. The escrow shall be closed immediately upon disbursement of all monies and securities on deposit and payments of fees and charges.

9. Escrow Agent shall rely on written notifications from District and Contractor pursuant to Paragraphs 5 through 8, inclusive, of this Escrow Agreement and District and Contractor shall hold Escrow Agent harmless from Escrow Agent's release and disbursement of securities and interest as set forth above.

[REMAINDER OF PAGE INTENTIONALLY LEFT BLANK]

10. Names of persons who are authorized to give written notice or to receive written notice on behalf of District and on behalf of Contractor in connection with the foregoing, and exemplars of their respective signatures are as follows:

On behalf of District:	On behalf of Contractor:
_____	_____
Title	Title
_____	_____
Name	Name
_____	_____
Signature	Signature
_____	_____
Address	Address

On behalf of Escrow Agent:

_____
Title

_____
Name

_____
Signature

_____
Address

At the time that the Escrow Account is opened, District and Contractor shall deliver to Escrow Agent a fully executed copy of this Agreement.

IN WITNESS WHEREOF, the parties have executed this Agreement by their proper officers on the date first set forth above.

On behalf of District:	On behalf of Contractor:
_____	_____
Title	Title
_____	_____
Name	Name
_____	_____
Signature	Signature
_____	_____
Address	Address

END OF DOCUMENT

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 San Rafael City Schools, ("District") 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:

Terra Linda High School Ceramics Studio Kiln Room

("Project" or "Contract") which Contract dated _____, 20___, 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 District 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 District all damages the District incurs as a result of the Principal's failure to perform all the Work required to complete the Project.

Or, at the District'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 District of the lowest responsible bidder, arrange for a contract between such bidder and the District 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 District under the Contract and any modifications thereto, less the amount previously paid by the District to the Principal, less any withholdings by the District allowed under the Contract. District 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 District, 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 District 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 District declares the Principal to be in default and notifies Surety of the District'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 District 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 District'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 District 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

TDOCUMENT 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 San Rafael City Schools, ("District") 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:

Terra Linda High School Ceramics Studio Kiln Room

("Project" or "Contract") which Contract dated _____, 20___, 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 40

ALLOWANCE EXPENDITURE DIRECTIVE FORM

San Rafael City Schools
310 Nova Albion Way
San Rafael, CA 94903

ALLOWANCE EXPENDITURE DIRECTIVE NO.:

ALLOWANCE EXPENDITURE DIRECTIVE

Project: _____ **Date:** _____
DSA File No.:_____
Bid No.: _____ **DSA Appl. No.**_____

The following parties agree to the terms of this Allowance Expenditure Directive ("AED"):

Owner Name, Address, Telephone:

_____
_____
_____

Contractor Name, Address, Telephone:

_____
_____
_____

Reference	**Description**	**Allowance Authorized for Expenditure**
Request for AED # Requested by: Performed by: Reason:	[Description of unforeseen item relating to Work] [Requester] [Performer] [Reason]	$
Request for AED # Requested by: Performed by: Reason:	[Description of unforeseen item relating to Work] [Requester] [Performer] [Reason]	$
Request for AED # Requested by: Performed by: Reason:	[Description of unforeseen item relating to Work] [Requester] [Performer] [Reason]	$

Total Contract Allowance Amount:	$
Amount of Previously Approved Allowance Expenditure Directive(s):	$
Amount of this Allowance Expenditure Directive:	$

The undersigned Contractor approves the foregoing release of allowance for completion of each specified item, 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 ("Work"). 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 Allowance Expenditure Directive must be signed by an authorized District representative.

It is expressly understood that the authorized allowance expenditure granted herein represents a full accord and satisfaction for any and all cost impacts of the items herein, and Contractor waives any and all further compensation 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. Any costs, expenses, or damages not included are deemed waived.

Signatures:

DISTRICT: SAN RAFAEL CITY SCHOOLS Date: _____ By:_____ [Print Name and Title here]	**CONTRACTOR:** _____ Date: _____ By:_____ [Print Name and Title here]
ARCHITECT: _____ Date: _____ By:_____ [Print Name and Title here]	**PROJECT INSPECTOR:** _____ Date: _____ By:_____ [Print Name and Title here]

END OF DOCUMENT

DOCUMENT 00 63 47

DAILY FORCE ACCOUNT REPORT

From: Contractor
[Name/Address]

To: Owner
[Name/Address]

Project: _____

Contractor hereby submits this Daily Force Account Report for Work performed, pursuant to Force Account Directive No. _____, on _____.
[Date of Work]

Contractor attests that the material, labor, and equipment itemized herein were used only on the force account work.

A. Material: *Attach all applicable invoices not provided in prior Daily Force Account Reports and complete the information below.*

Description	Unit Price	Quantity	Cost

Daily subtotal (w/out markup): $_____

B. Labor: *Labor must be fully Burdened. Attach timesheets, if applicable, and complete the information below.*

Name	Craft	Regular Hrs.	Rate	OT Hrs.	Rate

Daily subtotal (w/out markup): $_____

C. Equipment: *Attach all applicable invoices not provided in prior Daily Force Account Reports and complete the information below.*

Type / Model	Hrs. Operated	Rate

Daily subtotal (w/out markup): $_____

Complete based on information reported above.

	WORK PERFORMED OTHER THAN BY CONTRACTOR	ADD
(a)	**Material**	
(b)	**Add Labor**	
(c)	**Add Equipment**	
(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 two percent (2%) of Item (h)	
(j)	**TOTAL**	

	WORK PERFORMED BY CONTRACTOR	ADD
(a)	**Material**	
(b)	**Add Labor**	
(c)	**Add Equipment**	
(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 two percent (2%) of Item (f)	
(h)	**TOTAL**	

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 (Gov. Code, § 12650 et seq.).

It is expressly understood that all force account work for the date stated above must be reported herein, and Contractor may not claim any labor, equipment, material or any other costs or expenses not reported herein. Contractor is not entitled to separately recover amounts for overhead or other indirect costs. Any costs, expenses, or damages, not included are deemed waived.

SUBMITTED BY:		**REVIEWED BY:**	
Contractor:		District:	
[Name]	Date	[Name]	Date

District may require additional information from Contractor to review this Daily Force Account Report. Upon District's return of the Daily Force Account Report, Contractor may invoice the Work reflected therein. District's review and return of the Daily Force Account Report and/or payment for the force account work does not constitute acceptance of the Work or waiver of any Contract rights or criteria.

END OF DOCUMENT

DOCUMENT 00 63 57

PROPOSED CHANGE ORDER FORM

San Rafael City Schools
310 Nova Albion Way
San Rafael, CA 94903

PCO NO.:

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

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

Contractor hereby submits for District'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 District review and evaluation. Contractor further understands and acknowledges that failure to include documentation sufficient to, in District'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 Burdened, and specify the hourly rate for each additional labor burden, for example, payroll taxes, fringe benefits, etc.)		
(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 General Conditions** (if Time is Compensable) (attach supporting documentation)		
(h)	**Subtotal**		
(i)	**Add Overhead and Profit for Contractor**, not to exceed five percent (5%) of Item (h)		
(j)	**Subtotal**		
(k)	**Add Bond and Insurance**, not to exceed two percent (2%) of Item (j)		
(l)	**TOTAL**		
(m)	**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 Burdened, and specify the hourly rate for each additional labor burden, for example, payroll taxes, fringe benefits, etc.)		
(c)	**Add Equipment** (attach suppliers' invoice)		
(d)	**Add General Conditions** (if Time is Compensable) (attach supporting documentation)		
(e)	**Subtotal**		
(f)	**Add Overhead and Profit for Contractor**, not to exceed fifteen percent (15%) of Item (e)		
(g)	**Subtotal**		
(h)	**Add Bond and Insurance**, not to exceed two percent (2%) of Item (g)		
(i)	**TOTAL**		
(j)	**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 District.

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

San Rafael City Schools
310 Nova Albion Way
San Rafael, CA 94903

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 District and must be signed by the District. Until such time as this change order is approved by the District's governing board and executed by a duly authorized District 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:

District:		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 SAN RAFAEL CITY SCHOOLS ("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 Marin, 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 * * *

SAN RAFAEL CITY SCHOOLS

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 San Rafael City Schools ("District") for the following project:

PROJECT:_____

("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 _____ year(s) 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 District, but not later than seven (7) days after being notified in writing by the District, the undersigned authorizes the District 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

DOCUMENT 00 72 13 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 District to perform the Work of this Contract.

1.1.7 Burdened: The labor rate for Contractor or any Subcontractor inclusive of any and all burden costs including, but not limited to, health and welfare pay, vacation and holiday pay, pension contributions, training rates, benefits of any kind, insurance of any kind, workers' compensation, liability insurance, truck expenses, supply expenses of any kind, payroll taxes, and any other taxes of any kind.

1.1.8 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.

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

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

1.1.11 Construction Manager: The individual, partnership, corporation, joint venture, or any combination thereof, or its authorized representative, named as such by the District. 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 District.

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

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

1.1.13.1 Notice to Bidders
1.1.13.2 Instructions to Bidders
1.1.13.3 Bid Form and Proposal
1.1.13.4 Bid Bond
1.1.13.5 Designated Subcontractors List
1.1.13.6 Site Visit Certification (if a site visit was required)
1.1.13.7 Non-Collusion Declaration
1.1.13.8 Notice of Award
1.1.13.9 Notice to Proceed
1.1.13.10 Agreement
1.1.13.11 Escrow of Bid Documentation
1.1.13.12 Escrow Agreement for Security Deposits in Lieu of Retention (if applicable)
1.1.13.13 Performance Bond
1.1.13.14 Payment Bond (Contractor's Labor & Material Bond)
1.1.13.15 General Conditions
1.1.13.16 Special Conditions (if applicable)
1.1.13.17 Project Labor Agreement (if applicable)
1.1.13.18 Hazardous Materials Procedures and Requirements
1.1.13.19 Workers' Compensation Certification
1.1.13.20 Prevailing Wage Certification
1.1.13.21 Disabled Veteran Business Enterprise Participation Certification (if applicable)
1.1.13.22 Drug-Free Workplace Certification (if applicable)
1.1.13.23 Tobacco-Free Environment Certification
1.1.13.24 Hazardous Materials Certification (if applicable)
1.1.13.25 Lead-Based Materials Certification (if applicable)
1.1.13.26 Imported Materials Certification (if applicable)
1.1.13.27 Criminal Background Investigation/Fingerprinting Certification
1.1.13.28 Buy American Certification (if certain federal funds used)
1.1.13.29 Roofing Project Certification (if applicable)
1.1.13.30 Registered Subcontractors List

1.1.13.31 Iran Contracting Act Certification (if applicable)
1.1.13.32 COVID-19 Vaccination/Testing Certification
1.1.13.33 Federal Debarment Certification (if applicable)
1.1.13.34 Federal Byrd Anti-Lobbying Certification (if applicable)
1.1.13.35 Post Bid Interview
1.1.13.36 All Plans, Technical Specifications, and Drawings
1.1.13.37 Any and all addenda to any of the above documents
1.1.13.38 Any and all change orders or written modifications to the above documents if approved in writing by the District

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

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

1.1.16 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.

1.1.17 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.

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

1.1.19 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.

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

1.1.21 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 District.

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

1.1.22.1 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 District; and/or

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

1.1.23 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.

1.1.24 DSA: Division of the State Architect.

1.1.25 Force Account Directive: A process that may be used when the District 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.

1.1.26 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.

1.1.27 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.

1.1.28 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.

1.1.29 Plans: See **Drawings**.

1.1.30 Premises: The real property owned by the District on which the Site is located.

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

1.1.32 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.

1.1.33 Program Manager: The individual, partnership, corporation, joint venture, or any combination thereof, or its authorized representative, named as such by the District. 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 District.

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

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

1.1.36 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.

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

1.1.38 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.

1.1.39 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.

1.1.40 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**.

1.1.41 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.

1.1.42 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.

1.1.43 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").

1.1.44 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.

1.1.45 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.

1.1.46 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.

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

1.1.48 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.

1.1.49 State: The State of California.

1.1.50 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.

1.1.51 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.

1.1.52 Submittal Schedule: The schedule of submittals as provided by Contractor and approved by District.

1.1.53 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.

1.1.54 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 District, or the property, funds, operations, or powers of District, 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 District, 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 Work or money to become due hereunder without the prior written consent of the

District. Assignment without District'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 District 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 District.

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 District 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 District, Architect, or Construction Manager shall constitute a waiver of any right or duty afforded the District 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 District.

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 District and after relevant submittals have been reviewed, 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 five (5) days' demand from District, present documentary evidence showing that orders have been placed.

1.8.6 District 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 District may deem advisable in order that the Work may be completed at the date specified in the Contract, 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 District, 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 District 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 District 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 District 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 District within ten (10) calendar days after demand by the District, satisfactory evidence that a lien or a claim based on a stop payment notice has been so released, discharged, or secured, the District 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 District 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 District (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 District. 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 District, 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 District. Contractor shall keep an accurate inventory of all materials and/or equipment in a manner satisfactory to District or its authorized representative and shall, at the District's request, forward it to the District.

1.8.10 [RESERVED]

2. [RESERVED]

3. ARCHITECT

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

3.2 Architect shall, with the District and on behalf of the District, determine the amount, quality, acceptability, and fitness of all parts of the Work, and interpret the

Specifications, Drawings, and shall, with the District, 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 District 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 District's behalf. After execution of the Contract and Notice to Proceed, all correspondence and/or instructions from Contractor and/or District 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 District, 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 District does not use a Construction Manager on this Project, all references within the Contract Documents to Construction Manager or CM shall be read as District.

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 District, 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 District. 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 District 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 District's representative and not by the Contractor. The Contractor shall notify the District's representative a sufficient time in advance of its readiness for required observation or inspection.

5.2.3 The Contractor shall notify the District'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 District 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 District will select the testing laboratory and pay for the cost of all tests and inspections, excepting those inspections performed at Contractor's request and expense. Contractor shall reimburse the District 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 District's discretion, District 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 District or the District 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 District, or any of the District'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 District employees. District 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 Contractor and all Subcontractors shall not be presently debarred, suspended, proposed for disbarment, declared ineligible or excluded pursuant to either Labor Code section 1777.1 or Labor Code section 1777.7.

6.1.5 [RESERVED]

6.1.6 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 Contract and that no person having any such interest shall be employed by Contractor.

6.1.7 [RESERVED]

6.1.8 If Contractor intends to make any change in the name or legal nature of the Contractor's entity, Contractor must first notify the District in writing prior to

making any contemplated change. The District shall determine in writing if Contractor's intended change is permissible while performing this Contract.

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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 District 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 District 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 District. If the Contractor's project manager and/or construction superintendent proves to be unsatisfactory to Contractor, or to District, any of the District's employees, agents, the Construction Manager, or the Architect, the unsatisfactory project manager and/or construction superintendent shall be replaced. However, Contractor shall notify District 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 District. 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 District, Construction Manager, and Architect any error, inconsistency, or omission that Contractor or its employees and Subcontractors may discover, in writing, with a copy to District'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. District 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 District 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 District.

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 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 District pupils until such time as Contractor has verified in writing to the governing board of the District, (A) that such employee has not been convicted of a violent or serious felony, as defined in Education Code section 45122.1 and/or (B) that the prohibition does not apply to an employee as provided by Education Code section 45125.1(e)(2) or (3). Contractor shall fully complete and perform all tasks required pursuant to the Criminal Background Investigation/ Fingerprinting Certification.

6.5 Field Office

6.5.1 Contractor shall provide a temporary office on the Site for the District'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 District to assure that there will be no delays.

6.7 Documents on Work

6.7.1 Contractor shall at all times keep on the Site, or at another location as the District 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 District, 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 District or the Construction Manager.

6.8 Preservation of Records

Contractor shall maintain, and District 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 District 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 District. These documents may be duplicative and/or be in addition to any Bid Documents held in escrow by the District. 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 District 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 District 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 of a design professional to detect errors, omissions or inconsistencies in the Contract Documents or to ascertain compliance with applicable laws, building codes or regulations. However, nothing in this provision shall abrogate Contractor's responsibilities for discovering and reporting any error, inconsistency, or omission pursuant to the Contract within the Contractor's standard of care including, without limitation, any applicable laws, ordinance, rules, or regulations. Following receipt of written notice from Contractor, the District 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. Schedule delays resulting from unauthorized work shall be Contractor's responsibility.

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 District.

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

6.11.1 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 District before demand is made for final payment.

6.11.2 General Permit For Storm Water Discharges Associated With Construction and Land Disturbance Activities.

6.11.2.1 Contractor acknowledges that all California school districts 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 pursuant to the Clean Water Act and Porter Cologne Water Quality Act. District has determined that the construction of this Project requires enrollment in the Construction Storm Water Permit. District has filed certain submittals referred to as Permit Registration Documents ("PRDS") with the Regional Water Control Board ("Storm Water Pollution Prevention Plan" or "SWPPP").

6.11.2.2 Contractor shall comply with any District SWPPP that is approved by the District and applicable to the Project, at no additional cost to the District. Contractor shall pay any fees and any penalties that may imposed by a regulatory agency for its non-compliance with the SWPPP during the course of Work.

6.11.2.3 Contractor shall provide a Qualified Storm Water Practitioner ("QSP") at no additional cost to the District, who shall be onsite and implement and monitor any and all SWPPP requirements applicable to the Project, including but not limited to:

6.11.2.3.1 All required visual observations, sampling, analysis, reporting and record keeping, including any Numeric Action Levels ("NALs"), if applicable;

6.11.2.3.2 Rain Event Action Plan ("REAP") at least forty eight (48) hours prior to any forecasted rain event requiring implementation of the REAP, including any erosion and sediment control measures needed to protect all exposed portions of the site, if applicable;

6.11.2.3.3 Active Treatment System ("ATS"), if applicable; and

6.11.2.3.4 Best management practices ("BMPs").

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 District, 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 District, Architect and Construction Manager against any loss or damage unless the Contractor promptly informs the District of its information.

6.12.2 The review by the District 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 District in writing and any changes deemed necessary by District 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.

6.13.5 [RESERVED]

6.14 Safety/Protection of Persons and Property

6.14.1 The Contractor will be solely and completely responsible for conditions of the 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 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 District 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 District. 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 District 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 District storm water requirements that are approved by the District and applicable to the Project, at no additional cost to the District.

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 District reserves the right to designate certain items of value that shall be turned over to the District unless otherwise directed by District.

6.14.14 All connections to public utilities and/or existing on-site services, including, without limitation, internet, phone and data connections, shall be made and maintained in such a manner as to not interfere with the continuing use of same by the District 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 District 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 District 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 and/or logos, or behavior will be permitted. District may require Contractor to temporarily or 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 District.

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 District prior to the commencement of any Work on or about the adjacent property. The Contractor shall also indemnify the District 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 District. Contractor shall give the District 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 District'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 District 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 District. 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, District 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 District as it deems necessary for continued operations. Contractor shall comply with all related provisions of the Specifications.

6.16.3 If the Construction Manager, Architect, or District observes the accumulation of trash and debris, the District 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 District, the District may, at its sole discretion, 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.

6.17 No Relief from Obligations Based on Review by Other Persons

6.17.1 Contractor shall not be relieved of obligations to perform the Work in accordance with the Contract Documents by act or omission of the District, Architect, Construction Manager, Project Inspector, or DSA or other entities having jurisdiction including, but not limited to, administration of the Contract, review of submittals, or by tests, observation, inspection, or permit/interconnection approvals.

7. SUBCONTRACTORS

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

7.2 No contractual relationship exists between the District 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 District 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 District'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 District 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 District 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 District or any other contractor, the Contractor shall inspect and, before proceeding with its Work, promptly report to the District in writing any defects in District'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 District for District'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 District'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 District'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 District 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 District's or any other contracts that have been or may be awarded by District 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 operation(s) of the Premises and/or to District or any other contractor working on the Project. If simultaneous execution of any contract or Premises 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 District 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 District 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 District with the functionally complete and operable Project described in the Drawings and Specifications. In case of ambiguity, conflict, or lack of information, District 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 District, are the property of District. 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 District on request at completion of Work, or may be used by District as it may require without any additional costs to District. 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. District 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 District for review, in a form supported by sufficient data to substantiate its accuracy as the District 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 District, 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 District.

10.1.1.1.1 The District is not required to approve a preliminary schedule of construction with early completion, i.e., one that shows early completion dates for the Work and/or milestones. Contractor shall not be entitled to extra compensation if the District approves a Construction Schedule with an early completion date and Contractor completes the Project beyond the date shown in the schedule but within the Contract Time. A Construction Schedule showing the Work completed in less than the Contract Time, the time between the early completion date and the end of the Contract Time shall be Float.

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

10.1.1.2.4 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.

10.1.1.2.5 Contractor shall certify that the preliminary schedule of values as submitted to the District is accurate and reflects the costs as developed in preparing Contractor's bid. For example, without limiting the foregoing, Contractor shall not "front-load" the preliminary schedule of values with dollar amounts greater than the value of activities performed early in the Project.

10.1.1.2.6 The preliminary schedule of values shall be subject to the District's review and approval of the form and content thereof. In the event that the District objects to any portion of the preliminary schedule of values, the District shall notify the Contractor, in writing, of the District's objection(s) to the preliminary schedule of values. Within five (5) calendar days of the date of the District's written objection(s), Contractor shall submit a revised preliminary schedule of values to the District for review and approval. The foregoing procedure for the preparation, review and approval of the preliminary schedule of values shall continue until the District 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 District, 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 District, which may be granted or withheld in the sole discretion of the District.

10.1.1.3 Preliminary Schedule of Submittals. A preliminary schedule of submittals, including Shop Drawings, Product Data, and Samples submittals. Once approved by District, this shall become the Submittal Schedule. All submittals shall be forwarded to the District 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 District so as not to delay the Construction Schedule. Upon request by the District, Contractor shall provide an electronic copy of all submittals to the

District. 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 District.

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

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

10.1.5 All schedules must be approved by the District 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 District. 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 District and shall be in a format acceptable to the District 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 District 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 District.

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

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

10.2.6 All schedules must be approved by the District 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 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 District.

10.4 Submittals

10.4.1 Architect's favorable review shall neither be construed as a complete check nor relieve the Contractor, Subcontractor, manufacturer, fabricator, or supplier from responsibility for any deficiency that may exist or from any departures or deviations from the requirements of the Contract Documents unless the Contractor has, in writing, called Architect's attention to the deviations at the time of submission and the Architect has given specific written response. "Favorable review" shall mean merely that Architect has no objection to Contractor using, upon Contractor's own full responsibility, plan or method of Work proposed, or furnishing materials or equipment proposed.

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 District'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 District 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 District'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. Although any such report is not a part of this Contract, recommendations from the report may be included in the Drawings, Specifications, or other Contract Documents. It is Contractor's sole responsibility to thoroughly review all Contract Documents, Drawings, and Specifications.

11.2.2 Contractor agrees that no claim against District 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

District 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 District'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 District 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. District 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 District. Contractor shall replace any benchmarks or monuments that are lost or destroyed subsequent to proper notification of District and with District'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 District, 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 District 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, District 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 District 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 District 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. District 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 District 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 District in Contract Plans and Specifications, Contractor shall immediately notify the District and the utility in writing. The cost of repair for damage to above-mentioned visible facilities without prior written notification to the District shall be borne by the Contractor.

11.10 Notification

Contractor understands, acknowledges and agrees that the purpose for prompt notification to the District pursuant to these provisions is to allow the District to investigate the condition(s) so that the District shall have the opportunity to decide how the District desires to proceed as a result of the condition(s). Accordingly, failure of Contractor to promptly notify the District 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 District.

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 District and/or a registered civil or structural engineer employed by the District 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 District or by the person to whom authority to accept has been delegated by the District.

12.3 No Tort Liability of District

Pursuant to Labor Code section 6705, nothing in this Article shall impose tort liability upon the District 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 District, 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 District 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 District 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 at least as broad as 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, District, 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, or in connection with, 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 coverage, and Automobile Liability Insurance coverage including owned, non-owned, and hired automobiles, 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 deductible or self-insured retention for its Commercial General Liability Insurance policy shall not exceed $25,000 unless approved in writing by District.

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

13.1.2 Excess Liability Insurance

13.1.2.1 If Contractor's underlying policy limits are less than required, subject to the District's sole discretion, 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 in order to satisfy, in the aggregate with its underlying policy, the insurance requirements herein..

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, District, 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 District, in its sole discretion, may accept the Excess Liability Insurance Policy that brings 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

Contractor shall procure and maintain, during the life of this Contract, Builder's Risk (Course of Construction), or similar first party property coverage acceptable to the District, issued on a replacement cost value basis. The cost shall be consistent with the total replacement cost of all insurable Work of the Project included within the Contract Documents. Coverage is to insure against all risks of accidental physical loss and shall include without limitation the perils of vandalism and/or malicious mischief (both without any limitation regarding vacancy or occupancy), sprinkler leakage, civil authority, theft, sonic disturbance, earthquake, flood, collapse, wind, rain, dust, fire, war, terrorism, lightning, smoke, and rioting. Coverage shall include debris removal, demolition, increased costs due to enforcement of all applicable ordinances and/or laws in the repair and replacement of damaged and undamaged portions of the property, and reasonable costs for the Architect's and engineering services and expenses required as a result of any insured loss upon the Work and Project, including completed Work and Work in progress, to the full insurable value thereof.

13.1.6 Pollution Liability Insurance

13.1.6.1 Contractor shall procure and maintain Pollution Liability Insurance that shall protect Contractor, District, 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. This coverage shall be provided in a form at least as broad as Insurance Services Offices, Inc. (ISO) Form CG 2415, or Contractor shall procure and maintain these coverages separately.

13.1.6.2 Contractor warrants that any retroactive date applicable to coverage under the policy shall predate 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.

13.1.6.3 If Contractor is responsible for removing any pollutants from a site, then Contractor shall ensure that Any Auto, including owned, non-owned, and hired, is included within the above policies and at the required limits, to cover its automobile exposure from transporting the pollutants from the site to an approved disposal site. This coverage shall include the Motor Carrier Act Endorsement, MCS 90.

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 District complete endorsements (or entire insurance policies) and certificates indicating the required coverages have been obtained, and the District 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 the following, or other language acceptable to the District:

"This policy shall not be canceled until written notice to District, 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 District, its trustees, employees and agents, the State of California, 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.

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

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

13.1.7.2.6 Contractor's insurance limit shall apply separately to each insured against whom a claim is made or suit is brought.

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 District, Architect(s), and Construction Manager(s) 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 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**.

13.1.7.6 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.

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

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13.1.8 Insurance Policy Limits

13.1.8.1 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)		Issued for the value and scope of Work indicated herein.
Pollution Liability		$1,000,000 per claim; $2,000,000 aggregate

13.1.8.2 If Contractor normally carries insurance in an amount greater than the minimum amounts required by District, that greater amount shall become the minimum required amount of insurance for purposes of the Contract. Therefore, Contractor hereby acknowledges and agrees that all insurance carried by it shall be deemed liability coverage for all actions it performs in connection with the Contract.

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 District, 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 District's governing board 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 District'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 District. 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 District 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 District, defective work creates a dangerous condition or requires immediate correction or attention to prevent further loss to District or to prevent interruption of District operations, District will attempt to give the notice required above. If Contractor or Surety cannot be contacted or neither complies with District's request for correction within a reasonable time as determined by District, District may, notwithstanding the above provision, proceed to make any and all corrections and/or provide attentions the District 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 District all appropriate guarantee or warranty certificates as indicated in the Specifications or upon request by District.

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

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 District, the Architect(s), and the Construction Manager(s), their respective consultants, separate contractors, board

members, officers, representatives, agents, and employees, in both individual and official capacities ("Indemnitees"), against all suits, claims, injury, damages, losses, and expenses ("Claims"), including but not limited to attorney's fees, caused by, arising out of, resulting from, or incidental to, in whole or in part, the performance of the Work under this Contract by the Contractor, its Subcontractors, vendors, or suppliers. However, the Contractor's indemnification and hold harmless obligation shall be reduced by the proportion of the Indemnitees' and/or Architect's liability to the extent the Claim(s) is/are 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. This indemnification and hold harmless obligation of the Contractor shall not be construed to negate, abridge, or otherwise reduce any right or obligation of indemnity that would otherwise exist or arise as to any Indemnitee or other 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 DIR.

14.2.2 To the furthest extent permitted by California law, Contractor shall also defend Indemnitees, at its own expense, including but not limited to attorneys' fees and costs, against all Claims caused by, arising out of, resulting from, or incidental to, in whole or in part, the performance of the Work under this Contract by the Contractor, its Subcontractors, vendors, or suppliers. However, without impacting Contractor's obligation to provide an immediate and ongoing defense of Indemnitees, the Contractor's defense obligation shall be retroactively reduced by the proportion of the Indemnitees' and/or Architect's liability 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. The District shall have the right to accept or reject any legal representation that Contractor proposes to defend the Indemnitees. If any Indemnitee provides its 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 such Indemnitee for any expenditures. Contractor's defense obligation shall not be construed to negate, abridge, or otherwise reduce any right or obligation of defense that would otherwise exist as to any Indemnitee or other person described herein. Contractor's 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 DIR. The Contractor shall give prompt notice to the District in the event of any Claim(s).

14.2.3 Without limitation of the provisions herein, if the Contractor's obligation to indemnify and hold harmless the Indemnitees or its obligation 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 District shall provide timely notification to Contractor of the receipt of any third-party Claim relating to this Contract. The District 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 District may retain so much of the moneys due the Contractor as shall be considered necessary, until disposition of any such Claims or until the District, Architect(s) and Construction Manager(s) have received written agreement from the Contractor that they will unconditionally defend the District, Architect(s) and Construction Manager(s), their respective officers, agents and employees, and pay any damages due by reason of settlement or judgment.

14.2.7 The Contractor's defense and indemnification obligations hereunder shall survive the completion of Work, the warranty/guarantee period, and the termination of the Contract.

15. TIME

15.1 Notice to Proceed

15.1.1 District 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 District 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 District 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 District within ten (10) days after receipt by Contractor of District'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 District, the District 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, District 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;

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 herein.

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 District.

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 District and approval of any required governmental agencies.

15.3.3 No Work during State Testing

Contractor shall, at no additional cost to the District and at the District's request, coordinate its Work to not disturb District students including, without limitation, not performing any Work when students at the Site are taking State or Federally-

required tests. The District or District's Representative will provide Contractor with a schedule of test dates concurrent with the District's issuance of the Notice to Proceed, or as soon as test dates are made available to the District.

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 District claim for damages.

15.5 Schedule

Contractor shall provide to District, 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 District 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 District will suffer damage. It being impractical and unfeasible to determine the amount of actual damage, it is agreed the Contractor shall pay to District 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 the 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 District in writing of causes of delay including documentation and facts explaining the delay and the direct correlation between the cause and effect. District 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 District pursuant to the claims provisions in these General Conditions of any anticipated delay and its cause. Following submission of a claim, the District 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 ("Time Impact Analysis"). Such Time Impact 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 District 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 districts, 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 District 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 District and Contractor;

16.3.2.4 The delay could not have been avoided or mitigated by Contractor's reasonable diligence; and

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

16.3.3 Where a change in the Work extends the Contract Time, Contractor may request and recover additional, actual direct costs, provided that Contractor can demonstrate such additional costs are:

16.3.3.1 Actually incurred performing the Work;

16.3.3.2 Not compensated by the Markup allowed; and

16.3.3.3 Directly result from the extended Contract Time.

Contractor shall comply with all required procedures, documentation and time requirements in the Contract Documents. Contractor may not seek or recover such costs using formulas (e.g. Eichleay, labor factors).

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 District or the Contractor, but its use shall be determined solely by the District.

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 District as herein provided. District 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 District'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 District 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 District 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 District 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 District in an executed Change Order.

17.1.4 A Change Order or Construction Change Directive will become effective when approved by the Board, notwithstanding that Contractor has not signed it. A Change Order or Construction Change Directive will become effective without Contractor's signature provided District indicates it as a "Unilateral Change Order". Any dispute as to the adjustment in the Contract Price or Contract Time, if any, of the Unilateral Change Order shall be resolved pursuant to the Payment and Claims and Disputes provisions herein.

17.1.5 Contractor understands, acknowledges, and agrees that the reason for District authorization is so that District may have an opportunity to analyze the Work and decide whether the District 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 District and/or the Architect and signed by the District (as authorized by the District'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 District, the Construction Manager, and/or the Architect and signed by the District and the Architect, directing a change in the Work. The District 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 District 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 District and compensation will be determined as set forth herein.

17.5.2 The District 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 District.

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 District will only pay for actual costs verified in the field by the District 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 District 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 District when it has consumed eighty percent (80%) of the budget, and shall not exceed the budget unless specifically authorized in writing by the District. The Contractor will not be compensated for force account work in the event that the Contractor fails to timely

notify the District 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 using Document 00 63 47, "Daily Force Account Report," 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 District 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 District will not sign, nor will the Contractor receive compensation for work the District 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 District 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 is a written request prepared by the Architect requesting the Contractor to submit to the District 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 District 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 District'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. The Contractor shall justify the proposed change in time by submittal of a schedule analysis that accurately shows the impact of the change on the critical path of the Construction Schedule ("Time Impact Analysis"). If Contractor fails to request a time extension in a PCO, including the Time Impact Analysis, 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. Allowance Expenditure Directives shall be based on Contractor's costs, without overhead and profit, for products, delivery, installation, labor, insurance, payroll, taxes, bonding and equipment rental will be included in Allowance Expenditure Directive authorizing expenditure of funds from this Allowance. No overhead and profit shall be added to the Allowance Expenditure Directive. If cost of the unforeseen condition(s) exceed the Allowance, Contractor must submit a PCO for amounts in excess of the Allowance 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 District'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 District 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 Time to Submit Proposed Change Order

Contractor shall submit its PCO within five (5) working days of the date Contractor discovers, or reasonably should have discovered, the circumstances giving rise to the PCO, unless additional time to submit a PCO is granted in writing by the District. Time is of the essence in Contractor's submission of PCOs so that the District can promptly investigate the basis for the PCO. Accordingly, if Contractor fails to submit its PCO within this timeframe, Contractor waives, releases, and discharges any right to assert or claim any entitlement to an adjustment of the Contract Price and/or Time based on circumstances giving rise to the PCO.

17.7.6 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.

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.

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17.8 Format for Proposed Change Order

17.8.1 The following format shall be used as applicable by the District 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 Burdened, and specify the hourly rate for each additional labor burden, for example, payroll taxes, fringe benefits, etc.)		
(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 General Conditions Cost** (if Time is Compensable) (attach supporting documentation)		
(h)	**Subtotal**		
(i)	**Add Overhead and Profit for Contractor**, not to exceed five percent (5%) of Item (h)		
(j)	**Subtotal**		
(k)	**Add Bond and Insurance**, not to exceed two percent (2%) of Item (j)		
(l)	**TOTAL**		
(m)	**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 Burdened, and specify the hourly rate for each additional labor burden, for example, payroll taxes, fringe benefits, etc.)		
(c)	**Add Equipment** (attach suppliers' invoice)		
(d)	**Add General Conditions Cost** (if Time is Compensable) (attach supporting documentation)		
(e)	**Subtotal**		
(f)	**Add Overhead and Profit for Contractor**, not to exceed fifteen percent (15%) of Item (e)		
(g)	**Subtotal**		
(h)	**Add Bond and Insurance**, not to exceed two percent (2%) of Item (g)		
(i)	**TOTAL**		

(j)	**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 the actual cost, use of any formulas (e.g. labor factors) is not allowed, not to exceed prevailing wage rates in the locality of the Site and shall be in the labor classification(s) necessary for the performance of the Work, fully Burdened. 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. If applicable, District will pay Contractor the reasonable costs for room and board, supported with appropriate backup documentation, without markup for profit or overhead as provided by U.S. General Services Administration per diem rates for California lodging, meals and incidentals, https://www.gsa.gov/travel/plan-book/per-diem-rates/per-diem-rates-lookup.

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 District. 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 District, 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 District'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 District 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 District'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 District, 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 District, 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 General Conditions Cost. The phrase "General Conditions Cost" shall mean, other than expressly limited or excluded herein, the costs of Contractor during the construction phase, including but not limited to: payroll costs for project manager for Work conducted at the Site, payroll costs for the superintendent and full-time general foremen, workers not included as direct labor costs engaged in support functions (e.g., loading/unloading, clean-up), costs of offices and temporary facilities including office materials, office supplies, office equipment, minor expenses, utilities, fuel, sanitary facilities and telephone services at the Site, costs of consultants not in the direct employ of Contractor or Subcontractors, and fees for permits and licenses.

17.8.6 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, general conditions costs and home office expenses.

17.9 Change Order Certification

17.9.1 All Change Orders and PCOs include the following certification by the Contractor, either in the form specifically or incorporated by this reference:

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 District.

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 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.

17.9.2 Accord and Satisfaction: Contractor's execution of any Change Order shall constitute a full accord and satisfaction, and release, of all Contractor (and if applicable, Subcontractor) claims for additional time, money or other relief arising from or relating to the subject matter of the change including, without limitation, impacts of all types, cumulative impacts, inefficiency, overtime, delay and any other type of claim.

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 District's discretion:

17.10.1.1 District acceptance of a PCO;

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

17.10.1.3 By agreement between District 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 District'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 District 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 District 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 District, including, without limitation, Job Cost Reports as provided in these General Conditions, which shall be available to the District 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 District, 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 District'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 District 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 District, 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 District 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. District, 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 District 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 District 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 District 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 District 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 District 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 District shall not make any payment to Contractor until:

19.2.1.1.1.16.1 Contractor and/or its Subcontractor(s) provide electronic CPRs directly to the DIR on no less than every 30 days while Work is being performed and within 30 days after the final day of Work performed on the Project for any journeyman, apprentice, worker or other employee was employed in connection with the Work, or within ten (10) days of any request by the District or the DIR to the requesting entity, 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 District 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 District'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 District 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 District. Instead, such payment shall be construed as a good faith effort by District 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 District's Approval of Application for Payment

19.3.1.1 Upon receipt of an Application for Payment, The District shall act in accordance with both of the following:

19.3.1.1.1 Each Application for Payment shall be reviewed by the District 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 District to make a payment without incurring interest pursuant to this section shall be reduced by the number of days by which the District 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 District.

19.3.1.2 The District's review of the Contractor's Application for Payment will be based on the District'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 District'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 District'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 District's right to enforce each and every provision of this Contract, and the District 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 District concerning the Work, or any portion thereof, remains incomplete.

19.3.2.3 If the District 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 District 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 District hereunder shall be interpreted so as to imply that District has inspected, approved, or accepted any part of the Work. Notwithstanding any payment, the District may enforce each and every provision of this Contract. The District 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 District may withhold payment in whole, or in part, to the extent reasonably necessary to protect the District if, in the District's opinion, the representations to the District required herein cannot be made. The District may withhold payment, in

whole, or in part, to such extent as may be necessary to protect the District 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 District as a result of the Contract. Contractor agrees that the District may withhold up to 125% of the amount claimed in the Stop Payment Notice to answer the claim and to provide for the District's reasonable cost of any litigation pursuant to the stop payment notice.

19.4.1.3 Written notice to withhold payment from Contractor by payment and/or performance bond surety(ies).

19.4.1.4 Liquidated damages assessed against the Contractor.

19.4.1.5 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.

19.4.1.6 Damage to the District or other contractor(s).

19.4.1.7 Unsatisfactory prosecution of the Work by the Contractor.

19.4.1.8 Failure to store and properly secure materials.

19.4.1.9 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.

19.4.1.10 Failure of the Contractor to maintain As-Built Drawings.

19.4.1.11 Erroneous estimates by the Contractor of the value of the Work performed, or other false statements in an Application for Payment.

19.4.1.12 Unauthorized deviations from the Contract Documents.

19.4.1.13 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.

19.4.1.14 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.

19.4.1.15 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.

19.4.1.16 Allowing an unregistered subcontractor, as described in Labor Code section 1725.5, to engage in the performance of any work under this Contract.

19.4.1.17 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.

19.4.1.18 Failure to properly maintain or clean up the Site.

19.4.1.19 Failure to timely indemnify, defend, or hold harmless the District.

19.4.1.20 Any payments due to the District, including but not limited to payments for failed tests, utilities changes, or permits.

19.4.1.21 Failure to pay Subcontractor(s) or supplier(s) as required by law and by the Contract Documents.

19.4.1.22 Failure to pay any royalty, license or similar fees.

19.4.1.23 Contractor is otherwise in breach, default, or in substantial violation of any provision of this Contract.

19.4.1.24 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 District or Contractor.

19.4.2 Reallocation of Withheld Amounts

19.4.2.1 District may, in its discretion, apply any withheld amount to pay outstanding claims or obligations as defined herein. In so doing, District shall make such payments on behalf of Contractor. If any payment is so made by District, then that amount shall be considered a payment made under Contract by District to Contractor and District 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. District 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, District may, after **FORTY-EIGHT (48)** hours' written notice to the Contractor and, without prejudice to any other remedy, make good such deficiencies. The District shall adjust the total Contract Price by reducing the amount thereof by the cost of making good such deficiencies. If District 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 District for Subcontractor Payment

The District 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

District shall have the right in its sole discretion, if necessary for the protection of the District, 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 District and a Subcontractor of any tier, or a material or equipment supplier, any obligation from the District to such Subcontractor or a material or equipment supplier, or rights in such Subcontractor or a material or equipment supplier against the District.

20. COMPLETION OF THE WORK

20.1 Completion

20.1.1 District will accept completion of Contract and have the Notice of Completion recorded when the entire Work shall have been completed to the satisfaction of District.

20.1.2 The Work may only be accepted as complete by action of the governing board of the District.

20.1.3 District, 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 District, 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 District's acceptance of completion, District 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 District, 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, District may elect to proceed as provided herein related to adjustments to Contract Price, and/or District'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 District, 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 District with AutoCAD file to the District.

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 Construction Storm Water Permit, if applicable

Contractor shall submit to District all electronic or hard copy records required by the Construction Storm Water Permit, if applicable, within seven (7) days of Completion of the Project.

20.2.2.4 Maintenance Manuals: Contractor shall prepare all operation and maintenance manuals and date as indicated in the Specifications.

20.2.2.5 Source Programming: Contractor shall provide all source programming for all items in the Project.

20.2.2.6 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 District'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 District acceptance, Architect and Project Inspector will inspect the Work and shall submit to Contractor and District 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 District 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 District 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 including, without limitation, security system, data, and fire alarm, 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 District to make a final inspection shall be considered an additional service of District, 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 District's Rights to Occupancy

The District may occupy or use any completed or partially completed portion of the Work at any stage, and such occupancy shall not constitute the District's Final Acceptance of any part of the Work. Neither the District'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 District 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 District 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 District 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 District 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 District, 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 District's 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 District 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 District's acceptance of the Work of the Contractor as fully complete by the Governing Board of the District (that, absent unusual circumstances, will occur when the Punch List items have been satisfactorily completed), the District shall record a Notice of Completion with the County Recorder, and the Contractor shall, upon receipt of final payment from the District, 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 District 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 District all manuals and materials required by the Contract Documents, which must be approved by the District.

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 District or that the District 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 District.

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 District and the Contractor pursuant to Public Contract Code section 22300.

21.4 Substitution of Securities

The District 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 District, 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 District 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 District 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 District or other Contractors caused thereby.

23.1.2 If Contractor does not remove Work that District has identified as failing to conform to the Contract Documents within a reasonable time, not to exceed **FORTY-EIGHT (48)** hours, District 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, District 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 District and/or District 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 District, 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 District 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 District's acceptance of the Work under the Contract and termination of the Contract. The District shall give such notice promptly after discovery of the condition.

23.3 District'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 District, 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, District 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 District;

23.3.2.2 That the District 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 District exercise any other remedy it may have at law or under the Contract Documents, including but not limited to the District hiring its own forces or another contractor to replace the Contractor's nonconforming Work, in which case the District 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 District may withhold those amounts from payment(s) to Contractor.

24. TERMINATION AND SUSPENSION

24.1 District's Request for Assurances

If District at any time reasonably believes Contractor is or may be in default under this Contract, District may in its sole discretion notify Contractor of this fact and request written assurances from Contractor of performance of Work and a written plan from Contractor to remedy any potential default under the terms this Contract that the District may advise Contractor of in writing. Contractor shall, within ten (10) calendar days of District's request, deliver a written cure plan that meets the District's requirements in its request for assurances. Contractor's failure to provide such written assurances of performance and the required written plan, within ten (10) calendar days of request, will constitute a material breach of this Contract sufficient to justify termination for cause.

24.2 District's Right to Terminate Contractor for Cause

24.2.1 Grounds for Termination: The District, 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:

24.2.1.1 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

24.2.1.2 Contractor fails to complete said Work within the time specified or any extension thereof, or

24.2.1.3 Contractor persistently fails or refuses to perform Work or provide material of sufficient quality as to be in compliance with Contract Documents; or

24.2.1.4 Contractor persistently refuses, or repeatedly 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

24.2.1.5 Contractor fails to make prompt payment to Subcontractors, or for material, or for labor; or

24.2.1.6 Contractor persistently disregards laws, or ordinances, or instructions of District; or

24.2.1.7 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

24.2.1.8 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.

24.2.2 Notification of Termination

24.2.2.1 Upon the occurrence at District's sole determination of any of the above conditions, District may, without prejudice to any other right or remedy, serve written notice upon Contractor and its Surety of District'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 District for the correction of the condition(s) and/or violation(s) be made, this Contract and/or the Contractor's right to perform the Work of the Contract shall cease and terminate. Upon termination, Contractor shall not be entitled to receive any further payment until the entire Work is finished.

24.2.2.2 Upon termination, District 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:

24.2.2.2.1 Within three (3) days after service upon it of the notice of tender, gives District written notice of Surety's intention to take over and perform this Contract; and

24.2.2.2.2 Commences performance of this Contract within three (3) days from date of serving of its notice to District.

24.2.2.3 Surety shall not utilize Contractor in completing the Project if the District notifies Surety of the District'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 District's approval. District's approval shall not be unreasonably withheld, conditioned or delayed.

24.2.2.4 If Surety fails to notify District or begin performance as indicated herein, District 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 District for any excess cost or other damages the District incurs thereby. Time is of the essence in this Contract. If the District takes over the Work as herein provided, District 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.

24.3 Termination of Contractor for Convenience

24.3.1 District in its sole discretion may terminate the Contract in whole or in part upon three (3) days' written notice to the Contractor.

24.3.2 Upon notice, Contractor shall:

24.3.2.1 Cease operations as directed by the District in the notice;

24.3.2.2 Take necessary actions for the protection and preservation of the Work as soon as possible; and

24.3.2.3 Terminate all existing subcontracts and purchase orders and enter into no further subcontracts and purchase orders.

24.3.3 Within 30 days of the notice, Contractor submit to the District a payment application for the actual cost for labor, materials, and services performed, including all Contractor's and Subcontractor(s)' mobilization and/or demobilization costs, that is unpaid. Contractor shall have no claims against the District except for the actual cost for labor, materials, and services performed that adequately documented through timesheets, invoices, receipts, or otherwise. District shall pay all undisputed invoice(s) for work performed until the notice of termination.

24.3.4 Under a termination for convenience, the District retains the right to all the options available to the District if there is a termination for cause.

24.4 Effect of Termination

24.4.1 Contractor shall, only if ordered to do so by the District, 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 District 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 District by reason of the Contractor's failure to complete the Contract.

24.4.2 In the event that the District shall perform any portion of, or the whole of the Work, pursuant to the provisions of the General Conditions, the District 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 District or for any changes the District may make in the Work or for the money expended by the District in satisfying claims and/or suits and/or other obligations in connection with the Work.

24.4.3 In the event termination for cause is determined to have not been for cause, the termination shall be deemed to have been a termination for convenience effective as of the same date as the purported termination for cause.

24.4.4 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.

24.4.5 If the expense to the District to finish the Work exceeds the unpaid Contract Price, Contractor and Surety shall pay difference to District within twenty-one (21) days of District's request.

24.4.6 The District 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 District, no Subcontractor shall have any claim against the District or third party for Work performed by Subcontractor or other matters arising prior to termination of the Contract. The District 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 District so elect, the Contractor shall execute and deliver all documents and take all steps, including the legal assignment of its contractual rights, as the District may require, for the purpose of fully vesting in the District 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 District for expenses and damages suffered by the District 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.

24.4.7 The foregoing provisions are in addition to and not in limitation of any other rights or remedies available to District.

24.5 Emergency Termination of Public Contracts Act of 1949

24.5.1 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.

24.5.1.1 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.

24.5.1.2 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.

24.5.2 Compensation to the Contractor shall be determined at the sole discretion of District on the basis of the reasonable value of the Work done, including preparatory work. As an exception to the foregoing and at the District'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 District, at its sole discretion, may adopt the Contract Price as the reasonable value of the work done or any portion thereof.

24.6 Suspension of Work

24.6.1 District in its sole discretion may suspend, delay or interrupt the Work in whole or in part for such period of time as the District may determine upon three (3) days written notice to the Contractor.

24.6.1.1 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:

24.6.1.1.1 That performance is, was or would have been so suspended, delayed or interrupted by another cause for which Contractor is responsible; or

24.6.1.1.2 That an equitable adjustment is made or denied under another provision of the Contract; or

24.6.1.1.3 That the suspension of Work was the direct or indirect result of Contractor's failure to perform any of its obligations hereunder.

24.6.1.2 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 Obligation to File Claims for Disputed Work

25.1.1 Should Contractor otherwise seek extra time or compensation for any reason whatsoever ("Disputed Work"), then Contractor shall first follow procedures set forth in the Contract Documents including, without limitation, Articles 15, 16 and 17, all of which are conditions precedent to submitting a Claim pursuant to Article 25. A Notice of Delay or Proposed Change Order are less formal procedures that proceed the formal claim and do not constitute a Claim. A Claim also does not include correspondence, RFIs, vouchers, invoices, progress payment applications, or other routine or authorized form of requests for progress payments in compliance with the Contract. If a dispute remains, then Contractor shall give written notice to District that expressly invokes this Article 25 within the time limits set forth herein.

25.1.2 Contractor's sole and exclusive remedy for Disputed Work is to file a written claim setting forth Contractor's position as required herein within the time limits set forth herein.

25.2 Duty to Perform during Claim Process

Contractor and its subcontractors shall continue to perform its Work under the Contract including the disputed work, and shall not cause a delay of the Work during any dispute,

claim, negotiation, mediation, or arbitration proceeding, except by written agreement by the District.

25.3 Definition of Claim

25.3.1 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:

25.3.1.1 A time extension, including without limitation, for relief of damages or penalties for delay assessed by the District under the Contract;

25.3.1.2 Payment by the District 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

25.3.1.3 An amount of payment disputed by the District.

25.4 Claims Presentation

25.4.1 Form and Contents of Claim

25.4.1.1 If Contractor intends to submit a Claim for an increase in the Contract Price and/or Contract Time for any reason including, without limitation, the acts of District or its agents, Contractor shall, within thirty (30) days after the event giving rise to the Claim, give notice of the Claim ("Notice of Potential Claim") in writing specifically identifying Contractor is invoking this Article 25 Claims Presentation. The Notice of Potential Claim shall provide Contractor's preliminary request for an adjustment to the Contract Price and/or Contract Time, with a description of the grounds therefore.

25.4.1.2 Within thirty (30) days after serving the written Notice of Potential Claim, Contractor shall provide a Claim including an itemized statement of the details and amounts of its Claim for any increase in the Contract Price of Contract Time as provided below, including a Time Impact Analysis and any and all other documentation substantiating Contractor's claimed damages:

25.4.1.2.1 The issues, events, conditions, circumstances and/or causes giving rise to the dispute, and shall show, in detail, the cause and effect of same;

25.4.1.2.2 Citation to provisions in the Contract Documents, statute sections, and/or case law entitling Contractor to an increase in the Contract Price or Contract Time;

25.4.1.2.3 The pertinent dates and/or durations and actual and/or anticipated effects on the Contract Price, Contract Schedule milestones and/or Contract Time adjustments;

25.4.1.2.4 The Time Impact Analysis of all time delays that shows actual time impact on the critical path; and

25.4.1.2.5 The line-item costs for labor, material, and/or equipment, if applicable, for all cost impacts priced like a change order according to Article 17 and must be updated monthly as to cost and entitlement if a continuing claim.

25.4.1.3 The Claim shall include the following certification by the Contractor:

25.4.1.3.1 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 District is liable; and that I am duly authorized to certify the dispute on behalf of the Contractor.

25.4.1.3.2 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 including, without limitation, cumulative impacts. Contractor may not separately recover for overhead or other indirect costs. Any costs, expenses, damages, or time extensions not included are deemed waived.

25.4.2 Contractor shall bear all costs incurred in the preparation and submission of a Claim.

25.4.3 Failure to timely submit a Claim and the requisite supporting documentation shall constitute a waiver of Contractor's claim(s) against the District and Contractor's Claim(s) for compensation or an extension of time shall be deemed waived, released, and discharged as to any entitlement for adjustment to Contract Price and/or Contract Time.

25.5 Claim Resolution pursuant to Public Contract Code section 9204

Contractor may request to waive the claims procedure under Public Contract Code section 9204 and proceed directly to the commencement of a civil action or binding arbitration. If Contractor chooses to proceed, Contractor shall comply with the following steps:

25.5.1 STEP 1:

25.5.1.1 Upon receipt of a Claim by registered or certified mail, return receipt requested, including the documents necessary to substantiate it, the District 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 District and Contractor may, by mutual agreement, extend the time period to provide a written statement. If the District 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 District 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.

25.5.1.1.1 Any payment due on an undisputed portion of the Claim shall be processed and made within 60 days after the District 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.

25.5.1.2 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, District and Contractor must comply with the sections below regarding Public Contract Code section 20104 et seq. and Government Code Claim Act Claims.

25.5.1.3 If the District 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 District'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.

25.5.2 STEP 2:

25.5.2.1 If Contractor disputes the District's written response, or if the District 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 District 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 District shall provide the Contractor a written statement identifying the portion of the Claim that remains in dispute and the portion that is undisputed.

25.5.2.1.1.1 Any payment due on an undisputed portion of the Claim shall be processed and made within 60 days after the District 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.

25.5.3 STEP 3:

25.5.3.1 Any disputed portion of the Claim, as identified by Contractor in writing, shall be submitted to nonbinding mediation, with the District and Contractor sharing the associated costs equally. The District 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.

25.5.3.1.1 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.

25.5.3.2 Unless otherwise agreed to by the District 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.

25.5.4 STEP 4:

25.5.4.1 If mediation under this section does not resolve the parties' dispute, the District may, but does not require arbitration of disputes under private arbitration or the Public Works Contract Arbitration Program.

25.6 Subcontractor Pass-Through Claims

25.6.1 If a subcontractor or a lower tier subcontractor lacks legal standing to assert a claim against a District because privity of contract does not exist, the contractor may present to the District 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 District shall furnish reasonable documentation to support the Claim.

25.6.2 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 District and, if Contractor did not present the Claim, provide the subcontractor with a statement of the reasons for not having done so.

25.6.3 The Contractor shall bind all its Subcontractors to the provisions of this section and will hold the District harmless against Claims by Subcontractors.

25.7 Government Code Claim Act Claim

25.7.1 If a claim, or any portion thereof, remains in dispute upon satisfaction of all applicable Claim Resolution requirements 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 District.

25.7.2 Contractor shall bear all costs incurred in the preparation, submission and administration of a Claim. Any claims presented in accordance with the Government Code must affirmatively indicate Contractor's prior compliance with the claims procedure herein of the claims asserted.

25.7.3 For purposes of those provisions, the running of the time within which a claim pursuant to Public Contract Code section 20104.2 only must be presented to

the District shall be tolled from the time the claimant submits his or her written claim pursuant to subdivision (a) until the time that claim is denied as a result of the meet and confer process, including any period of time utilized by the meet and confer process.

25.8 Claim Resolution pursuant to Public Contract Code section 20104 et seq.

25.8.1 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 District by those procedures set forth in Public Contract Code section 20104, et seq., to the extent applicable.

25.8.1.1 Contractor shall file with the District any written Claim, including the documents necessary to substantiate it, upon the application for final payment.

25.8.1.2 For claims of less than fifty thousand dollars ($50,000), the District 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 District may have against the Contractor.

25.8.1.2.1 If additional information is required, it shall be requested and provided by mutual agreement of the parties.

25.8.1.2.2 District'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.

25.8.1.3 For claims of over fifty thousand dollars ($50,000) and less than or equal to three hundred seventy-five thousand dollars ($375,000), the District 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 District may have against the Contractor.

25.8.1.3.1 If additional information is required, it shall be requested and provided upon mutual agreement of the District and the Contractor.

25.8.1.3.2 The District'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.

25.8.1.4 If Contractor disputes the District’s written response, or the District fails to respond within the time prescribed, Contractor may so notify the District, in writing, either within fifteen (15) days of receipt of the District's response or within fifteen (15) days of the District'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 District shall schedule a meet and confer conference within thirty (30) days for settlement of the dispute.

25.8.1.5 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.

25.8.1.6 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.

25.8.1.7 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.

25.8.1.8 The District 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 District 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.

25.8.2 Contractor shall bind its Subcontractors to the provisions of this Section and will hold the District harmless against disputes by Subcontractors.

25.9 Claim Procedure Compliance

25.9.1 Failure to submit and administer claims as required in Article 25 shall waive Contractor's right to claim on any specific issues not included in a timely submitted claim. Claim(s) not raised in a timely protest and timely claim submitted under this Article 25 may not be asserted in any subsequent litigation, Government Code Claim, or legal action.

25.9.2 District shall not be deemed to waive any provision under this Article 25, if at District's sole discretion, a claim is administered in a manner not in accord with this Article 25. Waivers or modifications of this Article 25 may only be made by a

signed change order approved as to form by legal counsel for both District and Contractor; oral or implied modifications shall be ineffective.

25.10 Claim Resolution Non-Applicability

25.10.1 The procedures for dispute and claim resolutions set forth in this Article shall not apply to the following:

25.10.1.1 Personal injury, wrongful death or property damage claims;

25.10.1.2 Latent defect or breach of warranty or guarantee to repair;

25.10.1.3 Stop payment notices;

25.10.1.4 District's rights set forth in the Article on Suspension and Termination;

25.10.1.5 Disputes arising out of labor compliance enforcement by the Department of Industrial Relations; or

25.10.1.6 District 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.

25.11 Attorney's Fees

25.11.1 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 District 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 District'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 District, 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 District, forfeit the statutory amount (believed by the District 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 District 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 District 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 District forfeit the statutory amount (believed by the District 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 District.

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 no less than every 30 days while Work is being performed and within 30 days after the final day of Work performed on the Project and within ten (10) days of any request by the District 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 District 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. District 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 District, 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 District, 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 District, 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 District 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 District, 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 District 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 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 District 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, District, upon request, will execute documents necessary to show (1) that District is a political subdivision of the State for the purposes of such exemption, and (2) that the sale is for the exclusive use of District. 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

Contractor is responsible for any or all damage or loss to shipments until delivered and accepted on Site, 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 District at no additional cost.

END OF DOCUMENT

DOCUMENT 00 7313

SPECIAL CONDITIONS

1. Mitigation Measures
2. Modernization Projects
3. Badge Policy for Contractors
4. Substitution for Specified Items
5. Weather Days
6. Insurance Policy Limits
7. Permits, Certificates, Licenses, Fees, Approval
8. As-Builts and Record Drawings
9. Construction Manager
10. Program Manager
11. Preliminary Schedule of Values
12. COVID-19 Safety Requirements
13. COVID-19 Vaccination/Testing Requirements

DOCUMENT 00 7313

SPECIAL CONDITIONS

1. Mitigation Measures

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*.)

2. Modernization Projects

2.1 **Access**. Access to the school buildings and entry to buildings, classrooms, restrooms, mechanical rooms, electrical rooms, or other rooms, for construction purposes, must be coordinated with District and onsite District personnel before Work is to start. Unless agreed to otherwise in writing, only a school 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 District, other arrangements are made in advance.

2.2 **Keys.** Upon request, the District 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 District 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 District. 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 District.

2.7 **No Work during Student Testing**. Contractor shall, at no additional cost to the District and at the District's request, coordinate its Work to not disturb District students including, without

limitation, not performing any Work when students at the Site are taking State or Federally-required tests.

3. Badge Policy for Contractors

All Contractors doing work for the District 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 District facility.

3.1 Badges must be filled out in full and contain the following information:

3.1.1 Name of Contractor

3.1.2 Name of Employee

3.1.3 Contractor's address and phone number

3.2 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 District employees, the Architect, the Construction Manager, the Program Manager, or the Project Inspector to review the information on the badges upon request.

3.3 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. Substitutions for Specified Items

Replace Section 1.7 in the General Conditions with the following provisions:

1.7.1 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.

1.7.1.1 If the material, process, or article offered by Contractor is not, in the opinion of the District, 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.

1.7.1.2 This provision shall not be applicable with respect to any material, product, thing or service for which District 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.

1.7.2 A request for a substitution shall be submitted as follows:

1.7.2.1 Contractor shall notify the District in writing of any request for a substitution at least ten (10) days prior to bid opening as indicated in the Instructions to Bidders.

1.7.2.2 Requests for Substitutions after award of the Contract shall be submitted within thirty-five (35) days of the date of the Notice of Award.

1.7.3 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:

1.7.3.1 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;

1.7.3.2 Available maintenance, repair or replacement services;

1.7.3.3 Increases or decreases in operating, maintenance, repair, replacement, and spare parts costs;

1.7.3.4 Whether or not acceptance of the substitute will require other changes in the Work (or in work performed by the District or others under Contract with the District); and

1.7.3.5 The time impact on any part of the Work resulting directly or indirectly from acceptance of the proposed substitute.

1.7.4 No substitutions shall be made until approved, in writing, by the District. 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:

1.7.4.1 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;

1.7.4.2 The Contractor provides the same warranties and guarantees for the substitute that would be provided for that specified;

1.7.4.3 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;

1.7.4.4 The Contractor shall be responsible for any re-design costs occasioned by District's acceptance and/or approval of any substitute; and

1.7.4.5 The Contractor shall, in the event that a substitute is less costly than that specified, credit the District 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.

1.7.5 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.

1.7.6 In no event shall the District 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.

1.7.7 Contractor shall be responsible for any costs the District 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. District 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. District, 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

Replace Section 15.2.1.5 in the General Conditions with the following:

15.2.1.5 The number of days of Adverse Weather exceeds the following parameters:

January	**15**	July	**3**
February	**15**	August	**3**
March	**10**	September	**10**
April	**10**	October	**10**
May	**3**	November	**15**
June	**3**	December	**15**

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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++. The limits of insurance shall not be less than:

Commercial General Liability	Product Liability and Completed Operations, Fire Damage Liability – Split Limit	
		$5,000,000 per occurrence; $10,000,000 aggregate]
Automobile Liability – Any Auto	Combined Single Limit	Personal vehicles: $500,000 Commercial vehicles: $1,000,000
Workers' Compensation		Statutory limits pursuant to State law
Employer's Liability		$1,000,000
Builder's Risk (Course of Construction)		$1,000,000
Pollution Liability		$1,000,000

7. Permits, Certificates, Licenses, Fees, Approvals

8. 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 Project Labor Agreement/Payroll Records

9. As-Builts and Record Drawings

9.1 When called for by Division 1, Contractor shall submit As-Built Drawings pursuant to the Contract Documents consisting of one set of computer-aided design and drafting ("CADD") files in the following format (.PDF & .CAD), plus one full size set of As-Built Drawings.

9.2 Contractor shall submit Record Drawings pursuant to the Contract Documents consisting of one set of computer-aided design and drafting ("CADD") files in the following format (.PDF & .CAD), plus one printed set of full size Record Drawings.

10. Construction Manager

The District will use a Construction Manager on the Project that is the subject of this Contract. Greystone West is the Construction Manager for this Project.

11. Program Manager

Greystone West is the Program Manager designated for the Project that is the subject of this Contract.

15. COVID-19 Safety Requirements

Contractor shall, at its cost, timely comply with all applicable federal, State, and local requirements relating to COVID-19 or other public health emergency/epidemic/pandemic. Further, except to the extent the Order provides otherwise, Contractor and Contractor's personnel, subcontractors and suppliers shall continue to comply with all applicable terms in the California Department of Public Health's State Public Health Officer Orders.

16. COVID-19 Vaccination/Testing Requirements

Vaccination Requirements

Contractor shall fill out, sign, date and submit to District the COVID-19 Vaccination/Testing Certification Form, attached hereto as **Attachment "A."**

According to the August 11, 2021, California Department of Public Health ("CDPH") State Public Health Officer Order ("Order"), a person is "fully vaccinated" for COVID-19 if two weeks or more have passed since they have received the second dose in a 2-dose series (Pfizer-BioNTech or Moderna or vaccine authorized by the World Health Organization), or two weeks or more have passed since they received a single-dose vaccine (Johnson and Johnson[J&J]/Janssen).

Pursuant to the CDPH Guidance for Vaccine Records Guidelines & Standards, Contractor shall only accept the following as proof of vaccination:

(a) COVID-19 Vaccination Record Card (issued by the Department of Health and Human Services Centers for Disease Control & Prevention or WHO Yellow Card which includes name of person vaccinated, type of vaccine provided and date last dose administered);

(b) a photo of a Vaccination Record Card as a separate document;

(c) a photo of a Vaccination Record Card stored on a phone or electronic device;

(d) documentation of COVID-19 vaccination from a health care provider;

(e) digital record that includes a QR code that when scanned by a SMART Health Card reader displays to the reader name, date of birth, vaccine dates and vaccine type; or

(f) documentation of vaccination from other contracted employers who follow these vaccination records guidelines and standards.

In the absence of knowledge to the contrary, Contractor may accept the documentation presented in (a) through (f) above as valid.

Contractor shall have a plan in place for tracking verified Contractor personnel vaccination status. Records of vaccination verification must be made available, upon request, to the local health jurisdiction for purposes of case investigation.

Contractor personnel, including any and all tiers of subcontractor, supplier, and any other personnel entering the Project site, who are not fully vaccinated, or for whom vaccine status is unknown or documentation is not provided, must be considered unvaccinated.

Weekly Testing Requirements

Contractor shall ensure that Contractor personnel, including any and all tiers of subcontractor, supplier, and any other worker entering the Project site, who are unvaccinated or who are not fully vaccinated are required to undergo diagnostic screening testing, as specified below:

(a) Contractor personnel may be tested with either antigen or molecular tests to satisfy this requirement, but unvaccinated or incompletely vaccinated workers must be tested at least once weekly with either PCR testing or antigen testing. Any PCR (molecular) or antigen test used must either have Emergency Use Authorization by the U.S. Food and Drug Administration or be operating per the Laboratory Developed Test requirements by the U.S. Centers for Medicare and Medicaid Services.

(b) Unvaccinated or not fully vaccinated Contractor personnel must also observe all other infection control requirements, and are not exempted from the testing requirement even if they have a medical contraindication to vaccination, since they are still potentially able to spread the illness. Previous history of COVID-19 from which the individual recovered more than 90 days earlier, or a previous positive antibody test for COVID-19, do not waive this requirement for testing.

Contractor shall have a plan in place for tracking test results and conducting workplace contact tracing, and must report results to local public health departments, if applicable.

[ATTACHMENT "A" ON NEXT PAGE]

ATTACHMENT "A"
COVID-19 VACCINATION/TESTING CERTIFICATION

Contractor: _____

The California Department of Public Health ("CDPH") requires, pursuant to its August 11, 2021, Order ("Order"), that all public and private schools serving students in transitional kindergarten through grade twelve, unless exempt, are required to verify the vaccine status of all K-12 school workers, effective October 15, 2021. Further, pursuant to the Order, all such schools are required to verify that all workers are either fully vaccinated or undergo weekly diagnostic testing.

In light of these CDPH requirements, Contractor certifies that the following entity:

_____ has verified that the Contractor personnel providing services at District's Project site(s):

☐ Have all been fully vaccinated in accordance with the CDPH Order.

☐ Have not all been fully vaccinated, but those who are unvaccinated or not fully vaccinated undergo weekly diagnostic testing in accordance with the CDPH Order.

☐ Have not been fully vaccinated and do not undergo weekly diagnostic testing in accordance with the CDPH Order.

Contractor understands that the District's Project site will need to comply with the CDPH Order's COVID-19 requirements for fully vaccinated personnel or unvaccinated personnel. Personnel who are not fully vaccinated or decline to state their vaccination status will be treated as unvaccinated, and Contractor will comply with the CDPH Order, and all applicable state and local laws for vaccinated and unvaccinated personnel.

CERTIFICATION

I, _____, certify that I am Contractor's_____ and that I have made a diligent effort to ascertain the facts with regard to the representations made herein.

Date: _____

Proper Name of Contractor: _____

Signature: _____

Print Name: _____

Title: _____

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 District, 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 District shall investigate the identified conditions.

d. If the District determines that conditions do not involve hazardous materials or that no change in terms of Contract is justified, the District shall so notify Contractor in writing, stating reasons. If the District 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 District.

e. If after receipt of notice from the District, 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 District 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 District may invoke its rights to terminate the Contract in whole or in part. District 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. District 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 District 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 District 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 District elects to perform these activities and tests, Contractor shall afford District 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 District in the Contract Price and the Scheduled Completion Date.

c. Notwithstanding District'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 District 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. District 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 District to track hazardous waste from the Site to disposal, including appropriate "Hazardous Waste Manifests" on the EPA form, so that District may track the volume of waste it put in each landfill and receive from each landfill a certificate of receipt.

c. Contractor shall provide District with the name and address of each waste disposal facility prior to any disposal, and District shall have the express right to reject any proposed disposal facility. Contractor shall not use any disposal facility to which District 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 District.

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 District 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 District. 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 District 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 District's name or of necessity to be made in District's name, District shall cooperate with Contractor in securing the permit or giving the notice, but the Contractor shall prepare for District 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

District 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

DOCUMENT 01 1100

SUMMARY OF WORK

PART 1 - GENERAL

1.01 RELATED DOCUMENTS AND PROVISIONS

All Contract Documents should be reviewed for applicable provisions related to the provisions in this document, including without limitation:

A. General Conditions, including, without limitation, Site Access Conditions and Requirements;

B. Special Conditions.

1.02 SUMMARY OF WORK COVERED BY CONTRACT DOCUMENTS

A. The Work of this Contract consists of the following:

Demolition of existing metal clad fencing enclosure, gas / electrical / SOG, earthwork consisting of rough and fine grading, formwork for new foundation and flatwork, rough and fine carpentry related to framing of new building as well as casework / trim installation, electrical service installation as well as rough in and trim out of electrical devices, rerouting of underground and above grade utilities, installation of new mechanical systems, including heating / cooling as well as ventilation ductwork for ceramics kilns, landscaping and work on existing and new irrigation lines and low voltage lines, low voltage electrical work related to the installation of POE security cameras, WAPs, data ports, and secure access systems.

1.03 CONTRACTS

A. Perform the Work under a single, fixed-price Contract.

1.04 CODES, REGULATIONS, AND STANDARDS

A. The codes, regulations, and standards adopted by the state and federal agencies having jurisdiction shall govern minimum requirements for this Project. Where codes, regulations, and standards conflict with the Contract Documents, these conflicts shall be brought to the immediate attention of the District and the Architect.

B. Codes, regulations, and standards shall be as published effective as of date of bid opening, unless otherwise specified or indicated.

1.05 PROJECT RECORD DOCUMENTS

A. Contractor shall maintain on Site one set of the following record documents; Contractor shall record actual revisions to the Work:

(1) Contract Drawings.

(2) Specifications.

(3) Addenda.

(4) Change Orders and other modifications to the Contract.

(5) Reviewed shop drawings, product data, and samples.

(6) Field test records.

(7) Inspection certificates.

(8) Manufacturer's certificates.

B. Contractor shall store Record Documents separate from documents used for construction. Provide files, racks, and secure storage for Record Documents and samples.

C. Contractor shall record information concurrent with construction progress.

D. Specifications: Contractor shall legibly mark and record at each product section of the Specifications the description of the actual product(s) 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 Change Orders and written directives.

1.06 EXAMINATION OF EXISTING CONDITIONS

A. Contractor shall be held to have examined the Project Site and acquainted itself with the conditions of the Site and of the streets or roads approaching the Site.

B. Prior to commencement of Work, Contractor shall survey the Site and existing buildings and improvements to observe existing damage and defects such as cracks, sags, broken, missing or damaged glazing, other building elements and Site improvements, and other damage.

C. Should Contractor observe cracks, sags, and other damage to and defects of the Site and adjacent buildings, paving, and other items not indicated in the Contract Documents, Contractor shall immediately report same to the District and the Architect.

1.07 CONTRACTOR'S USE OF PREMISES

A. If unoccupied and only with District’s prior written approval, Contractor may use the building(s) at the Project Site without limitation for its operations, storage, and office facilities for the performance of the Work. If the District chooses to beneficially occupy any building(s), Contractor must obtain the District's written approval for Contractor's use of spaces and types of operations to be performed within the building(s) while so occupied. Contractor's access to the building(s) shall be limited to the areas indicated.

B. If the space at the Project Site is not sufficient for Contractor's operations, storage, office facilities and/or parking, Contractor shall arrange and pay for any additional facilities needed by Contractor.

C. Contractor shall not interfere with use of or access to occupied portions of the building(s) or adjacent property.

D. Contractor shall maintain corridors, stairs, halls, and other exit-ways of building clear and free of debris and obstructions at all times.

E. No one other than those directly involved in the demolition and construction, or specifically designated by the District or the Architect shall be permitted in the areas of work during demolition and construction activities.

F. The Contractor shall install the construction fence and maintain that it will be locked when not in use. Keys to this fencing will be provided to the District.

1.08 PROTECTION OF EXISTING STRUCTURES AND UTILITIES

A. The Drawings show above-grade and below-grade structures, utility lines, and other installations that are known or believed to exist in the area of the Work. Contractor shall locate these existing installations before proceeding with excavation and other operations that could damage same; maintain them in service, where appropriate; and repair damage to them caused by the performance of the Work. Should damage occur to these existing installations, the costs of repair shall be at the Contractor's expense and made to the District's satisfaction.

B. Contractor shall be alert to the possibility of the existence of additional structures and utilities. If Contractor encounters additional structures and utilities, Contractor will immediately report to the District for disposition of same as indicated in the General Conditions.

1.09 UTILITY SHUTDOWNS AND INTERRUPTIONS

A. Contractor shall give the District a minimum of three (3) days written notice in advance of any need to shut off existing utility services or to effect equipment interruptions. The District will set exact time and duration for shutdown, and will assist Contractor with shutdown. Work required to re-establish utility services shall be performed by the Contractor.

B. Contractor shall obtain District's written approval as indicated in the General Conditions in advance of deliveries of material or equipment or other activities that may conflict with District's use of the building(s) or adjacent facilities.

1.10 STRUCTURAL INTEGRITY

A. Contractor shall be responsible for and supervise each operation and work that could affect structural integrity of various building elements, both permanent and temporary.

B. Contractor shall include structural connections and fastenings as indicated or required for complete performance of the Work.

PART 2 – PRODUCTS Not Used.

PART 3 – EXECUTION Not Used.

END OF DOCUMENT

DOCUMENT 01 2100

ALLOWANCE

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Non-specified work.

1.2 RELATED SECTIONS

A. Document 01 10 00 (Summary of Work)

B. Document 01 29 00 (Payments and Completion)

C. Document 01 32 19 (Submittal Procedures)

1.3 ALLOWANCES

A. Included in the Contract, a stipulated sum of **One Hundred Fifty Thousand Dollars & 1/100 ($150,000.00)** as an allowance for Unforeseen Conditions within the limits set forth in the Contract Documents. This Allowance shall not be utilized without written approval by the District.

B. Contractor's costs, without overhead and profit, for products, delivery, installation, labor, insurance, payroll, taxes, bonding and equipment rental will be included in Allowance Expenditure Directive authorizing expenditure of funds from this Allowance. No overhead and profit shall be added to the Allowance Expenditure Directive.

C. Funds will be drawn from Allowance only with District approval evidenced by an Allowance Expenditure Directive.

D. At Contract closeout, funds remaining in Allowance will be credited to District by Change Order.

E. Whenever costs are more than the Allowance, the amount covered by the Allowance will be approved at cost. The Contract Price shall be adjusted by Change Order for amounts in excess of the Allowance.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

Not used.

END OF DOCUMENT

DOCUMENT 01 2200

ALTERNATES AND UNIT PRICING

PART 1 – ALTERNATES

1.01 RELATED DOCUMENTS AND PROVISIONS

All Contract Documents should be reviewed for applicable provisions related to the provisions in this document, including without limitation:

A. General Conditions;

B. Special Conditions;

C. Bid Form and Proposal;

D. Instruction to Bidders.

1.02 DESCRIPTION

The items of work indicated below propose modifications to, substitutions for, additions to and/or deletions from the various parts of the Work specified in other Sections of the Specifications. The acceptance or rejection of any of the alternates is strictly at the option of the District subject to District's acceptance of Contractor's stated prices contained in this Proposal.

1.03 GENERAL

Where an item is omitted, or scope of Work is decreased, all Work pertaining to the item whether specifically stated or not, shall be omitted and where an item is added or modified or where scope of Work is increased, all Work pertaining to that required to render same ready for use on the Project in accordance with intention of Drawings and Specifications shall be included in an agreed upon price amount.

1.04 BASE BID

The Base Bid includes all work required to construct the Project completely and in accordance with the Contract Documents.

1.05 ALTERNATES

A. _Alternate No. 1 – paint South wall of Existing Building 'A', two-story, approximately 24'-0" tall, concrete wall from corner to corner to match existing color. The square footage is approximately 4,942 sq. ft.

1. **Refer to elevation 6, sheet A-5.1.01 2300 for height of building.**

PART 2 - UNIT PRICING

2.01 GENERAL

Contractor shall completely state all required figures based on Unit Prices listed below. Where scope of Work is decreased, all Work pertaining to the item, whether specifically stated or not, shall be omitted and where scope of Work is increased, all work pertaining to that item required to render same ready for use on the Project in accordance with intention of Drawings and Specifications shall be included in an agreed upon price amount.

2.02 UNIT PRICES

Furnish unit prices for each of the named items on a square foot, lineal foot, or per each basis, as applies. Unit prices shall include all labor, materials, services, profit, overhead, insurance, bonds, taxes, and all other incidental costs of Contractor, subcontractors, and supplier(s).

A. **None.**

END OF DOCUMENT

DOCUMENT 01 25 13

PRODUCT OPTIONS AND SUBSTITUTIONS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS AND PROVISIONS

All Contract Documents should be reviewed for applicable provisions related to the provisions in this document, including without limitation:

A. Instructions to Bidders;

B. General Conditions, including, without limitation, Substitutions For Specified Items; and

C. Special Conditions.

1.02 SUBSTITUTIONS OF MATERIALS AND EQUIPMENT

A. Catalog numbers and specific brands or trade names followed by the designation "or equal" are used in conjunction with material and equipment required by the Specifications to establish the standards of quality, utility, and appearance required. Substitutions which are equal in quality, utility, and appearance to those specified may be reviewed subject to the provisions of the General Conditions.

B. Wherever more than one manufacturer's product is specified, the first-named product is the basis for the design used in the work and the use of alternative-named manufacturers' products or substitutes may require modifications in that design. If such alternatives are proposed by Contractor and are approved by the District and/or the Architect, Contractor shall assume all costs required to make necessary revisions and modifications of the design resulting from the substitutions requested by the Contractor.

C. When materials and equipment are specified by first manufacturer's name and product number, second manufacturer's name and "or approved equal," supporting data for the second product, if proposed by Contractor, shall be submitted in accordance with the requirements for substitutions. The District's Board has found and determined that certain item(s) shall be used on this Project based on the purpose(s) indicated pursuant to Public Contract Code section 3400(c). These findings, as well as the products and brand or trade names, have been identified in the Notice to Bidders.

D. The Contractor will not be allowed to substitute specified items unless the request for substitution is submitted as follows:

(1) District must receive any notice of request for substitution of a specified item a minimum of ten (10) calendar days prior to bid opening.

(2) Within 35 days after the date of the Notice of Award, the Contractor shall submit data substantiating the request(s) for all substitution(s) containing sufficient information to assess acceptability of product or system and impact on Project, including, without limitation, the requirements specified in the Special Conditions and the technical Specifications. Insufficient information shall be grounds for rejection of substitution.

E. If the District and/or Architect, in reviewing proposed substitute materials and equipment, require revisions or corrections to be made to previously accepted Shop Drawings and supplemental supporting data to be resubmitted, Contractor shall promptly do so. If any proposed substitution is judged by the District and/or Architect to be unacceptable, the specified material or equipment shall be provided.

F. Samples may be required. Tests required by the District and/or Architect for the determination of quality and utility shall be made at the expense of Contractor, with acceptance of the test procedure first given by the District.

G. In reviewing the supporting data submitted for substitutions, the District and/or Architect will use for purposes of comparison all the characteristics of the specified material or equipment as they appear in the manufacturer's published data even though all the characteristics may not have been particularly mentioned in the Contract Documents. If more than two (2) submissions of supporting data are required, the cost of reviewing the additional supporting data shall be borne by Contractor, and the District will deduct the costs from the Contract Price. The Contractor shall be responsible for any re-design costs occasioned by District's acceptance and/or approval of any substitute.

H. The Contractor shall, in the event that a substitute is less costly than that specified, credit the District 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. 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.

I. In no event shall the District 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.

PART 2 – PRODUCTS Not Used.

PART 3 – EXECUTION Not Used.

END OF DOCUMENT

DOCUMENT 01 26 00

CHANGES IN THE WORK

CONTRACTOR SHALL COMPLY WITH ALL APPLICABLE PROVISIONS IN THE AGREEMENT, GENERAL CONDITIONS, AND SPECIAL CONDITIONS, IF USED, RELATED TO CHANGES AND/OR REQUESTS FOR CHANGES.

END OF DOCUMENT

DOCUMENT 01 29 00

APPLICATION FOR PAYMENT AND CONDITIONAL AND UNCONDITIONAL WAIVER AND RELEASE FORMS

CONTRACTOR SHALL COMPLY WITH ALL PROVISIONS IN THE GENERAL CONDITIONS RELATED TO APPLICATIONS FOR PAYMENT AND/OR PAYMENTS.

CONDITIONAL WAIVER AND RELEASE
ON PROGRESS PAYMENT
(CIVIL CODE SECTION 8132)

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.

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.

Claimant's Signature: _____

Claimant's Title: _____

Date of Signature: _____

UNCONDITIONAL WAIVER AND RELEASE
ON PROGRESS PAYMENT
(CIVIL CODE SECTION 8134)

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.

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.

Claimant's Signature: _____

Claimant's Title: _____

Date of Signature: _____

CONDITIONAL WAIVER AND RELEASE
ON FINAL PAYMENT
(CIVIL CODE SECTION 8136)

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.

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: $_____

Claimant's Signature: _____

Claimant's Title: _____

Date of Signature: _____

UNCONDITIONAL WAIVER AND RELEASE
ON FINAL PAYMENT
(CIVIL CODE SECTION 8138)

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.

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: $_____

Claimant's Signature: _____

Claimant's Title: _____

Date of Signature: _____

DOCUMENT 01 31 19

PROJECT MEETINGS

PART 1 – GENERAL

1.01 RELATED DOCUMENTS AND PROVISIONS:

All Contract Documents should be reviewed for applicable provisions related to the provisions in this document, including without limitation:

A. General Conditions; and

B. Special Conditions.

1.02 PROGRESS MEETINGS:

A. Contractor shall schedule and hold regular weekly progress meetings after a minimum of one week's prior written notice of the meeting date and time to all Invitees as indicated below.

B. Location: Contractor's field office.

C. The Contractor shall notify and invite the following entities ("Invitees"):

(1) District Representative.

(2) Contractor.

(3) Contractor's Project Manager.

(4) Contractor's Superintendent.

(5) Subcontractors, as appropriate to the agenda of the meeting.

(6) Suppliers, as appropriate to the agenda of the meeting.

(7) Construction Manager, if any.

(8) Architect

(9) Engineer(s), if any and as appropriate to the agenda of the meeting.

(10) Others, as appropriate to the agenda of the meeting.

D. The District's and/or the Architect's Consultants will attend at their discretion, in response to the agenda.

E. The District representative, the Construction Manager, and/or another District Agent shall take and distribute meeting notes to attendees and other concerned parties. If exceptions are taken to anything in the meeting notes,

those exceptions shall be stated in writing to the District within five (5) working days following District's distribution of the meeting notes.

1.03 PRE-INSTALLATION/PERFORMANCE MEETING:

A. Contractor shall schedule a meeting prior to the start of each of the following portions of the Work: cutting and patching of plaster and roofing, and other weather-exposed and moisture-resistant products. Contractor shall invite all Invitees to this meeting, and others whose work may affect or be affected by the quality of the cutting and patching work.

B. Contractor shall review in detail prior to this meeting, the manufacturer's requirements and specifications, applicable portions of the Contract Documents, Shop Drawings, and other submittals, and other related work. At this meeting, invitees shall review and resolve conflicts, incompatibilities, or inadequacies discovered or anticipated.

C. Contractor shall review in detail Project conditions, schedule, requirements for performance, application, installation, and quality of completed Work, and protection of adjacent Work and property.

D. Contractor shall review in detail means of protecting the completed Work during the remainder of the construction period.

PART 2 - PRODUCTS Not Used.

PART 3 - EXECUTION Not Used.

END OF DOCUMENT

DOCUMENT 01 3213

SCHEDULING OF WORK

PART 1 – GENERAL

1.01 RELATED DOCUMENTS AND PROVISIONS

All Contract Documents should be reviewed for applicable provisions related to the provisions in this document, including without limitation:

A. General Conditions;

B. Special Conditions;

C. Summary of Work; and

D. Submittals.

1.02 SECTION INCLUDES

A. Scheduling of Work under this Contract shall be performed by Contractor in accordance with requirements of this Section.

(1) Development of schedule, cost and resource loading of the schedule, monthly payment requests, and project status reporting requirements of the Contract shall employ computerized Critical Path Method ("CPM") scheduling ("CPM Schedule").

(2) CPM Schedule shall be cost loaded based on Schedule of Values as approved by District.

(3) Submit schedules and reports as specified in the General Conditions.

B. Upon Award of Contract, Contractor shall immediately commence development of Initial and Original CPM Schedules to ensure compliance with CPM Schedule submittal requirements.

1.03 CONSTRUCTION SCHEDULE

A. Within ten (10) days of issuance of the Notice to Proceed and before request for first progress payment, the Contractor shall prepare and submit to the Project Manager a construction progress schedule conforming to the Milestone Schedule below.

B. The Construction Schedule shall be continuously updated, and an updated schedule shall be submitted with each application for progress payment. Each revised schedule shall indicate the work actually accomplished during the previous period and the schedule for completion of the remaining work.

C. Milestone Schedule:

ACTIVITY DESCRIPTION	REQUIRED COMPLETION
CONSTRUCTION STARTS	**02/20/2023**
FINAL PROJECT COMPLETION	**10/15/2023**

1.04 QUALIFICATIONS

A. Contractor shall employ experienced scheduling personnel qualified to use the latest version of Microsoft Project. Experience level required is set forth below. Contractor may employ such personnel directly or may employ a consultant for this purpose.

(1) The written statement shall identify the individual who will perform CPM scheduling.

(2) Capability and experience shall be verified by description of construction projects on which individual has successfully applied computerized CPM.

(3) Required level of experience shall include at least two (2) projects of similar nature and scope with value not less than three fourths (¾) of the Total Bid Price of this Project. The written statement shall provide contact persons for referenced projects with current telephone and address information.

B. District reserves the right to approve or reject Contractor's scheduler or consultant at any time. District reserves the right to refuse replacing of Contractor's scheduler or consultant, if District believes replacement will negatively affect the scheduling of Work under this Contract.

1.05 GENERAL

A. Progress Schedule shall be based on and incorporate milestone and completion dates specified in Contract Documents.

B. Overall time of completion and time of completion for each milestone shown on Progress Schedule shall adhere to times in the Contract, unless an earlier (advanced) time of completion is requested by Contractor and agreed to by District. Any such agreement shall be formalized by a Change Order.

(1) District is not required to accept an early completion schedule, i.e., one that shows an earlier completion date than the Contract Time.

(2) Contractor shall not be entitled to extra compensation in event agreement is reached on an earlier completion schedule and Contractor completes its Work, for whatever reason, beyond completion date shown in its early completion schedule but within the Contract Time.

(3) A schedule showing the work completed in less than the Contract Time, and that has been accepted by District, shall be considered to have Project Float. The

Project Float is the time between the scheduled completion of the work and the Completion Date. Project Float is a resource available to both District and the Contractor.

C. Ownership Project Float: Neither the District nor Contractor owns Project Float. The Project owns the Project Float. As such, liability for delay of the Completion Date rests with the party whose actions, last in time, actually cause delay to the Completion Date.

(1) For example, if Party A uses some, but not all of the Project Float and Party B later uses remainder of the Project Float as well as additional time beyond the Project Float, Party B shall be liable for the time that represents a delay to the Completion Date.

(2) Party A would not be responsible for the time since it did not consume the entire Project Float and additional Project Float remained; therefore, the Completion Date was unaffected by Party A.

D. Progress Schedule shall be the basis for evaluating job progress, payment requests, and time extension requests. Responsibility for developing Contract CPM Schedule and monitoring actual progress as compared to Progress Schedule rests with Contractor.

E. Failure of Progress Schedule to include any element of the Work, or any inaccuracy in Progress Schedule, will not relieve Contractor from responsibility for accomplishing the Work in accordance with the Contract. District's acceptance of schedule shall be for its use in monitoring and evaluating job progress, payment requests, and time extension requests and shall not, in any manner, impose a duty of care upon District, or act to relieve Contractor of its responsibility for means and methods of construction.

F. Software: Use the latest version of Microsoft Project. Such software shall be compatible with Windows operating system. Contractor shall transmit contract file to District on compact disk at times requested by District.

G. Transmit each item under the form approved by District.

(1) Identify Project with District Contract number and name of Contractor.

(2) Provide space for Contractor's approval stamp and District's review stamps.

(3) Submittals received from sources other than Contractor will be returned to the Contractor without District's review.

1.06 INITIAL CPM SCHEDULE

A. Initial CPM Schedule submitted for review at the pre-construction conference shall serve as Contractor's schedule for up to ninety (90) calendar days after the Notice to Proceed.

B. Indicate detailed plan for the Work to be completed in first ninety (90) days of the Contract; details of planned mobilization of plant and equipment; sequence of early operations; procurement of materials and equipment. Show Work beyond ninety (90) calendar days in summary form.

C. Initial CPM Schedule shall be time scaled.

D. Initial CPM Schedule shall be cost and resource loaded. Accepted cost and resource loaded schedule will be used as basis for monthly progress payments until acceptance of the Original CPM Schedule. Use of Initial CPM Schedule for progress payments shall not exceed ninety (90) calendar days.

E. District and Contractor shall meet to review and discuss the Initial CPM Schedule within seven (7) calendar days after it has been submitted to District.

(1) District's review and comment on the schedule shall be limited to Contract conformance (with sequencing, coordination, and milestone requirements).

(2) Contractor shall make corrections to schedule necessary to comply with Contract requirements and shall adjust schedule to incorporate any missing information requested by District. Contractor shall resubmit Initial CPM Schedule if requested by District.

F. If, during the first ninety (90) days after Notice to Proceed, the Contractor is of the opinion that any of the Work included on its Initial CPM Schedule has been impacted, the Contractor shall submit to District a written Time Impact Evaluation ("TIE") in accordance with Article 1.12 of this Section. The TIE shall be based on the most current update of the Initial CPM Schedule.

1.07 ORIGINAL CPM SCHEDULE

A. Submit a detailed proposed Original CPM Schedule presenting an orderly and realistic plan for completion of the Work in conformance with requirements as specified herein.

B. Progress Schedule shall include or comply with following requirements:

(1) Time scaled, cost and resource (labor and major equipment) loaded CPM schedule.

(2) No activity on schedule shall have duration longer than fifteen (15) work days, with exception of submittal, approval, fabrication and procurement activities, unless otherwise approved by District.

(a) Activity durations shall be total number of actual work days required to perform that activity.

(3) The start and completion dates of all items of Work, their major components, and milestone completion dates, if any.

(4) District furnished materials and equipment, if any, identified as separate activities.

(5) Activities for maintaining Project Record Documents.

(6) Dependencies (or relationships) between activities.

(7) Processing/approval of submittals and shop drawings for all material and equipment required per the Contract. Activities that are dependent on submittal

acceptance or material delivery shall not be scheduled to start earlier than expected acceptance or delivery dates.

(a) Include time for submittals, re-submittals and reviews by District. Coordinate with accepted schedule for submission of Shop Drawings, samples, and other submittals.

(b) Contractor shall be responsible for all impacts resulting from re-submittal of Shop Drawings and submittals.

(8) Procurement of major equipment, through receipt and inspection at jobsite, identified as separate activity.

(a) Include time for fabrication and delivery of manufactured products for the Work.

(b) Show dependencies between procurement and construction.

(9) Activity description; what Work is to be accomplished and where.

(10) The total cost of performing each activity shall be total of labor, material, and equipment, excluding overhead and profit of Contractor. Overhead and profit of the General Contractor shall be shown as a separate activity in the schedule. Sum of cost for all activities shall equal total Contract value.

(11) Resources required (labor and major equipment) to perform each activity.

(12) Responsibility code for each activity corresponding to Contractor or Subcontractor responsible for performing the Work.

(13) Identify the activities which constitute the controlling operations or critical path. No more than twenty-five (25%) of the activities shall be critical or near critical. Near critical is defined as float in the range of one (1) to (10) days.

(14) Twenty (20) workdays for developing punch list(s), completion of punch-list items, and final clean up for the Work or any designated portion thereof. No other activities shall be scheduled during this period.

(15) Interface with the work of other contractors, District, and agencies such as, but not limited to, utility companies.

(16) Show detailed Subcontractor Work activities. In addition, furnish copies of Subcontractor schedules upon which CPM was built.

(a) Also furnish for each Subcontractor, as determined by District, submitted on Subcontractor letterhead, a statement certifying that Subcontractor concurs with Contractor's Original CPM Schedule and that Subcontractor's related schedules have been incorporated, including activity duration, cost and resource loading.

(b) Subcontractor schedules shall be independently derived and not a copy of Contractor's schedule.

(c) In addition to Contractor's schedule and resource loading, obtain from electrical, mechanical, and plumbing Subcontractors, and other Subcontractors as required by District, productivity calculations common to their trades, such as units per person day, feet of pipe per day per person, feet of wiring per day per person, and similar information.

(d) Furnish schedule for Contractor/Subcontractor CPM schedule meetings which shall be held prior to submission of Original CPM schedule to District. District shall be permitted to attend scheduled meetings as an observer.

(17) Activity durations shall be in Work days.

(18) Submit with the schedule a list of anticipated non-Work days, such as weekends and holidays. The Progress Schedule shall exclude in its Work day calendar all non-Work days on which Contractor anticipates critical Work will not be performed.

C. Original CPM Schedule Review Meeting: Contractor shall, within sixty (60) days from the Notice to Proceed date, meet with District to review the Original CPM Schedule submittal.

(1) Contractor shall have its Project Manager, Project Superintendent, Project Scheduler, and key Subcontractor representatives, as required by District, in attendance. The meeting will take place over a continuous one (1) day period.

(2) District's review will be limited to submittal's conformance to Contract requirements including, but not limited to, coordination requirements. However, review may also include:

(a) Clarifications of Contract Requirements.

(b) Directions to include activities and information missing from submittal.

(c) Requests to Contractor to clarify its schedule.

(3) Within five (5) days of the Schedule Review Meeting, Contractor shall respond in writing to all questions and comments expressed by District at the Meeting.

1.08 ADJUSTMENTS TO CPM SCHEDULE

A. Adjustments to Original CPM Schedule: Contractor shall have adjusted the Original CPM Schedule submittal to address all review comments from original CPM Schedule review meeting and resubmit network diagrams and reports for District's review.

(1) District, within ten (10) days from date that Contractor submitted the revised schedule, will either:

(a) Accept schedule and cost and resource loaded activities as submitted, or

(b) Advise Contractor in writing to review any part or parts of schedule which either do not meet Contract requirements or are unsatisfactory for District to monitor Project's progress, resources, and status or evaluate monthly payment request by Contractor.

(2) District may accept schedule with conditions that the first monthly CPM Schedule update be revised to correct deficiencies identified.

(3) When schedule is accepted, it shall be considered the "Original CPM Schedule" which will then be immediately updated to reflect the current status of the work.

(4) District reserves right to require Contractor to adjust, add to, or clarify any portion of schedule which may later be discovered to be insufficient for monitoring of Work or approval of partial payment requests. No additional compensation will be provided for such adjustments, additions, or clarifications.

B. Acceptance of Contractor's schedule by District will be based solely upon schedule's compliance with Contract requirements.

(1) By way of Contractor assigning activity durations and proposing sequence of Work, Contractor agrees to utilize sufficient and necessary management and other resources to perform work in accordance with the schedule.

(2) Upon submittal of schedule update, updated schedule shall be considered "current" CPM Schedule.

(3) Submission of Contractor's schedule to District shall not relieve Contractor of total responsibility for scheduling, sequencing, and pursuing Work to comply with requirements of Contract Documents, including adverse effects such as delays resulting from ill-timed Work.

C. Submittal of Original CPM Schedule, and subsequent schedule updates, shall be understood to be Contractor's representation that the Schedule meets requirements of Contract Documents and that Work shall be executed in sequence indicated on the schedule.

D. Contractor shall distribute Original CPM Schedule to Subcontractors for review and written acceptance, which shall be noted on Subcontractors' letterheads to Contractor and transmitted to District for the record.

1.09 MONTHLY CPM SCHEDULE UPDATE SUBMITTALS

A. Following acceptance of Contractor's Original CPM Schedule, Contractor shall monitor progress of Work and adjust schedule each month to reflect actual progress and any anticipated changes to planned activities.

(1) Each schedule update submitted shall be complete, including all information requested for the Original CPM Schedule submittal.

(2) Each update shall continue to show all Work activities including those already completed. These completed activities shall accurately reflect "as built" information by indicating when activities were actually started and completed.

B. A meeting will be held on approximately the twenty-fifth (25th) of each month to review the schedule update submittal and progress payment application.

(1) At this meeting, at a minimum, the following items will be reviewed: Percent (%) complete of each activity; Time Impact Evaluations for Change Orders and Time Extension Request; actual and anticipated activity sequence changes; actual and anticipated duration changes; and actual and anticipated Contractor delays.

(2) These meetings are considered a critical component of overall monthly schedule update submittal and Contractor shall have appropriate personnel attend. At a minimum, these meetings shall be attended by Contractor's General Superintendent and Scheduler.

(3) Contractor shall plan on the meeting taking no less than four (4) hours.

C. Within five (5) working days after monthly schedule update meeting, Contractor shall submit the updated CPM Schedule update.

D. Within five (5) work days of receipt of above noted revised submittals, District will either accept or reject monthly schedule update submittal.

(1) If accepted, percent (%) complete shown in monthly update will be basis for Application for Payment by the Contractor. The schedule update shall be submitted as part of the Contractor's Application for Payment.

(2) If rejected, update shall be corrected and resubmitted by Contractor before the Application for Payment is submitted.

E. Neither updating, changing or revising of any report, curve, schedule, or narrative submitted to District by Contractor under this Contract, nor District's review or acceptance of any such report, curve, schedule or narrative shall have the effect of amending or modifying in any way the Completion Date or milestone dates or of modifying or limiting in any way Contractor's obligations under this Contract.

1.10 SCHEDULE REVISIONS

A. Updating the Schedule to reflect actual progress shall not be considered revisions to the Schedule. Since scheduling is a dynamic process, revisions to activity durations and sequences are expected on a monthly basis.

B. To reflect revisions to the Schedule, the Contractor shall provide District with a written narrative with a full description and reasons for each Work activity revised. For revisions affecting the sequence of work, the Contractor shall provide a schedule diagram which compares the original sequence to the revised sequence of work. The Contractor shall provide the written narrative and schedule diagram for revisions two (2) working days in advance of the monthly schedule update meeting.

C. Schedule revisions shall not be incorporated into any schedule update until the revisions have been reviewed by District. District may request further information and justification for schedule revisions and Contractor shall, within three (3) days, provide District with a complete written narrative response to District's request.

D. If the Contractor's revision is still not accepted by District, and the Contractor disagrees with District's position, the Contractor has seven (7) calendar days from receipt of District's letter rejecting the revision to provide a written narrative providing full justification and explanation for the revision. The Contractor's failure to respond in writing within seven (7) calendar days of District's written rejection of a schedule revision shall be contractually interpreted as acceptance of District's position, and the Contractor waives its rights to subsequently dispute or file a claim regarding District's position.

E. At District's discretion, the Contractor can be required to provide Subcontractor certifications of performance regarding proposed schedule revisions affecting said Subcontractors.

1.11 RECOVERY SCHEDULE

A. If the Schedule Update shows a completion date twenty-one (21) calendar days beyond the Contract Completion Date, or individual milestone completion dates, the Contractor shall submit to District the proposed revisions to recover the lost time within seven (7) calendar days. As part of this submittal, the Contractor shall provide a written narrative for each revision made to recapture the lost time. If the revisions include sequence changes, the Contractor shall provide a schedule diagram comparing the original sequence to the revised sequence of work.

B. The revisions shall not be incorporated into any schedule update until the revisions have been reviewed by District.

C. If the Contractor's revisions are not accepted by District, District and the Contractor shall follow the procedures in paragraph 1.09.C, 1.09.D and 1.09.E above.

D. At District's discretion, the Contractor can be required to provide Subcontractor certifications for revisions affecting said Subcontractors.

1.12 TIME IMPACT EVALUATION ("TIE") FOR CHANGE ORDERS, AND OTHER DELAYS

A. When Contractor is directed to proceed with changed Work, the Contractor shall prepare and submit within fourteen (14) calendar days from the Notice to Proceed a TIE which includes both a written narrative and a schedule diagram depicting how the changed Work affects other schedule activities. The schedule diagram shall show how the Contractor proposes to incorporate the changed Work in the schedule and how it impacts the current schedule-update critical path. The Contractor is also responsible for requesting time extensions based on the TIE's impact on the critical path. The diagram must be tied to the main sequence of schedule activities to enable District to evaluate the impact of changed Work to the scheduled critical path.

B. Contractor shall be required to comply with the requirements of Paragraph 1.09.A for all types of delays such as, but not limited to, Contractor/Subcontractor delays, adverse weather delays, strikes, procurement delays, fabrication delays, etc.

C. Contractor shall be responsible for all costs associated with the preparation of TIEs, and the process of incorporating them into the current schedule update. The Contractor shall provide District with four (4) copies of each TIE.

D. Once agreement has been reached on a TIE, the Contract Time will be adjusted accordingly. If agreement is not reached on a TIE, the Contract Time may be extended in an amount District allows, and the Contractor may submit a claim for additional time claimed by contractor.

1.13 TIME EXTENSIONS

A. The Contractor is responsible for requesting time extensions for time impacts that, in the opinion of the Contractor, impact the critical path of the current schedule update. Notice of time impacts shall be given in accord with the General Conditions.

B. Where an event for which District is responsible impacts the projected Completion Date, the Contractor shall provide a written mitigation plan, including a schedule diagram, which explains how (e.g., increase crew size, overtime, etc.) the impact can be mitigated. The Contractor shall also include a detailed cost breakdown of the labor, equipment, and material the Contractor would expend to mitigate District-caused time impact. The Contractor shall submit its mitigation plan to District within fourteen (14) calendar days from the date of discovery of the impact. The Contractor is responsible for the cost to prepare the mitigation plan.

C. Failure to request time, provide TIE, or provide the required mitigation plan will result in Contractor waiving its right to a time extension and cost to mitigate the delay.

D. No time will be granted under this Contract for cumulative effect of changes.

E. District will not be obligated to consider any time extension request unless the Contractor complies with the requirements of Contract Documents.

F. Failure of the Contractor to perform in accordance with the current schedule update shall not be excused by submittal of time extension requests.

G. If the Contractor does not submit a TIE within the required fourteen (14) calendar days for any issue, it is mutually agreed that the Contractor does not require a time extension for said issue.

1.14 SCHEDULE REPORTS

A. Submit four (4) copies of the following reports with the Initial CPM Schedule, the Original CPM Schedule, and each monthly update.

B. Required Reports:

(1) Two activity listing reports: one sorted by activity number and one by total Project Float. These reports shall also include each activity's early/late and actual start and finish dates, original and remaining duration, Project Float, responsibility code, and the logic relationship of activities.

(2) Cost report sorted by activity number including each activity's associated cost, percentage of Work accomplished, earned value- to date, previous payments, and amount earned for current update period.

(3) Schedule plots presenting time-scaled network diagram showing activities and their relationships with the controlling operations or critical path clearly highlighted.

(4) Cash flow report calculated by early start, late start, and indicating actual progress. Provide an exhibit depicting this information in graphic form.

(5) Planned versus actual resource (i.e., labor) histogram calculated by early start and late start.

C. Other Reports:

In addition to above reports, District may request, from month to month, any two of the following reports. Submit four (4) copies of all reports.

(1) Activities by early start.

(2) Activities by late start.

(3) Activities grouped by Subcontractors or selected trades.

(4) Activities with scheduled early start dates in a given time frame, such as fifteen (15) or thirty (30) day outlook.

D. Furnish District with report files on compact disks containing all schedule files for each report generated.

1.15 PROJECT STATUS REPORTING

A. In addition to submittal requirements for CPM scheduling identified in this Section, Contractor shall provide a monthly project status report (i.e., written narrative report) to be submitted in conjunction with each CPM Schedule as specified herein. Status reporting shall be in form specified below.

B. Contractor shall prepare monthly written narrative reports of status of Project for submission to District. Written status reports shall include:

(1) Status of major Project components (percent (%) complete, amount of time ahead or behind schedule) and an explanation of how Project will be brought back on schedule if delays have occurred.

(2) Progress made on critical activities indicated on CPM Schedule.

(3) Explanations for any lack of work on critical path activities planned to be performed during last month.

(4) Explanations for any schedule changes, including changes to logic or to activity durations.

(5) List of critical activities scheduled to be performed next month.

(6) Status of major material and equipment procurement.

(7) Any delays encountered during reporting period.

(8) Contractor shall provide printed report indicating actual versus planned resource loading for each trade and each activity. This report shall be provided on weekly and monthly basis.

(a) Actual resource shall be accumulated in field by Contractor, and shall be as noted on Contractor's daily reports. These reports will be basis for information provided in computer-generated monthly and weekly printed reports.

(b) Contractor shall explain all variances and mitigation measures.

(9) Contractor may include any other information pertinent to status of Project. Contractor shall include additional status information requested by District at no additional cost.

(10) Status reports, and the information contained therein, shall not be construed as claims, notice of claims, notice of delay, or requests for changes or compensation.

1.16 WEEKLY SCHEDULE REPORT

At the Weekly Progress Meeting, the Contractor shall provide and present a time-scaled three (3) week look-ahead schedule that is based and correlated by activity number to the current schedule (i.e., Initial, Original CPM, or Schedule Update).

1.17 DAILY CONSTRUCTION REPORTS

On a daily basis, Contractor shall submit a daily activity report to District for each workday, including weekends and holidays when worked. Contractor shall develop the daily construction reports on a computer-generated database capable of sorting daily Work, manpower, and man-hours by Contractor, Subcontractor, area, sub-area, and Change Order Work. Upon request of District, furnish computer disk of this data base. Obtain District's written approval of daily construction report data base format prior to implementation. Include in report:

A. Project name and Project number.

B. Contractor's name and address.

C. Weather, temperature, and any unusual site conditions.

D. Brief description and location of the day's scheduled activities and any special problems and accidents, including Work of Subcontractors. Descriptions shall be referenced to CPM scheduled activities.

E. Worker quantities for its own Work force and for Subcontractors of any tier.

F. Equipment, other than hand tools, utilized by Contractor and Subcontractors.

1.18 PERIODIC VERIFIED REPORTS

Contractor shall complete and verify construction reports on a form prescribed by the Division of the State Architect and file reports on the first day of February, May, August, and November during the preceding quarter year; at the completion of the Contract; at the completion of the Work; at the suspension of Work for a period of more than one (1) month; whenever the services of Contractor or any of Contractor's Subcontractors are terminated for any reason; and at any time a special verified report is required by the Division of the State Architect. Refer to section 4-336 and section 4-343 of Part 1, Title 24 of the California Code of Regulations.

PART 2 – PRODUCTS Not Used.

PART 3 - EXECUTION Not Used.

END OF DOCUMENT

DOCUMENT 01 33 00

SUBMITTALS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS AND PROVISIONS:

All Contract Documents should be reviewed for applicable provisions related to the provisions in this document, including without limitation:

A. General Conditions, including, without limitation, Contractor's Submittals and Schedules, Drawings and Specifications;

B. Special Conditions.

1.02 SECTION INCLUDES:

A. Definitions:

(1) Shop Drawings and Product Data are as indicated in the General Conditions and include, but are not limited to, fabrication, erection, layout and setting drawings, formwork and falsework drawings, manufacturers' standard drawings, descriptive literature, catalogues, brochures, performance and test data, wiring and control diagrams. In addition, there are other drawings and descriptive data pertaining to materials, equipment, piping, duct and conduit systems, and methods of construction as may be required to show that the materials, equipment or systems and all positions conform to the requirement of the Contract Documents, including, without limitation, the Drawings.

(2) "Manufactured" applies to standard units usually mass-produced; "fabricated" means specifically assembled or made out of selected materials to meet design requirements. Shop Drawings shall establish the actual detail of manufactured or fabricated items, indicated proper relation to adjoining work and amplify design details of mechanical and electrical equipment in proper relation to physical spaces in the structure.

(3) Manufacturer's Instructions: Where any item of Work is required by the Contract Documents to be furnished, installed, or performed, at a minimum, in accordance with a specified product manufacturer's instructions, the Contractor shall procure and distribute copies of these to the District, the Architect, and all other concerned parties and shall furnish, install, or perform the work, at a minimum, in accordance with those instructions.

B. Samples, Shop Drawings, Product Data, and other items as specified, in accordance with the following requirements:

(1) Contractor shall submit all Shop Drawings, Product Data, and Samples to the District, the Architect, the Project Inspector, and the Construction Manager.

(2) Contractor shall comply with all time frames herein and in the General Conditions and, in any case, shall submit required information in sufficient time to permit proper consideration and action before ordering any materials or items represented by such Shop Drawings, Product Data, and/or Samples.

(3) Contractor shall allow sufficient time so that no delay occurs due to required lead time in ordering or delivery of any item to the Site. Contractor shall be responsible for any delay in progress of Work due to its failure to observe these requirements.

(4) Time for completion of Work shall not be extended on account of Contractor's failure to promptly submit Shop Drawings, Product Data, and/or Samples.

(5) Reference numbers on Shop Drawings shall have Architectural and/or Engineering Contract Drawings reference numbers for details, sections, and "cuts" shown on Shop Drawings. These reference numbers shall be in addition to any numbering system that Contractor chooses to use or has adopted as standard.

(6) When the magnitude or complexity of submittal material prevents a complete review within the stated time frame, Contractor shall make this submittal in increments to avoid extended delays.

(7) Contractor shall certify on submittals for review that submittals conform to Contract requirements. Also certify that Contractor-furnished equipment can be installed in allocated space. In event of any variance, Contractor shall specifically state in transmittal and on Shop Drawings, portions vary and require approval of a substitute. Submittals shall not be used as a means of requesting a substitution.

(8) Unless specified otherwise, sampling, preparation of samples, and tests shall be in accordance with the latest standard of the American Society for Testing and Materials.

(9) Upon demand by Architect or District, Contractor shall submit samples of materials and/or articles for tests or examinations and consideration before Contractor incorporates same in Work. Contractor shall be solely responsible for delays due to sample(s) not being submitted in time to allow for tests. Acceptance or rejection will be expressed in writing. Work shall be equal to approved samples in every respect. Samples that are of value after testing will remain the property of Contractor.

C. Submittal Schedule:

(1) Contractor shall prepare its proposed submittal schedule that is coordinated with the proposed construction schedule and submit both to the District within ten (10) days after the date of the Notice to Proceed. Contractor's proposed schedules shall become the Project Construction Schedule and the Project Submittal Schedule after each is approved by the District.

(2) Contractor is responsible for all lost time should the initial submittal be rejected, marked "revise and resubmit", etc.

(3) All Submittals shall be forwarded to the District 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 District so as not to delay the Construction Schedule.

(4) Contractor may be assessed $100 a day for each day it is late in submitting a shop drawing or sample. No extensions of time will be granted to Trade Contractor or any Subcontractor because of its failure to have shop drawings and samples submitted in accordance with the Schedule.

1.03 SHOP DRAWINGS:

A. Contractor shall submit one reproducible transparency and six (6) opaque reproductions. The District will review and return the reproducible copy and one (1) opaque reproduction to Contractor.

B. Before commencing installation of any Work, the Contractor shall submit and receive approval of all drawings, descriptive data, and material list(s) as required to accomplish Work.

C. Review of Shop Drawings is regarded as a service to assist Contractor and in all cases original Contract Documents shall take precedence as outlined under General Conditions.

D. No claim for extra time or payment shall be based on work shown on Shop Drawings unless the claim is (1) noted on Contractor's transmittal letter accompanying Shop Drawings and (2) Contractor has complied with all applicable provisions of the General Conditions, including, without limitation, provisions regarding changes and payment, and all required written approvals.

E. District shall not review Shop Drawings for quantities of materials or number of items supplied.

F. District's and/or Architect’s review of Shop Drawing will be general. District and/or Architect review does not relieve Contractor of responsibility for dimensions, accuracy, proper fitting, construction of Work, furnishing of materials, or Work required by Contract Documents and not indicated on Shop Drawings. The District’s and/or Architect’s review of Shop Drawings is not to be construed as approving departures from Contract Documents.

G. Review of Shop Drawings and Schedules does not relieve Contractor from responsibility for any aspect of those Drawings or Schedules that is a violation of local, County, State, or Federal laws, rules, ordinances, or rules and regulations of commissions, boards, or other authorities or utilities having jurisdiction.

H. Before submitting Shop Drawings for review, Contractor shall check Shop Drawings of its subcontractors for accuracy, and confirm that all Work

contiguous with and having bearing on other work shown on Shop Drawings is accurately drawn and in conformance with Contract Documents.

I. Submitted drawings and details must bear stamp of approval of Contractor:

(1) Stamp and signature shall clearly certify that Contractor has checked Shop Drawings for compliance with Drawings.

(2) If Contractor submits a Shop Drawing without an executed stamp of approval, or whenever it is evident (despite stamp) that Drawings have not been checked, the District and/or Architect will not consider them and will return them to the Contractor for revision and resubmission. In that event, it will be deemed that Contractor has not complied with this provision and Contractor shall bear risk of all delays to same extent as if it had not submitted any Shop Drawings or details.

J. Submission of Shop Drawings (in either original submission or when resubmitted with correction) constitutes evidence that Contractor has checked all information thereon and that it accepts and is willing to perform Work as shown.

K. Contractor shall pay for cost of any changes in construction due to improper checking and coordination. Contractor shall be responsible for all additional costs, including coordination. Contractor shall be responsible for costs incurred by itself, the District, the Architect, the Project Inspector, the Construction Manager, any other Subcontractor or contractor, etc., due to improperly checked and/or coordination of submittals.

L. Shop Drawings must clearly delineate the following information:

(1) Project name and address.

(2) Specification number and description.

(3) Architect's name and project number.

(4) Shop Drawing title, number, date, and scale.

(5) Names of Contractor, Subcontractor(s) and fabricator.

(6) Working and erection dimensions.

(7) Arrangements and sectional views.

(8) Necessary details, including complete information for making connections with other Work.

(9) Kinds of materials and finishes.

(10) Descriptive names of materials and equipment, classified item numbers, and locations at which materials or equipment are to be installed in the Work. Contractor shall use same reference identification(s) as shown on Contract Drawings.

M. Contractor shall prepare composite drawings and installation layouts when required to solve tight field conditions.

(1) Shop Drawings shall consist of dimensioned plans and elevations and must give complete information, particularly as to size and location of sleeves, inserts, attachments, openings, conduits, ducts, boxes, structural interferences, etc.

(2) Contractor shall coordinate these composite Shop Drawings and installation layouts in the field between itself and its Subcontractor(s) for proper relationship to the Work, the work of other trades, and the field conditions. The Contractor shall check and approve all submittal(s) before submitting them for final review.

1.04 PRODUCT DATA OR NON REPRODUCIBLE SUBMITTALS:

A. Contractor shall submit manufacturer's printed literature in original form. Any fading type of reproduction will not be accepted. Contract must submit a minimum of six (6) each, to the District. District shall return one (1) to the Contractor, who shall reproduce whatever additional copies it requires for distribution.

B. Contractor shall submit six (6) copies of a complete list of all major items of mechanical, plumbing, and electrical equipment and materials in accordance with the approved Submittal Schedule, except as required earlier to comply with the approved Construction Schedule. Other items specified are to be submitted prior to commencing Work. Contractor shall submit items of like kind at one time in a neat and orderly manner. Partial lists will not be acceptable.

C. Submittals shall include manufacturer's specifications, physical dimensions, and ratings of all equipment. Contractor shall furnish performance curves for all pumps and fans. Where printed literature describes items in addition to that item being submitted, submitted item shall be clearly marked on sheet and superfluous information shall be crossed out. If highlighting is used, Contractor shall mark all copies.

D. Equipment submittals shall be complete and include space requirements, weight, electrical and mechanical requirements, performance data, and supplemental information that may be requested.

E. Imported Materials Certification must be submitted at least ten (10) days before material is delivered.

1.05 SAMPLES:

A. Contractor shall submit for approval Samples as required and within the time frame in the Contract Documents. Materials such as concrete, mortar, etc., which require on-site testing will be obtained from Project Site.

B. Contractor shall submit four (4) samples except where greater or lesser number is specifically required by Contract Documents including, without limitation, the Specifications.

(1) Samples must be of sufficient size and quality to clearly illustrate functional characteristics, with integrally related parts and attachment devices.

(2) Samples must show full range of texture, color, and pattern.

C. Contractor shall make all Submittals, unless it has authorized Subcontractor(s) to submit and Contractor has notified the District in writing to this effect.

D. Samples to be shipped prepaid or hand-delivered to the District.

E. Contractor shall mark samples to show name of Project, name of Contractor submitting, Contract number and segment of Work where representative Sample will be used, all applicable Specifications Sections and documents, Contract Drawing Number and detail, and ASTM or FS reference, if applicable.

F. Contractor shall not deliver any material to Site prior to receipt of District's and/or Architect's completed written review and approval. Contractor shall furnish materials equal in every respect to approved Samples and execute Work in conformance therewith.

G. District's and/or Architect's review, acceptance, and/or approval of Sample(s) will not preclude rejections of any material upon discovery of defects in same prior to final acceptance of completed Work.

H. After a material has been approved, no change in brand or make will be permitted.

I. Contractor shall prepare its Submittal Schedule and submit Samples of materials requiring laboratory tests to specified laboratory for testing not less than ninety (90) days before such materials are required to be used in Work.

J. Samples which are rejected must be resubmitted promptly after notification of rejection and be marked "Resubmitted Sample" in addition to other information required.

K. Field Samples and Mock-Ups are to be removed by Contractor at District's direction:

(1) Size: As Specified.

(2) Furnish catalog numbers and similar data, as requested.

1.06 REVIEW AND RESUBMISSION REQUIREMENTS:

A. The District will arrange for review of Sample(s), Shop Drawing(s), Product Data, and other submittal(s) by appropriate reviewer and return to Contractor as provided below within twenty-one (21) days after receipt or within twenty-one (21) days after receipt of all related information necessary for such review, whichever is later.

B. One (1) copy of product or materials data will be returned to Contractor with the review status.

C. Samples to be incorporated into the Work will be returned to Contractor, together with a written notice designating the Sample with the appropriate review status and indicating errors discovered on review, if any. Other Samples will not be returned, but the same notice will be given with respect thereto, and that notice shall be considered a return of the Sample.

D. Contractor shall revise and resubmit any Sample(s), Shop Drawing(s), Product Data, and other submittal(s) as required by the reviewer. Such resubmittals will be reviewed and returned in the same manner as original Sample(s), Shop Drawing(s), Product Data, and other submittal(s), within fourteen (14) days after receipt thereof or within fourteen (14) days after receipt of all related information necessary for such review. Such resubmittal shall not delay the Work.

E. Contractor may proceed with any of the Work covered by Sample(s), Shop Drawing(s), Product Data, and other submittal(s) upon its return if designated as no exception taken, or revise as noted, provided the Contractor proceeds in accordance with the District and/or the Architect's notes and comments.

F. Contractor shall not begin any of the work covered by a Sample(s), Shop Drawing(s), Product Data, and other submittal(s), designated as revise and resubmit or rejected, until a revision or correction thereof has been reviewed and returned to Contractor.

G. Sample(s), Shop Drawing(s), Product Data, and other submittal(s) designated as revise and resubmit or rejected and requiring resubmittal, shall be revised or corrected and resubmitted to the District no later than fourteen (14) days or a shorter period as required to comply with the approved Construction Schedule, after its return to Contractor.

H. Neither the review nor the lack of review of any Sample(s), Shop Drawing(s), Product Data, and other submittal(s) shall waive any of the requirements of the Contract Documents, or relieve Contractor of any obligation thereunder.

I. District's and/or Architect's review of Shop Drawings does not relieve the Contractor of responsibility for any errors that may exist. Contractor is responsible for the dimensions and design of adequate connections and details and for satisfactory construction of all the Work.

PART 2 – PRODUCTS Not Used.

PART 3 - EXECUTION Not Used.

END OF DOCUMENT

DOCUMENT 01 35 13.23

SITE STANDARDS

PART 1 – GENERAL

1.01 RELATED DOCUMENTS AND PROVISIONS:

All Contract Documents should be reviewed for applicable provisions related to the provisions in this document, including without limitation:

A. General Conditions, including without limitation, Site Access, Conditions, and Regulations;

B. Special Conditions;

C. Drug-Free Workplace Certification;

D. Tobacco-Free Environment Certification;

E. Criminal Background Investigation/Fingerprinting Certification;

F. Temporary Facilities and Controls.

1.02 REQUIREMENTS OF THE DISTRICT:

A. Drug-Free Schools and Safety Requirements:

(1) All school sites and other District Facilities have been declared "Drug-Free Zones." No drugs, alcohol and/or smoking are allowed at any time in any buildings and/or grounds on District property. No students, staff, visitors, or contractors are to use drugs on these sites.

(2) Smoking and the use of tobacco products by all persons is prohibited on or in District property. District property includes school buildings, school grounds, school-owned vehicles and vehicles owned by others while on District property. Contractor shall post: "Non-Smoking Area" in a highly visible location in each work area, staging area, and parking area. Contractor may designate a smoking area outside of District property within the public right-of-way, provided that this area remains quiet and unobtrusive to adjacent neighbors. This smoking area is to be kept clean at all times.

(3) Contractor shall ensure that no alcohol, firearms, weapons, or controlled substances enter or are used at the Site. Contractor shall immediately remove from the Site and terminate the employment of any employee(s) found in violation of this provision.

B. Language: Profanity or other unacceptable and/or loud language will not be tolerated, "Cat calls" or other derogatory language toward students, staff, volunteers, parents or public will not be allowed.

C. Disturbing the Peace (Noise and Lighting):

(1) Contractor shall observe the noise ordinance of the Site at all times including, without limitation, all applicable local, city, and/or state laws, ordinances, and/or regulations regarding noise and allowable noise levels.

(2) The use of radios, etc., shall be controlled to keep all sound at a level that cannot be heard beyond the immediate area of use. District reserves the right to prohibit the use of radios at the Site, except for mobile phones or other handheld communication radios.

(3) If portable lights are used after dark, all light must be located so as not to direct light into neighboring property.

D. Traffic:

(1) Driving on the Premises shall be limited to periods when students and public are not present. If driving or deliveries must be made during the school hours, two (2) or more ground guides shall lead the vehicle across the area of travel. In no case shall driving take place across playgrounds or other pedestrian paths during recess, lunch, and/or class period changes. The speed limit on-the Premises shall be five (5) miles per hour (maximum) or less if conditions require.

(2) All paths of travel for deliveries, including without limitation, material, equipment, and supply deliveries, shall be reviewed and approved by District in advance. Any damage will be repaired to the pre-damaged condition by the Contractor.

(3) District shall designate a construction entry to the Site. If Contractor requests, District determines it is required, and to the extent possible, District shall designate a staging area so as not to interfere with the normal functioning of school facilities. Location of gates and fencing shall be approved in advance with District and at Contractor's expense.

(4) Parking areas shall be reviewed and approved by District in advance. No parking is to occur under the drip line of trees or in softscape areas that could otherwise be damaged.

E. All of the above shall be observed and complied with by the Contractor and all workers on the Site. Failure to follow these directives could result in individual(s) being suspended or removed from the work force at the discretion of the District. The same rules and regulations shall apply equally to delivery personnel, inspectors, consultants, and other visitors to the Site.

PART 2 - PRODUCTS Not Used.

PART 3 - EXECUTION Not Used.

END OF DOCUMENT

DOCUMENT 01 41 00

REGULATORY REQUIREMENTS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS AND PROVISIONS:

All Contract Documents should be reviewed for applicable provisions related to the provisions in this document, including without limitation:

A. General Conditions, including, without limitation, Obtaining of Permits, Licenses and Registrations and Work to Comply with All Applicable Laws and Regulations;

B. Special Conditions; and

C. Quality Control.

1.02 DESCRIPTION:

This section covers the general requirements for regulatory requirements pertaining to the Work and is supplementary to all other regulatory requirements mentioned or referenced elsewhere in the Contract Documents.

1.03 REQUIREMENTS OF REGULATORY AGENCIES:

A. All statutes, ordinances, laws, rules, codes, regulations, standards, and the lawful orders of all public authorities having jurisdiction over the Work, are hereby incorporated into these Contract Documents as if repeated in full herein and are intended to be included in any reference to Code or Building Code, unless otherwise specified, including, without limitation, the references in the list below. Contractor shall make available at the Site copies of all the listed documents applicable to the Work as the District and/or Architect may request, including, without limitation, applicable portions of the California Code of Regulations ("CCR").

(1) California Building Standards Administrative Code, Part 1, Title 24, CCR.

(2) California Building Code (CBC), Part 2, Title 24, CCR; (International Building Code volumes 1-2 and California Amendments).

(3) California Electrical Code (CEC), Part 3, Title 24, CCR; (National Electrical Code and California Amendments).

(4) California Mechanical Code (CMC), Part 4, Title 24, CCR; (Uniform Mechanical Code and California Amendments).

(5) California Plumbing Code (CPC), Part 5, Title 24, CCR; (Uniform Plumbing Code and California Amendments).

(6) California Fire Code (CFC), Part 9, Title 24, CCR; (International Fire Code and California Amendments).

(7) California Green Building Standards Code (CALGreen), Part 11, Title 24, CCR.

(8) California Referenced Standards Code, Part 12, Title 24, CCR.

(9) State Fire Marshal Regulations, Public Safety, Title 19, CCR.

(10) Partial List of Applicable National Fire Protection Association (NFPA) Standards:

(a) NFPA 13 - Automatic Sprinkler System.

(b) NFPA 14 - Standpipes Systems.

(c) NFPA 17A - Wet Chemical System

(d) NFPA 24 - Private Fire Mains.

(e) (California Amended) NFPA 72 - National Fire Alarm Codes.

(f) NFPA 253 - Critical Radiant Flux of Floor Covering System.

(g) NFPA 2001 - Clean Agent Fire Extinguishing Systems.

(11) California Division of the State Architect interpretation of Regulations ("DSA IR"), including, without limitation:

(a) DSA IR A-6 — Construction Change Document Submittal and Approval Processes.

(b) DSA IR A-7 — Project Inspector Certification and Approval.

(c) DSA IR A-8 — Project Inspector and Assistant Inspector Duties and Performance.

(d) DSA IR A-12 — Assistant Inspector Approval.

(12) DSA Procedures ("DSA PR")

(a) DSA PR 13-01 – Construction Oversight Process

(b) DSA PR 13-02 – Project Certification Process

B. This Project shall be governed by applicable regulations, including, without limitation, the State of California's Administrative Regulations for the Division of the State Architect-Structural Safety (DSA/SS), Chapter 4, Part 1, Title 24, CCR, and the most current version on the date the bids are opened and as it pertains to school construction including, without limitation:

(1) Test and testing laboratory per Section 4-335. District shall pay for the testing laboratory.

(2) Special inspections per Section 4-333(c).

(3) Deferred Approvals per section 4-317(g).

(4) Verified reports per Sections 4-336 & 4-343(c).

(5) Duties of the Architect & Engineers shall be per Sections 4-333(a) and 4-341.

(6) Duties of the Contractor shall be per Section 4-343.

(7) Duties of Project Inspector shall be per Section 4-334.

(8) Addenda and Construction Change Documents per Section 4-338.

Contractor shall keep and make available all applicable parts of the most current version of Title 24 referred to in the plans and specifications at the Site during construction.

PART 2 – PRODUCTS Not Used.

PART 3 – EXECUTION Not Used.

END OF DOCUMENT

DOCUMENT 01 4213

ABBREVIATIONS AND ACRONYMS

PART 1 – GENERAL

1.01 RELATED DOCUMENTS AND PROVISIONS:

All Contract Documents should be reviewed for applicable provisions related to the provisions in this document, including without limitation:

A. General Conditions including without limitation, Definitions;

B. Special Conditions.

1.02 DOCUMENT INCLUDES:

A. Abbreviations used throughout the Contract Documents.

B. Reference to a technical society, organization, or body is by abbreviation, as follows:

1.	AA	The Aluminum Association
2.	AASHTO	American Association of State Highway and Transportation Officials
3.	ABPA	Acoustical and Board Products Association
4.	ACI	American Concrete Institute
5.	AGA	American Gas Association
6.	AGC	Associated General Contractors of America
7.	AHC	Architectural Hardware Consultant
8.	AHRI	Air Conditioning, Heating, Refrigeration Institute
9.	AI	Asphalt Institute
10.	AIA	American Institute of Architects
11.	AISC	American Institute of Steel Construction
12.	AISI	American Iron and Steel Institute
13.	AMCA	Air Movement and Control Association
14.	ANSI	American National Standards Institute
15.	APA	APA – The Engineered Wood Association
16.	ASCE	American Society of Civil Engineers
17.	ASHRAE	American Society of Heating, Refrigeration and Air Conditioning Engineers
18.	ASME	American Society of Mechanical Engineers
19.	ASTM	American Society of Testing and Materials International
20.	AWPA	American Wood Protection Association
21.	AWPI	American Wood Preservers Institute
22.	AWS	American Welding Society
23.	AWSC	American Welding Society Code
24.	AWI	Architectural Woodwork Institute
25.	AWWA	American Water Works Association
26.	BIA	The Brick Industry Association
27.	CCR	California Code of Regulations

28.	CLFMI	Chain Link Fence Manufacturers Institute
29.	CRA	California Redwood Association
30.	CRSI	Concrete Reinforcing Steel Institute
31.	CS	Commercial Standards
32.	CSI	Construction Specifications Institute
33.	CTI	Cooling Technology Institute
34.	FGIA	Fenestration and Glazing Industry Alliance
35.	FGMA	Flat Glass Manufacturers' Association
36.	FIA	Factory Insurance Association
37.	FM	Factory Mutual Global
38.	FS/FED SPEC	Federal Specification
39.	FTI	Facing Title Institute
40.	GA	Gypsum Association
41.	IAPMO	International Association of Plumbing and Mechanical Officials
42.	ICC	International Code Council
43.	IEEE	Institute of Electrical and Electronics Engineers
44.	IES	Illuminating Engineering Society
45.	MCAC	Mason Contractors Association of California
46.	MIMA	Mineral Wool Insulation Manufacturers Association
47.	MLMA	Metal Lath Manufacturers Association
48.	MS/MIL SPEC	Military Specifications
49.	NAAMM	National Association of Architectural Metal Manufacturers
50.	NBHA	National Builders Hardware Association
51.	NCMA	National Concrete Masonry Association
52.	NCSEA	National Council of Structural Engineers Associations
53.	NEC	National Electrical Code
54.	NEMA	National Electrical Manufacturers Association
55.	NIST	National Institute of Standards and Technology
56.	NSI	Natural Stone Institute
57.	NTMA	National Terrazzo and Mosaic Association, Inc.
58.	ORS	Office of Regulatory Services (California)
59.	OSHA	Occupational Safety and Health Act
60.	PCI	Precast/Prestressed Concrete Institute
61.	PCA	Portland Cement Association
62.	PCA	Painting Contractors Association
63.	PDI	Plumbing Drainage Institute
64.	PEI	Porcelain Enamel Institute, Inc.
65.	PG&E	Pacific Gas & Electric Company
66.	PS	Product Standards
67.	SDI	Steel Door Institute; Steel Deck Institute
68.	SJI	Steel Joist Institute
69.	SSPC	Society for Protective Coatings
70.	TCNA	Tile Council of North America, Inc.
71.	TPI	Truss Plate Institute
72.	UL	Underwriters Laboratories Code
73.	UMC	Uniform Mechanical Code
74.	USDA	United States Department of Agriculture
75.	VI	Vermiculite Institute
76.	WCLIB	West Coast Lumber Inspection Bureau

77.	WDMA	Window and Door Manufacturers Association
78.	WEUSER	Western Electric Utilities Service Engineering Requirements
79.	WIC	Woodwork Institute of California

PART 2 - PRODUCTS Not Used.

PART 3 - EXECUTION Not Used.

END OF DOCUMENT

DOCUMENT 01 42 16

DEFINITIONS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS AND PROVISIONS

All Contract Documents should be reviewed for applicable provisions related to the provisions in this document, including without limitation:

A. General Conditions including without limitation, Definitions;

B. Special Conditions.

1.02 QUALITY ASSURANCE

A. For products or workmanship specified by association, trade, or Federal Standards, Contractor shall comply with requirements of the standard, except when more rigid requirements are specified in the Contract Documents, or are required by applicable codes.

B. Contractor shall conform to current reference standard publication date in effect on the date of bid opening.

C. Contractor shall obtain copies of standards unless specifically required not to by the Contract Documents.

D. Contractor shall maintain a copy of all standards at jobsite during submittals, planning, and progress of the specific Work, until final completion, unless specifically required not to by the Contract Documents.

E. Should specified reference standards conflict with Contract Documents, Contractor shall request clarification from the District and/or the Architect before proceeding.

F. The contractual relationship of the parties to the Contract shall not be altered from the contractual relationship as indicated in the Contract Documents by mention or inference otherwise in any referenced document.

G. Governing Codes shall be as shown in the Contract Documents including, without limitation, the Specifications.

END OF DOCUMENT

DOCUMENT 01 4219

REFERENCES

PART 1 - GENERAL

1.01 SCHEDULE OF REFERENCES:

The following information is intended only for the general assistance of the Contractor, and the District does not represent that all of the information is current. It is the Contractor's responsibility to verify the correct information for each of the entities listed.

AA	The Aluminum Association 1400 Crystal Drive, Suite 430 Arlington, VA 22202 www.aluminum.org	703/358-2960
AABC	Associated Air Balance Council 2401 Pennsylvania Avenue NW, Suite 330 Washington, DC 20037 www.aabc.com	202/737-0202
AASHTO	American Association of State Highway and Transportation Officials 555 12th St. NW - Suite 1000 Washington, DC 20004 www.transportation.org	202/624-5800
AATCC	American Association of Textile Chemists and Colorists P.O. Box 12215Research Triangle Park, NC 27709-2215 www.aatcc.org	919/549-8141
ACA	American Coatings Association 901 New York Ave., NW, Suite 300 West Washington, DC 20001 www.paint.org	202/462-6272
ACI	American Concrete Institute 38800 Country Club Dr. Farmington Hills, MI 48331-3439 www.concrete.org	248/848-3800
ACPA	American Concrete Pipe Association 5605 N. MacArthur Blvd., Suite 340 Irving, TX 75038 www.concrete-pipe.org	972/506-7216

ADC	Air Duct Council 1901 N. Roselle Road, Suite 800 Schaumburg, IL 60195 www.flexibleduct.org	847/706-6750
AF&PA	American Forest and Paper Association 1101 K Street, NW, Suite 700 Washington, DC 20005 www.afandpa.org	202/463-2700
AGA	American Gas Association 400 North Capitol Street, NW, Suite 450 Washington, DC 20001 www.aga.org	202/824-7000
AGC	Associate General Contractors of America 2300 Wilson Blvd., Suite 300 Arlington, VA 22201 www.agc.org	703/548-3118
AHA	American Hardboard Association 1210 West Northwest Highway Palatine, IL 60067 http://domensino.com/AHA/default.htm	847/934-8800
AI	Asphalt Institute 2696 Research Park Drive Lexington, KY 40511-8480 www.asphaltinstitute.org	859/288-4960
AIA	The American Institute of Architects 1735 New York Ave., NW Washington, DC 20006-5292 www.aia.org	202/626-7300
AISC	American Institute of Steel Construction 130 East Randolph Street, Suite 2000 Chicago, IL 60601 www.aisc.org	312.670.2400
AISI	American Iron and Steel Institute 25 Massachusetts Ave., NW, Suite 800 Washington, DC 20001 www.steel.org	202/452-7100
AITC	American Institute of Timber Construction 1010 South 336th Street, #210 Federal Way, WA 98003-7394 https://www.plib.org/aitc/	253/835-3344

ALI	Associated Laboratories, Inc. P.O. Box 152837 Dallas, TX 75315 www.assoc-labs.com	214/565-0593
ALSC	American Lumber Standards Committee, Inc. 7470 New Technology Way, Suite F Frederick, MD 21703 www.alsc.org	301/972-1700
AMCA	Air Movement and Control Association International, Inc. 30 W. University Drive Arlington Heights, IL 60004 www.amca.org	847/394-0150
AMPP (formerly SSPC)	Association for Materials Protection and Performance (merger of Society for Protective Coatings and National Association of Corrosion Engineers International) (formerly Steel Structures Painting Council) 800 Trumbull Drive Pittsburgh, PA 15205 www.sspc.org	412/281-2331 877/281-7772
ANLA	AmericanHort (merger of American Nursery & Landscape Association and OFA – The Association of Horticultural Professionals) 2130 Stella Court Columbus, OH 43215 www.americanhort.org	614/487-1117
ANSI	American National Standards Institute 1899 L Street, NW, 11th Floor Washington, DC 20036 www.ansi.org	202/293-8020
APA	APA-The Engineered Wood Association 7011 S. 19th Street Tacoma, WA 98466-5333 www.apawood.org	253/565-6600

APA	Architectural Precast Association 325 John Knox Rd, Suite L-103 Tallahassee, FL 32303 www.archprecast.org	850/205-5637
APCIA	American Property Casualty Insurance Association (merger of American Insurance Association (formerly the National Board of Fire Underwriters) with the Property Casualty Insurers Association of America) 555 12th St, NW, Suite 550 Washington DC 20004 www.apci.org	202/828-7100
AHRI	Air Conditioning and Refrigeration Institute (now Air-Conditioning, Heating, & Refrigeration Institute) 2311 Wilson Blvd, Suite 400 Arlington, VA 22201 www.ahrinet.org	703/524-8800
ARMA	Asphalt Roofing Manufacturers Association 2331 Rock Spring Road Forest Hill, MD 21050 www.asphaltroofing.org	443/640-1075
ASA	The Acoustical Society of America Suite 300 1305 Walt Whitman Road Melville, NY 11747-4300 https://acousticalsociety.org/	516/576-2360
ASCE	American Society of Civil Engineers 1801 Alexander Bell Drive Reston, VA 20191 www.asce.org	800/548-2723 703/295-6300
ASHRAE	American Society of Heating, Refrigerating and Air Conditioning Engineers 180 Technology Parkway Peachtree Corners, GA 30092 www.ashrae.org	800/527-4723 404/636-8400
ASLA	American Society of Landscape Architects 636 Eye Street, NW Washington, DC 20001-3736 www.asla.org	202/898-2444
ASME	American Society of Mechanical Engineers Two Park Avenue New York, NY 10016-5990 www.asme.org	800/834-2763

ASPE	American Society of Plumbing Engineers 6400 Shafer Court, Suite 350 Rosemont, IL 60018 http://aspe.org	847/296-0002
ASQ	American Society for Quality P.O. Box 3005 Milwaukee, WI 53201-3005 or 600 North Plankinton Avenue Milwaukee, WI 53203 http://asq.org	800/248-1946 414/272-8575
ASSE	American Society of Sanitary Engineering 18927 Hickory Creek Dr., Suite 220 Mokena, IL 60448 www.asse-plumbing.org	708/995-3019
ASTM	ASTM International 100 Barr Harbor Drive PO Box C700 West Conshohocken, PA, 19428-2959 www.astm.org	610/832-9500
AWCI	Association of the Wall and Ceiling Industry 513 West Broad Street, Suite 210 Falls Church, VA 22046 www.awci.org	703/538-1600
AWPA	American Wood Protection Association (formerly American Wood Preservers Institute) P.O. Box 361784 Birmingham, AL 35236-1784 www.awpa.com	205/733-4077
AWS	American Welding Society 8669 NW 36 Street, Suite 130 Miami, FL 33166 www.aws.org	800/443-9353 305/443-9353
AWI	Architectural Woodwork Institute 46179 Westlake Drive, Suite 120 Potomac Falls, VA 20165-5874 www.awinet.org	571/323-3636
AWWA	American Water Works Association 6666 West Quincy Avenue Denver, CO 80235 www.awwa.org	800/926-7337 303/794-7711

BHMA	Builders Hardware Manufacturers Association 355 Lexington Avenue, 15th Floor New York, NY 10017 www.buildershardware.com	212/297-2122
BIA	The Brick Industry Association 12007 Sunrise Valley Drive, Suite 430 Reston, VA 20191 www.gobrick.com	703/620-0010
CGA	Compressed Gas Association 8484 Westpark Drive, Suite 220 McLean, VA 22102 www.cganet.com	703/788-2700
CISCA	Ceilings & Interior Systems Construction Association 1010 Jorie Blvd, Suite 30 Oak Brook, IL 60523 www.cisca.org	630/584-1919
CISPI	Cast Iron Soil Pipe Institute 2401 Fieldcrest Dr. Mundelein, IL 60060 www.cispi.org	224/864-2910
CLFMI	Chain Link Fence Manufacturers Institute 10015 Old Columbia Road, Suite B-215 Columbia, MD 21046 chainlinkinfo.org	301/596-2583
CPA	Composite Panel Association 19465 Deerfield Avenue, Suite 306 Leesburg, VA 20176 www.compositepanel.org	703/724-1128
CPSC	Consumer Product Safety Commission 4330 East-West Highway Bethesda, MD 20814 www.cpsc.gov	800/638-2772
CRA	California Redwood Association 818 Grayson Road, Suite 201 Pleasant Hill, CA 94523 www.calredwood.org	925/935-1499

CRI	Carpet and Rug Institute 100 S. Hamilton Street Dalton, GA 30722-2048 www.carpet-rug.org	706/278-3176
CRSI	Concrete Reinforcing Steel Institute 933 N. Plum Grove Road Schaumburg, IL 60173-4758 www.crsi.org	847/517-1200
CSI	The Construction Specifications Institute 123 North Pitt St, Suite 450 Alexandria, VA 22314 www.csinet.org	800/689-2900
CTIOA	Ceramic Tile Institute of America 12061 Jefferson Blvd. Culver City, CA 90230-6219 www.ctioa.org	310/574-7800
DHA	Decorative Hardwoods Association (formerly Hardwood Plywood & Veneer Association) 42777 Trade West Dr. Sterling, VA 20166 https://www.decorativehardwoods.org/	703/435-2900
DHI	Door and Hardware Institute (formerly National Builders Hardware Association) 2001 K Street NW, 3rd Floor North Washington, DC 20006 www.dhi.org	202/367-1134
DIPRA	Ductile Iron Pipe Research Association P.O. Box 190306 Birmingham, AL 35219 www.dipra.org	205/402-8700
DOC	U.S. Department of Commerce 1401 Constitution Ave., NW Washington, DC 20230 www.commerce.gov	202/482-2000
DOT	U.S. Department of Transportation 1200 New Jersey Avenue, SE Washington, DC 20590 www.dot.gov	855/368-4200

EJMA	Expansion Joint Manufacturers Association, Inc. 25 North Broadway Tarrytown, NY 10591 www.ejma.org	914/332-0040
EPA	Environmental Protection Agency Ariel Rios Building 1200 Pennsylvania Avenue, N.W. Washington, DC 20460 www.epa.gov	202/272-0167
FCICA	Floor Covering Installation Contractors Association 800 Roosevelt Rd., Bldg. C, Suite 312 Glen Ellyn, IL 60137 www.fcica.com	630/672-3702
FGIA	Fenestration and Glazing Industry Alliance 1900 E Golf Rd, Suite 1250 Schaumburg, IL 60173 https://fgiaonline.org/	847/303-5664
FM Global	Factory Mutual Insurance Company Amy Daley Global Practice Leader – Education, Public Entities, Health Care FM Global 270 Central Avenue Johnston, RI 02919-4949 www.fmglobal.com	401/275-3000 401/275-3029
FS	General Services Administration (GSA) Index of Federal Specifications, Standards and Commercial Item Descriptions 470 East L'Enfant Plaza, SW, Suite 8100 Washington, DC 20407 www.gsa.gov	202/619-8925
GA	The Gypsum Association 962 Wayne Ave., Suite 620 Silver Spring, MD 20910 www.gypsum.org	301/277-8686
HMA	Hardwood Manufacturers Association One Williamsburg Place, Suite 108 Warrendale, PA 15086 http://hmamembers.org	412/244-0440

IAPMO	International Association of Plumbing and Mechanical Officials (formerly the Western Plumbing Officials Association) 4755 E. Philadelphia St. Ontario, CA 91761 www.iapmo.org	909/472-4100
ICC	International Code Council 500 New Jersey Avenue, NW, 6th Floor Washington, DC 20001 www.iccsafe.org	888/422-7233
IEEE	Institute of Electrical and Electronics Engineers 3 Park Avenue, 17th Floor New York, NY 10016-5997 www.ieee.org	212/419-7900
IES	Illuminating Engineering Society 120 Wall Street, Floor 17 New York, NY 10005-4001 www.ies.org	212/248-5000
ITRK	Intertek Testing Services 3933 US Route 11 Cortland, NY 13045 www.intertek.com	607/753-6711
MCAA	Mechanical Contractors Association of America 1385 Piccard Drive Rockville, MD 20850 www.mcaa.org	301/869-5800
MMPA (formerly WMMPA)	Moulding & Millwork Producers Association (formerly Wood Moulding & Millwork Producers Association) 507 First Street Woodland, CA 95695 www.wmmpa.com	530/661-9591 800/550-7889
MSS	Manufacturers Standardization Society (MSS) of the Valve and Fittings Industry, Inc. 127 Park Street, NE Vienna, VA 22180-4602 http://mss-hq.org	703/281-6613
NAAMM	National Association of Architectural Metal Manufacturers 800 Roosevelt Rd. Bldg. C, Suite 312 Glen Ellyn, IL 60137 www.naamm.org	630/942-6591

NAIMA	North American Insulation Manufacturers Association P.O. Box 1906 Alexandria, VA 22313 https://insulationinstitute.org/	703/684-0084
NALP	National Association of Landscape Professionals (formerly Professional Landcare Network) 12500 Fair Lakes Circle, Suite 200 Fairfax, VA 22033 https://www.landscapeprofessionals.org/	703/736-9666
NAPA	National Asphalt Pavement Association 6406 Ivy Lane, Suite 350 Greenbelt, MD 20770-1441 www.asphaltpavement.org	888/468-6499 301/731-4748
NCSPA	National Corrugated Steel Pipe Association 14070 Proton Road, Suite 100 Dallas, TX 75244 www.ncspa.org	972/850-1907
NCMA	National Concrete Masonry Association 13750 Sunrise Valley Drive Herndon, VA 20171-4662 www.ncma.org	703/713-1900
NEBB	National Environmental Balancing Bureau 8575 Grovemont Circle Gaithersburg, MD 20877 www.nebb.org	301/977-3698
NECA	National Electrical Contractors Association 1201 Pennsylvania Ave. NW Washington, D.C., 20004 www.necanet.org	202/991-6300
NEMA	National Electrical Manufacturers Association 1300 North 17th Street N, Suite 900 Rosslyn, VA 22209 www.nema.org	703/841-3200
NEII	National Elevator Industry, Inc. 5537 SW Urish Road Topeka, KS 66610 https://nationalelevatorindustry.org/	703/589-9985
NFPA	National Fire Protection Association 1 Batterymarch Park Quincy, MA02169-7471 www.nfpa.org	800/344-3555 855/274-8525

NGA (formerly GANA)	National Glass Association (merged with Glass Association of North America) 1945 Old Gallows Road Suite 750 Vienna, VA 22182 www.glass.org	866/342-5642 Ext 127
NHLA	National Hardwood Lumber Association PO Box 34518 Memphis, TN 38184 www.nhla.com	901/377-1818
NIA	National Insulation Association 516 Herndon Pkwy., Ste. D Herndon, VA 20170 www.insulation.org	703/464-6422
NRCA	National Roofing Contractors Association 10255 W. Higgins Road, Suite 600 Rosemont, IL 60018-5607 www.nrca.net	847/299-9070
NSF	NSF International 789 N. Dixboro Road Ann Arbor, MI 48113-0140 www.nsf.org	800/673-6275 734/769-8010
NSI	Natural Stone Institute (formerly Marble Institute of America) 380 E. Lorain St. Oberlin, OH 44074 https://www.naturalstoneinstitute.org/	440/250-9222
NTMA	National Terrazzo and Mosaic Association 209 N. Crockett Street, Suite 2 PO Box 2605 Fredericksburg, TX 78624 www.ntma.com	800/323-9736
OSHA	Occupational Safety and Health Act U.S. Department of Labor Occupational Safety & Health Administration 200 Constitution Ave., NW Washington, DC 20210 www.osha.gov	800/321-OSHA (6742)

PCA	Portland Cement Association 5420 Old Orchard Road Skokie, IL 60077 or 200 Massachusetts Ave NW, Suite 200 Washington, DC 20001 www.cement.org	847/966-6200 202/408-9494
PCA	Painting Contractors Association (formerly Painting and Decorating Contractors of America) 2316 Millpark Drive Maryland Heights, MO 63043 https://www.pcapainted.org/	800/322-7322
PCI	Precast/Prestressed Concrete Institute 8770 W. Bryn Mawr Ave., Suite 1150 Chicago, IL 60631 www.pci.org	312/786-0300
PDI	Plumbing & Drainage Institute 800 Turnpike Street, Suite 300 North Andover, MA 01845 http://pdionline.org	978/557-0720 800/589-8956
PEI	Porcelain Enamel Institute, Inc. P.O. Box 920220 Norcross, GA 30010 www.porcelainenamel.com	770/676-9366
PG&E	Pacific Gas & Electric Company P.O. Box 997300 Sacramento, CA 95899-7300 www.pge.com	800/743-5000
PLIB	Pacific Lumber Inspection Bureau (formerly West Coast Lumber Inspection Bureau) 1010 South 336th Street, Suite 210 Federal Way, WA 98003-7394 https://www.plib.org/	253/835-3344
RFCI	Resilient Floor Covering Institute 115 Broad Street, Suite 201 La Grange, GA 30240 www.rfci.com	706/882-3833
SDI	Steel Deck Institute P.O. Box 426 Glenshaw, PA 15116 www.sdi.org	412/487-3325

SDI	Steel Door Institute 30200 Detroit Road Westlake, OH 44145 www.steeldoor.org	440/899-0010
SJI	Steel Joist Institute 140 West Evans Street, Suite 203 Florence, SC 29501 http://steeljoist.org	843/407-4091
SMA	Stucco Manufacturers Association 5753 E Santa Ana Cyn Rd, #G-156 Anaheim, CA 92807 www.stuccomfgassoc.com	714/473-9579
SMACNA	Sheet Metal and Air Conditioning Contractors' National Association 4201 Lafayette Center Drive Chantilly, VA 20151-1219 www.smacna.org	703/803-2980
SPI	SPI: The Plastics Industry Trade Association, Inc. 1425 K St. NW, Suite 500 Washington, DC 20005 www.plasticsindustry.org	202/974-5200
TCA	The Tile Council of North America 100 Clemson Research Blvd. Anderson, SC 29625 www.tcnatile.com	864/646-8453
TPI	Truss Plate Institute 2670 Crain Highway, Suite 203 Waldorf, MD 20601 www.tpinst.org	240/587-5582
TPI	Turfgrass Producers International 444 E. Roosevelt Road #346 Lombard, IL 60148 www.turfgrasssod.org	800/405-8873 847/649-5555
TCIA	Tree Care Industry Association (formerly the National Arborist Association) 670 N Commercial Street, Suite 201 Manchester, NH 03101 www.tcia.org	603/314-5380 800/733-2622

TVI	The Vermiculite Institute c/o The Schundler Company 10 Central Street Nahant, MA 01908 www.vermiculiteinstitute.org	732/287-2244
UL	Underwriters Laboratories Inc. 333 Pfingsten Road Northbrook, IL 60062-2096 www.ul.com	847/272-8800 877/854-3577
UNI	Uni-Bell PVC Pipe Association 201 E. John Carpenter Freeway, Suite 750 Irving, TX 75062 www.uni-bell.org	972/243-3902
USDA	U.S. Department of Agriculture 1400 Independence Ave., S.W. Washington, DC 20250 www.usda.gov	202/720-2791
WA	Wallcoverings Association 35 E Wacker Dr., Suite 850 Chicago, IL 60601 www.wallcoverings.org	312/224-2574
WCMA	Window Covering Manufacturers Association 355 Lexington Avenue 15th Floor New York, NY 10017 www.wcmanet.org	212/297-2122
WDMA	Window & Door Manufacturers Association 2001 K Street NW, 3rd Floor North Washington, D.C. 20006 www.wdma.com	202/367-1157
WI	Woodwork Institute 1455 Response Road, Suite 110 Sacramento, CA 95815 www.wicnet.org	916/372-9943
WRI	Wire Reinforcement Institute 942 Main Street, Suite 300 Hartford, CT 06103 www.wirereinforcementinstitute.org	860/240-9545
WWCA	Western Wall & Ceiling Contractors Association 1910 N. Lime St. Orange, CA 92865 www.wwcca.org	714/221-5520

WWPA	Western Wood Products Association (formerly Redwood Inspection Service) 1500 SW First Ave., Suite 870 Portland, OR 97201 www.wwpa.org	503/224-3930

PART 2 - PRODUCTS Not Used.

PART 3 - EXECUTION Not Used.

END OF DOCUMENT

DOCUMENT 01 43 00

MATERIALS AND EQUIPMENT

PART 1 - GENERAL

1.01 RELATED DOCUMENTS AND PROVISIONS

All Contract Documents should be reviewed for applicable provisions related to the provisions in this document, including without limitation:

A. General Conditions, including, without limitation, Purchase of Materials and Equipment;

B. Special Conditions;

C. Imported Materials Certification.

1.02 MATERIAL AND EQUIPMENT

A. Only items approved by the District and/or Design Professional shall be used.

B. Contractor shall submit lists of products and other product information in accordance with the Contract Documents, including, without limitation, the provisions regarding the submittals.

1.03 MATERIAL AND EQUIPMENT COLORS

A. The District and/or Architect will provide a schedule of colors.

B. No individual color selections will be made until after approval of all pertinent materials and equipment and after receipt of appropriate samples in accordance with the Contract Documents, including, without limitation, the provisions regarding the submittals.

C. Contractor shall request priority in writing for any item requiring advance ordering to maintain the approved Construction Schedule.

1.04 DELIVERY, STORAGE, AND HANDLING

A. Contractor shall deliver manufactured materials in original packages, containers, or bundles (with seals unbroken), bearing name or identification mark of manufacturer.

B. Contractor shall deliver fabrications in as large assemblies as practicable; where specified as shop-primed or shop-finished, package or crate as required to preserve such priming or finish intact and free from abrasion.

C. Contractor shall store materials in such a manner as necessary to properly protect them from damage. Materials or equipment damaged by handling, weather, dirt, or from any other cause will not be accepted.

D. Materials are not acceptable that have been warehoused for long periods of time, stored or transported in improper environment, improperly packaged, inadequately labeled, poorly protected, excessively shipped, deviated from normal distribution pattern, or reassembled.

E. Contractor shall store material so as to cause no obstructions of sidewalks, roadways, access to the Site or buildings, and underground services. Contractor shall protect material and equipment furnished under Contract.

F. Contractor may store materials on Site with prior written approval by the District, all material shall remain under Contractor's control and Contractor shall remain liable for any damage to the materials. Should the Project Site not have storage area available, the Contractor shall provide for off-site storage at a bonded warehouse and with appropriate insurance coverage at no cost to District.

G. When any room in Project is used as a shop or storeroom, the Contractor shall be responsible for any repairs, patching, or cleaning necessary due to that use. Location of storage space shall be subject to prior written approval by District.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Manufacturers listed in various sections of Contract Documents are names of those manufacturers that are believed to be capable of supplying one or more of items specified therein.

B. The listing of a manufacturer does not imply that every product of that manufacturer is acceptable as meeting the requirements of the Contract Documents.

2.02 FACILITIES AND EQUIPMENT

Contractor shall provide, install, maintain, and operate a complete and adequate facility for handling, the execution, disposal, and distribution of material and equipment as required for proper and timely performance of Work connected with Contract.

2.03 MATERIAL REFERENCE STANDARDS

Where material is specified solely by reference to "standard specifications" and if requested by District, Contractor shall submit for review data on actual material proposed to be incorporated into Work of Contract listing name and address of vendor, manufacturer, or producer, and trade or brand names of those materials, and data substantiating compliance with standard specifications.

PART 3 - EXECUTION

3.01 WORKMANSHIP

A. Where not more specifically described in any other Contract Documents, workmanship shall conform to methods and operations of best standards and accepted practices of trade or trades involved and shall include items of fabrication, construction, or installation regularly furnished or required for completion (including finish and for successful operation, as intended).

B. Work shall be executed by tradespersons skilled in their respective lines of Work. When completed, parts shall have been durably and substantially built and present a neat appearance.

3.02 COORDINATION

A. Contractor shall coordinate installation of Work so as to not interfere with installation of others. Adjustment or rework because of Contractor's failure to coordinate will be at no additional cost to District.

B. Contractor shall examine in-place work for readiness, completeness, fitness to be concealed or to receive other work, and in compliance with Contract Documents. Concealing or covering Work constitutes acceptance of additional cost which will result should in-place Work be found unsuitable for receiving other Work or otherwise deviating from the requirements of the Contract Documents.

3.03 COMPLETENESS

Contractor shall provide all portions of the Work, unless clearly stated otherwise, installed complete and operational with all elements, accessories, anchorages, utility connections, etc., in manner to assure well-balanced performance, in accordance with manufacturer's recommendations and by Contract Documents. For example, electric water coolers require water, electricity, and drain services; roof drains require drain system; sinks fit within countertop, etc. Terms such as "installed complete," "operable condition," "for use intended," "connected to all utilities," "terminate with proper cap," "adequately anchored," "patch and refinish," "to match similar," should be assumed to apply in all cases, except where completeness of functional or operable condition is specifically stated as not required.

3.04 APPROVED INSTALLER OR APPLICATOR

Installation by a manufacturer's approved installer or applicator is an understood part of Specifications and only approved installer or applicator is to provide on-site Work where specified manufacturer has on-going program of approving (i.e. certifying, bonding, re-warranting) installers or applicators. Newly established relationships between a manufacturer and an installer or applicator who does not have other approved applicator work in progress or completed is not approved for this Project.

3.05 MANUFACTURER'S RECOMMENDATIONS

All installations shall be in accordance with manufacturer's published recommendations and specific written directions of manufacturer's representative. Should Contract Documents differ from recommendations of manufacturer or directions of his representative, Contractor shall analyze differences, make recommendations to the District and the Architect in writing, and shall not proceed until interpretation or clarification has been issued by the District and/or the Architect.

END OF DOCUMENT

DOCUMENT 01 4500

QUALITY CONTROL

PART 1 - GENERAL

1.01 RELATED DOCUMENTS AND PROVISIONS:

All Contract Documents should be reviewed for applicable provisions related to the provisions in this document, including without limitation:

A. General Conditions, including, without limitation, Inspector, Inspections and Tests, Uncovering of Work and Non-conforming of Work and Correction of Work;

B. Special Conditions.

1.02 RELATED CODES:

A. The Work is governed by requirements of Title 24, California Code of Regulations ("CCR"), and the Contractor shall keep a copy of these available at the job Site for ready reference during construction.

B. The Division of the State Architect ("DSA") shall be notified at or before the start of construction.

1.03 OBSERVATION AND SUPERVISION:

A. The District and Architect or their appointed representatives will review the Work and the Contractor shall provide facilities and access to the Work at all times as required to facilitate this review. Administration by the Architect and any consulting Structural Engineer will be in accordance with applicable regulations, including, without limitation, CCR, Part 1, Title 24, Section 4-341.

B. One or more Project Inspector(s) approved by DSA and employed by or in contract with the District, referred to hereinafter as the "Project Inspector", will observe the work in accordance with CCR, Part 1, Title 24, Sections 4-333(b) and 4-342:

(1) The Project Inspector and Special Inspector(s) shall have access to the Work wherever it is in preparation or progress for ascertaining that the Work is in accordance with the Contract Documents and all applicable code sections. The Contractor shall provide facilities and operation of equipment as needed, and access as required and shall provide assistance for sampling or measuring materials.

(2) The Project Inspector will notify the District and Architect and call the attention of the Contractor to any observed failure of Work or material to conform to Contract Documents.

(3) The Project Inspector shall observe and monitor all testing and inspection activities required.

The Contractor shall conform with all applicable laws as indicated in the Contract Documents, including, without limitation, to CCR, Part 1, Title 24, Section 4-343. The Contractor shall supervise and direct the Work and maintain a competent superintendent on the job who is authorized to act in all matters pertaining to the Work. The Contractor's superintendent shall also inspect all materials, as they arrive, for compliance with the Contract Documents. Contractor shall reject defective Work or materials immediately upon delivery or failure of the Work or material to comply with the Contract Documents. The Contractor shall submit verified reports as indicated in the Contract Documents, including, without limitation, the Specifications and as required by Part 1, Title 24, Section 4-336.

1.04 TESTING AGENCIES:

A. Testing agencies and tests shall be in conformance with the General Documents and the requirements of Part 1, Title 24, Section 4- 335.

B. Testing and inspection in connection with earthwork shall be under the direction of the District's consulting soils engineer, if any, referred to hereinafter as the "Soils Engineer."

C. Testing and inspection of construction materials and workmanship shall be performed by a qualified laboratory, referred to hereinafter as the "Testing Laboratory." The Testing Laboratory shall be under direction of an engineer registered in the State of California, shall conform to requirements of ASTM E329, and shall be employed by or in contract with the District.

1.05 TESTS AND INSPECTIONS:

A. The Contractor shall be responsible for notifying the District and Project Inspector of all required tests and inspections. Contractor shall notify the District and Project Inspector at least seventy-two hours (72) hours in advance of performing any Work requiring testing or inspection.

B. The Contractor shall provide access to Work to be tested and furnish incidental labor, equipment, and facilities to facilitate all inspections and tests.

C. The District will pay for first inspections and tests required by the “CCR”, and other inspections or tests that the District and/or the Architect may direct to have made, including the following principal items:

(1) Tests and observations for earthwork and paving.

(2) Tests for concrete mix designs, including tests of trial batches.

(3) Tests and inspections for structural steel work.

(4) Field tests for framing lumber moisture content.

(5) Additional tests directed by the District that establish that materials and installation comply with the Contract Documents.

(6) Tests and observations of welding and expansion anchors.

D. The District may at its discretion, pay and then back charge the Contractor for:

(1) Retests or reinspections, if required, and tests or inspections required due to Contractor error or lack of required identifications of material.

(2) Uncovering of work in accordance with Contract Documents.

(3) Testing done on weekends, holidays, and overtime will be chargeable to the Contractor for the overtime portion.

(4) Testing done off Site.

E. Testing and inspection reports and certifications:

(1) If initially received by Contractor, Contractor shall provide to each of the following a copy of the agency or laboratory report of each test or inspection or certification.

(a) The District;

(b) The Construction Manager, if any;

(c) The Architect;

(d) The Consulting Engineer, if any;

(e) Other engineers on the Project, as appropriate;

(f) The Project Inspector; and

(g) The Contractor.

(2) When the test or inspection is one required by the CCR, a copy of the report shall also be provided to the DSA.

PART 2 - PRODUCTS

2.01 TYPE OF TESTS AND INSPECTIONS

A. Testing and inspection shall be in accordance with DSA Form 103 (or current version)

PART 3 - EXECUTION Not Used.

END OF DOCUMENT

DOCUMENT 01 50 00

TEMPORARY FACILITIES AND CONTROLS

PART 1 – GENERAL

1.01 RELATED DOCUMENTS AND PROVISIONS:

All Contract Documents should be reviewed for applicable provisions related to the provisions in this document, including without limitation:

A. General Conditions;

B. Special Conditions;

C. Site Standards; and

D. Construction Waste Management and Disposal.

1.02 TEMPORARY UTILITIES:

A. Electric Power and Lighting:

(1) Contractor will pay for power during the course of the Work. To the extent power is available in the building(s) or on the Site, Contractor may use the District's existing utilities by making prearranged payments to the District for the utilities used by Contractor and all Subcontractors. Contractor shall be responsible for providing temporary facilities required to deliver that power service from its existing location in the building(s) or on the Site to point of intended use.

(2) Contractor shall verify characteristics of power available in building(s) or on the Site. Contractor shall take all actions required to make modifications where power of higher voltage or different phases of current are required. Contractor shall be fully responsible for providing that service and shall pay all costs required therefor.

(3) Contractor shall furnish, wire for, install, and maintain temporary electrical lights wherever it is necessary to provide illumination for the proper performance and/or observation of the Work: a minimum of 20 foot-candles for rough work and 50 foot-candles for finish work.

(4) Contractor shall be responsible for maintaining existing lighting levels in the project vicinity should temporary outages or service interruptions occur.

B. Heat and Ventilation:

(1) Contractor shall provide temporary heat to maintain environmental conditions to facilitate progress of the Work, to meet specified minimum conditions for the installation and curing of materials, and to

protect materials and finishes from damage due to improper temperature and humidity conditions. Portable heaters shall be standard units complete with controls.

(2) Contractor shall provide forced ventilation and dehumidification, as required, of enclosed areas for proper installation and curing of materials, to disperse humidity, and to prevent hazardous accumulations of dust, fumes, vapors, and gases.

(3) Contractor shall pay the costs of installation, maintenance, operation, and removal of temporary heat and ventilation, including costs for fuel consumed, required for the performance of the Work.

C. Water:

(1) Contractor shall pay for water used during the course of the Work. Contractor shall coordinate and pay for installation or use of water meter in compliance with local water agency requirements. To the extent water is then available in the building(s) or on the Site, Contractor may use the District's existing utilities by making prearranged payments to the District for the utilities used by Contractor and all Subcontractors. Contractor shall be responsible for providing temporary facilities required to deliver such utility service from its existing location in the building(s), on the Site, or other location approved by the local water agency, to point of intended use.

(2) Contractor shall use backflow preventers on water lines at point of connection to District's water supply. Backflow preventers shall comply with requirements of Uniform Plumbing Code.

(3) Contractor shall make potable water available for human consumption.

D. Sanitary Facilities:

(1) Contractor shall provide sanitary temporary facilities in no fewer numbers than required by law and such additional facilities as may be directed by the Inspector for the use of all workers. The facilities shall be maintained in a sanitary condition at all times and shall be left at the Site until removal is directed by the Inspector or Contractor completes all other work at the Site.

(2) Use of toilet facilities in the Work under construction shall not be permitted except by consent of the Inspector and the District.

E. Telephone Service:

(1) Contractor shall arrange with local telephone service company for telephone service as required for the performance of the Work. Contractor shall, at a minimum, provide in its field office one line for telephone and one line for fax machine.

(2) Contractor shall pay the costs for telephone and fax lines installation, maintenance, service, and removal.

F. Fire Protection:

(1) Contractor shall provide and maintain fire extinguishers and other equipment for fire protection. Such equipment shall be designated for use for fire protection only and shall comply with all requirements of the California Fire, State Fire Marshall and/or its designee.

(2) Where on-site welding and burning of steel is unavoidable, Contractor shall provide protection for adjacent surfaces.

G. Trash Removal:

(1) Contractor shall provide trash removal on a timely basis**.** Under no circumstance shall Contractor use District trash service.

H. Field Office:

(1) If Contractor chooses to provide a field office, it shall be an acceptable construction trailer that is well-lit and ventilated. The construction trailer shall be equipped with shelves, desks, filing cabinet, chairs, and such other items of equipment needed. Trailer and equipment are the property of the Contractor and must be removed from the Site upon completion of the Work. Contractor may use the corridor adjacent to the construction area for an office area, if approved in writing by District.

(2) Contractor shall provide any additional electric lighting and power required for the trailer. Contractor shall make adequate provisions for heating and cooling as required.

I. Temporary Facilities:

(1)

1.03 CONSTRUCTION AIDS:

A. Plant and Equipment:

(1) Contractor shall furnish, operate, and maintain a complete plant for fabricating, handling, conveying, installing, and erecting materials and equipment; and for conveyances for transporting workers. Include elevators, hoists, debris chutes, and other equipment, tools, and appliances necessary for performance of the Work.

(2) Contractor shall maintain plant and equipment in safe and efficient operating condition. Damages due to defective plant and equipment, and uses made thereof, shall be repaired by Contractor at no expense to the District.

B. None of the District's tools and equipment shall be used by Contractor for the performance of the Work.

1.04 BARRIERS AND ENCLOSURES:

A. Contractor shall obtain the District's written permission for locations and types of temporary barriers and enclosures, including fire-rated materials proposed for use, prior to their installation.

B. Contractor shall provide and maintain temporary enclosures to prevent public entry and to protect persons using other buildings and portions of the Site and/or Premises, the public, and workers. Contractor shall also protect the Work and existing facilities from the elements, and adjacent construction and improvements, persons, and trees and plants from damage and injury from demolition and construction operations.

C. Contractor shall provide site access to existing facilities for persons using other buildings and portions of the Site, the public, and for deliveries and other services and activities.

D. Tree and Plant Protection:

(1) Contractor shall preserve and protect existing trees and plants on the Premises that are not designated or required to be removed, and those adjacent to the Premises.

(2) Contractor shall provide barriers to a minimum height of 4'-0" around drip line of each tree and plant, around each group of trees and plants, as applicable, in the proximity of demolition and construction operations, or as denoted on the Plans.

(3) Contractor shall not park trucks, store materials, perform Work or cross over landscaped areas. Contractor shall not dispose of paint thinners, water from cleaning, plastering or concrete operations, or other deleterious materials in landscaped areas, storm drain systems, or sewers. Plant materials damaged as a result of the performance of the Work shall, at the option of the District and at Contractor's expense, either be replaced with new plant materials equal in size to those damaged or by payment of an amount representing the value of the damaged materials as determined by the District.

(4) Contractor shall remove soil that has been contaminated during the performance of the Work by oil, solvents, and other materials which could be harmful to trees and plants, and replace with good soil, at Contractor's expense.

(5) Excavation around Trees:

(a) Excavation within drip lines of trees shall be done only where absolutely necessary and with written permission from the District.

(b) Where trenching for utilities is required within drip lines, tunneling under and around roots shall be by hand digging and shall be approved by the District. Main lateral roots and taproots shall not be cut. All roots 2 inches in diameter and

larger shall be tunneled under and heavily wrapped with wet burlap so as to prevent scarring or excessive drying. Smaller roots that interfere with installation of new work may be cut with prior approval by the District. Roots must first be cut with a Vermeer, or equivalent, root cutter prior to any trenching.

(c) Where excavation for new construction is required within drip line of trees, hand excavation shall be employed to minimize damage to root system. Roots shall be relocated in backfill areas wherever possible. If encountered immediately adjacent to location of new construction, roots shall be cut approximately 6 inches back from new construction.

(d) Approved excavations shall be carefully backfilled with the excavated materials approved for backfilling. Backfill shall conform to adjacent grades without dips, sunken areas, humps, or other surface irregularities. Do not use mechanical equipment to compact backfill. Tamp carefully using hand tools, refilling and tamping until Final Acceptance as necessary to offset settlement.

(e) Exposed roots shall not be allowed to dry out before permanent backfill is placed. Temporary earth cover shall be provided, or roots shall be wrapped with four layers of wet, untreated burlap and temporarily supported and protected from damage until permanently relocated and covered with backfill.

(f) Accidentally broken roots should be sawed cleanly 3 inches behind ragged end.

1.05 SECURITY:

The Contractor shall be responsible for project security for materials, tools, equipment, supplies, and completed and partially completed Work.

1.06 TEMPORARY CONTROLS:

A. Noise Control:

(1) Contractor acknowledges that adjacent facilities may remain in operation during all or a portion of the Work period, and it shall take all reasonable precautions to minimize noise as required by applicable laws and the Contract Documents.

(2) Notice of proposed noisy operations, including without limitation, operation of pneumatic demolition tools, concrete saws, and other equipment, shall be submitted to the District a minimum of forty-eight (48) hours in advance of their performance.

B. Noise and Vibration:

(1) Equipment and impact tools shall have intake and exhaust mufflers.

(2) Contractor shall cooperate with District to minimize and/or cease the use of noisy and vibratory equipment if that equipment becomes objectionable by its longevity.

C. Dust and Dirt:

(1) Contractor shall conduct demolition and construction operations to minimize the generation of dust and dirt, and prevent dust and dirt from interfering with the progress of the Work and from accumulating in the Work and adjacent areas including, without limitation, occupied facilities.

(2) Contractor shall periodically water exterior demolition and construction areas to minimize the generation of dust and dirt.

(3) Contractor shall ensure that all hauling equipment and trucks carrying loads of soil and debris shall have their loads sprayed with water or covered with tarpaulins, and as otherwise required by local and state ordinance.

(4) Contractor shall prevent dust and dirt from accumulating on walks, roadways, parking areas, and planting, and from washing into sewer and storm drain lines.

D. Water:

(1) Contractor shall not permit surface and subsurface water, and other liquids, to accumulate in or about the vicinity of the Premises. Should accumulation develop, Contractor shall control the water or other liquid, and suitably dispose of it by means of temporary pumps, piping, drainage lines, troughs, ditches, dams, or other methods.

E. Pollution:

(1) No burning of refuse, debris, or other materials shall be permitted on or in the vicinity of the Premises.

(2) Contractor shall comply with applicable regulatory requirements and anti-pollution ordinances during the conduct of the Work including, without limitation, demolition, construction, and disposal operations.

F. Lighting:

(1) If portable lights are used after dark, all light must be located so as not to direct light into neighboring property.

1.07 JOB SIGN(S):

A. General:

(1) Contractor shall provide and maintain a Project identification sign with the design, text, and colors designated by the District and/or the Design Professional; locate sign as approved by the District.

(2) Signs other than the specified Project sign and or signs required by law, for safety, or for egress, shall not be permitted, unless otherwise approved in advance by the District.

B. Materials:

(1) Structure and Framing: Structurally sound, new or used wood or metal; wood shall be nominal 3/4-inch exterior grade plywood.

(2) Sign Surface: Minimum 3/4-inch exterior grade plywood.

(3) Rough Hardware: Galvanized.

(4) Paint: Exterior quality, of type and colors selected by the District and/or the Design Professional.

C. Fabrication:

(1) Contractor shall fabricate to provide smooth, even surface for painting.

(2) Size: 4'-0" x 8'-0", unless otherwise indicated.

(3) Contractor shall paint exposed surfaces of supports, framing, and surface material with exterior grade paint: one coat of primer and one coat of finish paint.

(4) Text and Graphics: As indicated.

1.08 PUBLICITY RELEASES:

A. Contractor shall not release any information, story, photograph, plan, or drawing relating information about the Project to anyone, including press and other public communications medium, including, without limitation, on website(s) without the written permission of the District.

PART 2 – PRODUCTS Not used.

PART 3 – EXECUTION Not used.

END OF DOCUMENT

DOCUMENT 01 50 13

CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

PART 1 - GENERAL

1.01 RELATED DOCUMENTS AND PROVISIONS:

All Contract Documents should be reviewed for applicable provisions related to the provisions in this document, including without limitation:

A. General Conditions;

B. Special Conditions; and

C. Temporary Facilities and Controls.

1.02 SECTION INCLUDES:

A. Administrative and procedural requirements for the following:

(1) Salvaging non-hazardous construction waste.

(2) Recycling non-hazardous construction waste.

(3) Disposing of non-hazardous construction waste.

1.03 DEFINITIONS:

A. Construction Waste: Building and site improvement materials and other solid waste resulting from construction, remodeling, renovation, or repair operations. Construction waste includes packaging.

B. Demolition Waste: Building and site improvement materials resulting from demolition or selective demolition operations.

C. Disposal: Removal off-site of demolition and construction waste and subsequent sale, recycling, reuse, or deposit in landfill or incinerator acceptable to authorities having jurisdiction.

D. Recycle: Recovery of demolition or construction waste for subsequent processing in preparation for reuse.

E. Salvage: Recovery of demolition or construction waste and subsequent sale or reuse in another facility.

F. Salvage and Reuse: Recovery of demolition or construction waste and subsequent incorporation into the Work.

1.04 PERFORMANCE REQUIREMENTS:

A. General: Develop waste management plan that results in end-of Project rates for salvage/recycling of sixty-five percent (65%) by weight (or by volume, but not a combination) of total waste generated by the Work.

1.05 SUBMITTALS:

A. Waste Management Plan: Submit waste management plan within 30 days of date established for commencement of the Work.

B. Waste Reduction Progress Reports: Concurrent with each Application for Payment, submit copies of report. Include the following information:

(1) Material category.

(2) Generation point of waste.

(3) Total quantity of waste in tons or cubic yards.

(4) Quantity of waste salvaged, both estimated and actual in tons or cubic yards.

(5) Quantity of waste recycled, both estimated and actual in tons or cubic yards.

(6) Total quantity of waste recovered (salvaged plus recycled) in tons or cubic yards.

(7) Total quantity of waste recovered (salvaged plus recycled) as a percentage of total waste.

C. Waste Reduction Calculations: Before request for final payment, submit copies of calculated end-of-Project rates for salvage, recycling, and disposal as a percentage of total waste generated by the Work.

D. Records of Donations: Indicate receipt and acceptance of salvageable waste donated to individuals and organizations. Indicate whether organization is tax exempt.

E. Records of Sales: Indicate receipt and acceptance of salvageable waste sold to individuals and organizations. Indicate whether organization is tax exempt.

F. Recycling and Processing Facility Records: Indicate receipt and acceptance of recyclable waste by recycling and processing facilities licensed to accept them. Include manifests, weight tickets, receipts, and invoices.

G. Landfill and Incinerator Disposal Records: Indicate receipt and acceptance of waste by landfills and incinerator facilities licensed to accept them. Include manifests, weight tickets, receipts, and invoices.

H. CHPS Submittal: CHPS letter template for Credit ME2.0 and ME2.1, signed by Contractor, tabulating total waste material, quantities diverted and means by which it is diverted, and statement that requirements for the credit have been met.

I. Qualification Data: For Waste Management Coordinator.

J. Statement of Refrigerant Recovery: Signed by refrigerant recovery technician responsible for recovering refrigerant, stating that all refrigerant that was present was recovered and that recovery was performed according to EPA regulations. Include name and address of technician and date refrigerant was recovered.

K. Submittal procedures and quantities are specified in Document 01 33 00.

1.06 QUALITY ASSURANCE:

A. Waste Management Coordinator Qualifications: LEED Accredited Professional by U.S. Green Building Council.

B. Regulatory Requirements: Comply with hauling and disposal regulations of authorities having jurisdiction.

C. Waste Management Conference: Conduct conference at Project site to comply with requirements. Review methods and procedures related to waste management including, but not limited to, the following:

(1) Review and discuss waste management plan including responsibilities of Waste Management Coordinator.

(2) Review requirements for documenting quantities of each type of waste and its disposition.

(3) Review and finalize procedures for materials separation and verify availability of containers and bins needed to avoid delays.

(4) Review procedures for periodic waste collection and transportation to recycling and disposal facilities.

(5) Review waste management requirements for each trade.

1.07 WASTE MANAGEMENT PLAN:

A. General: Develop plan consisting of waste identification, waste reduction work plan, and cost/revenue analysis. Indicate quantities by weight or volume, but use same units of measurement throughout waste management plan.

B. Waste Identification: Indicate anticipated types and quantities of site-clearing and construction waste generated by the Work. Include estimated quantities and assumptions for estimates.

C. Waste Reduction Work Plan: List each type of waste and whether it will be salvaged, recycled, or disposed of in landfill or incinerator. Include points of waste generation, total quantity of each type of waste, quantity for each means of recovery, and handling and transportation procedures.

(1) Salvaged Materials for Reuse: For materials that will be salvaged and reused in this Project, describe methods for preparing salvaged materials before incorporation into the Work.

(2) Salvaged Materials for Sale: For materials that will be sold to individuals and organizations, include list of their names, addresses, and telephone numbers.

(3) Salvaged Materials for Donation: For materials that will be donated to individuals and organizations, include list of their names, addresses, and telephone numbers.

(4) Recycled Materials: Include list of local receivers and processors and type of recycled materials each will accept. Include names, addresses, and telephone numbers.

(5) Disposed Materials: Indicate how and where materials will be disposed of. Include name, address, and telephone number of each landfill and incinerator facility.

(6) Handling and Transportation Procedures: Include method that will be used for separating recyclable waste including sizes of containers, container labeling, and designated location on Project site where materials separation will be located.

PART 2 - PRODUCTS Not Used.

PART 3 - EXECUTION

3.01 PLAN IMPLEMENTATION:

A. General: Implement approved waste management plan. Provide handling, containers, storage, signage, transportation, and other items as required to implement waste management plan during the entire duration of the Contract.

(1) Comply with Document 01 50 00 for operation, termination, and removal requirements.

B. **[**Waste Management Coordinator: Engage a waste management coordinator to be responsible for implementing, monitoring, and reporting status of waste management work plan. Coordinator shall be present at Project site full time for duration of Project.**]**

C. Training: Train workers, subcontractors, and suppliers on proper waste management procedures, as appropriate for the Work occurring at Project site.

(1) Distribute waste management plan to everyone concerned within 3 days of submittal return.

(2) Distribute waste management plan to entities when they first begin work on site. Review plan procedures and locations established for salvage, recycling, and disposal.

D. Site Access and Temporary Controls: Conduct waste management operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.

(1) Designate and label specific areas of Project site necessary for separating materials that are to be salvaged, recycled, reused, donated, and sold.

(2) Comply with Document 01 50 00 for controlling dust and dirt, environmental protection, and noise control.

3.02 RECYCLING CONSTRUCTION WASTE:

A. General: Recycle paper and beverage containers used by on-site workers.

B. Recycling Incentives: Revenues, savings, rebates, tax credits, and other incentives received for recycling waste materials shall accrue to the Contractor.

C. Procedures: Separate recyclable waste from other waste materials, trash, and debris. Separate recyclable waste by type at Project site to the maximum extent practical.

(1) Provide appropriately marked containers or bins for controlling recyclable waste until they are removed from Project Site. Include list of acceptable and unacceptable materials at each container and bin.

(a) Inspect containers and bins for contamination and remove contaminated materials if found.

(2) Stockpile processed materials on site without intermixing with other materials. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.

(3) Stockpile materials away from construction area. Do not store within drip line of remaining trees.

(4) Store components off the ground and protect from the weather.

(5) Remove recyclable waste off District property and transport to recycling receiver or processor.

D. Packaging:

(1) Cardboard and Boxes: Break down packaging into flat sheets. Bundle and store in a dry location.

(2) Polystyrene Packaging: Separate and bag material.

(3) Pallets: As much as possible, require deliveries using pallets to remove pallets from Project Site. For pallets that remain on Site, break down pallets into component wood pieces and comply with requirements for recycling wood.

(4) Crates: Break down crates into component wood pieces and comply with requirements for recycling wood.

E. Site-Clearing Wastes: Chip brush, branches, and trees on site.

F. Wood Materials:

(1) Clean Cut-Offs of Lumber: Grind or chip into small pieces.

(2) Clean Sawdust: Bag sawdust that does not contain painted or treated wood.

G. Gypsum Board: Stack large clean pieces on wood pallets and store in a dry location.

(1) Clean Gypsum Board: Grind scraps of clean gypsum board using small mobile chipper or hammer mill. Screen out paper after grinding.

3.03 DISPOSAL OF WASTE:

A. General: Except for items or materials to be salvaged, recycled, or otherwise reused, remove waste materials from Project Site and legally dispose of them in a landfill or incinerator acceptable to authorities having jurisdiction.

(1) Except as otherwise specified, do not allow waste materials that are to be disposed of accumulate on site.

(2) Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.

B. Burning: Do not burn waste materials.

C. Disposal: Transport waste materials off District property and legally dispose of them.

END OF DOCUMENT

DOCUMENT 01 52 13

FIELD OFFICES

PART 1 – GENERAL

1.01 RELATED DOCUMENTS AND PROVISIONS:

All Contract Documents should be reviewed for applicable provisions related to the provisions in this document, including without limitation:

A. General Conditions;

B. Special Conditions; and

C. Temporary Facilities and Controls.

1.02 SECTION INCLUDES:

A. Requirements for Field Offices and Field Office Trailers.

1.03 SUMMARY:

A. General: Contractor shall provide District's Field Office Trailer and contents, for District's use exclusively, during the term of the Contract.

B. Property: Trailer, furniture, furnishings, equipment, and the like, supplied by the Contractor with the Office Trailer shall remain the property of the Contractor; District property items installed, delivered, and the like by District within the Office Trailer will remain District's property.

C. Modifications: District reserves the right to modify the trailer or contents, or both, as may be deemed proper by District.

D. Condition: Trailer and contents shall be clean, neat, substantially finished, in good, proper, and safe condition for use, operation, and the like; the trailer and contents shall not be required to be new.

E. Installation Timing: Provide safe, fully furnished, functional, proper, complete, and finished trailer properly ready for entire use, within fourteen (14) calendar days of District's notification of the issuance of Notice to Proceed.

1.04 SUBMITTALS:

A. General: Submit submittals to District in quantity, format, type, and the like, as specified herein.

B. Office Trailer Data: One (1) copy of manufacturer's descriptive data, technical descriptions, regulatory compliance, industry standards, installation, removal, and maintenance instructions.

C. Equipment Data: Two (2) copies of manufacturer data for each type of equipment, if directed by District.

D. Furniture and Furnishings Data: Two (2) copies of manufacturer data for each type of equipment, if directed by District.

E. Plans: One (1) reproducible copy of appropriately scaled plans of trailer layout. Plans shall include, but not be limited to: lighting; furniture; equipment; telephone and electrical outlets; and the like.

F. Product Samples: One (1) complete and entire unit of each type, if directed by District.

1.05 QUALITY ASSURANCE

A. Standards: In the event that provisions of codes, regulations, safety orders, Contract Documents, referenced manufacturer's specifications, manufacturer's instructions, industry standards, and the like, are in conflict, the more restrictive and higher quality shall govern.

B. Installer: Installer or Installers engaged by Contractor must have a minimum of five (5) years of documented and properly authenticated successful experience of specialization in the installation of the items or systems, or both, specified herein.

C. Manufacturer: Contractor shall obtain products from nationally and industry recognized Manufacturer with five (5) years minimum, of immediately recent, continuous, documented and properly authenticated successful experience of specialization in the manufacture of the product specified herein.

D. State Personnel Training: Provide proper training for maintenance and operations, including emergency procedures, and the like, as directed by District.

E. Units: Shall be sound and free of defects, and shall not include any damage or defect that will impair the safety, installation, performance, or the durability of the entire Office Trailer and appurtenant systems.

1.06 REGULATORY REQUIREMENTS

A. General: Work shall be executed in accordance with applicable Codes, Regulations, Statutes, Enactments, Rulings, Laws, each authority having jurisdiction, and including, but not limited to, Regulatory Requirements specified herein.

B. California Building Standards Code ("CBSC").

C. California Code of Regulations, Title 25, Chapter 3, Sub Chapter 2, Article 3 ("CCR").

D. Coach Insignia: Trailer shall display California Commercial Coach Insignia; such insignia shall be deemed to show that the trailer is in accordance with the Construction and Fire Safety requirements of CCR.

PART 2 – PRODUCTS

2.01 FIELD OFFICE TRAILER

A. General: Provide entire Field Office Trailer of type, function, operation, capacity, size, complete with controls, safety devices, accessories, and the like, for proper and durable installation. Partitions, walls, ceiling, and other interior and exterior surfaces shall be appropriately finished, including, but not limited to, trim, painting, wall base, floor covering, suspended or similar ceiling, and the like; provide systems, components, units, nuts, bolts, screws, anchoring devices, fastening devices, washers, accessories, adhesives, sealants, and other items of type, grade, and class required for the particular use, not identified but required for a complete, weather-tight, appropriately operating, and finished installation.

B. Manufacturers: General Electric Capital Modular Space; The Space Place, Inc.; or equal.

C. Program: Provide a wheel-mounted trailer with stairs, landings, platforms, ramps, and the like, in good, proper, safe, clean, and properly finished condition; with proper heavy duty locks, and other proper and effective security at all doors, windows, and the like. Trailer shall be maintained in good, proper, safe, clean, and properly finished condition during the Contract.

(1) Nominal Trailer Size: Four hundred eighty (480) square feet, minimum.

(2) Stairs, Platform: Properly finished stairs, platforms, and ramps.

(3) Doors: Two (2), three (3) foot wide exterior doors with locksets; finished ramp, steps, and entry platform at each exterior door.

(4) Keys: Submit five (5) keys for each door, window, furniture unit, and the like. There shall be no other key copies or originals available; each key shall be identified for District; and shall be labeled, or tagged or both, as directed by District.

(5) HVAC:

(6) Lighting: Sixty-five (65) foot-candles illumination minimum at any point, at thirty (30) inches above finished floor throughout from fluorescent light source, exclusively, or as directed by District.

(7) Electrical Outlets: One (1) duplex outlet evenly spaced every twelve (12) linear horizontal feet of wall face, and electrical service ready for use.

(8) Telephones and Telephone Outlets: Two (2) telephone lines wired, connected to telephone utility service, and ready for use, and two (2) telephone instruments, each with two (2)-line capability, speed dial and hands-free feature. Locate each outlet as directed by District.

(9) Voicemail Messaging System or Answering Machine: One (1) unit, two (2)-line; digital.

2.02 FIELD OFFICE TRAILER ITEMS

A. General: Provide the Field Office Trailer with the following arranged into two (2) workstations:

(1) Desks: Two (2) desks: thirty-six (36) inches by sixty (60) inches; steel, laminated plastic top; locking, one (1) or two (2) file drawers single pedestal; steel; provide five (5) keys to District.

(2) Tables: Two (2) tables; thirty-six (36) inches by sixty (60) inches; twenty-nine (29) inches high; steel, laminated plastic top tables; one (1) at each desk.

(3) Chairs: Two (2) chairs: swivel; steel; with seat cushion and arms; one (1) at each desk.

(4) Waste Baskets: Two (2) waste baskets, one at each desk.

B. Furniture and Equipment: Provide in the space located to effect efficient and logical use.

(1) File cabinet: One (1); four (4) drawer; lateral; steel locking.

(2) Plan Table: One (1) plan table: thirty-six (36) inches deep by seventy-two (72) inches wide by forty-two (42) inches high; adjustable; wood or steel; with lockable plan and pencil drawers.

(3) Drafting Stool: One (1) drafting stool; swiveling; steel; padded; adjustable; with footrest and casters.

(4) Bookshelf: One (1) bookshelf: thirty-six (36) inches deep by seventy-two (72) inches wide by forty-two (42) inches high; adjustable; wood or steel; with lockable plan and pencil drawer.

(5) Plan Rack: One (1) wheel mounted plan rack.

(6) Waste Baskets: One (1) large waste basket.

(7) Coat/Hat Hanger: Wall mounted with minimum capacity for four (4) garments and ten (10) hats.

(8) Document Management System: Shall include an integrated high-volume printer, copier, and facsimile machine, including stand, base, and storage cabinet; and shall include the following features:

(a) Type: Laser, dry electrostatic transfer, plain paper, digital, multi-function imaging system.

(b) Network: Ethernet or Token Ring network ready, Plug-and-Play.

(c) Print, send/receive facsimile from any connected workstation.

(d) Resolution: Six hundred (600) dots per inch by six hundred (600) dots per inch, minimum.

(e) Print Speed: Twenty (20) pages per minute, minimum.

(f) Copies: Twenty (20) copies per minute, minimum.

(g) Document Handler: Forty (40) sheet, minimum

(h) Collator: Forty (40) bin, minimum, with stapling.

(i) Duplexing: Capable.

(j) Paper Size: Capable of handling paper sizes to eleven (11) inches by seventeen (17) inches.

(k) Paper Cassettes: One (1) each for eight and one half (8.5) inches by eleven (11) inches, eight and one half (8.5) inches by fourteen (14) inches, and eleven (11) inches by seventeen (17) inches paper sizes; minimum two hundred fifty (250) sheets per cassette.

(l) Reduction/Enlargement: Capable of reduction to twenty-five percent (25%) and enlargement to two hundred percent (200%).

(m) Facsimile Electronic Storage: Capable of storing minimum of fifty (50) speed dial numbers, group faxing and broadcast faxing.

(n) Facsimile Scanning: Capable of scanning into memory a minimum of one hundred (100) pages with maximum scan time of three (3) seconds per page.

(o) Halftone: Sixty-four (64) levels.

(p) Redial: Automatic and Manual.

(9) Maintenance: Contractor shall purchase service agreements for each unit of equipment for the duration of the project plus two (2) months, and shall maintain all equipment in proper working condition. Service agreements shall include provision for replacement of toner cartridges and other items required to effect proper unit use. Service agreements shall also provide for:

(a) Unlimited Service Calls.

(b) Same Day Response.

(c) All parts, labor, preventative maintenance and mileage.

(d) All chemicals, such as toner, fixing agent, and the like.

(e) System training and setup.

(10) Portable Toilets: Two (2); each shall include a urinal; each unit shall be a properly enclosed chemical unit conforming to ANSI Z4.3.

(a) Location: As directed by District.

(b) Maintenance: Maintain each unit and surrounding areas in a clean, hygienic and orderly manner, at all time. Empty, clean, and sanitize each unit each day at a location and time as directed by District.

(c) Removal: Relocate, or remove from the site, each Portable Toilet. Upon such directive by District, the Contractor shall forthwith relocate or remove each Portable Toilet and submit the affected areas to a condition which existed prior to the installation of each Portable Toilet, within three (3) calendar days, or as directed by District in writing, at no cost to District.

2.03 UTILITY AND SERVICES

A. Telephone Service: Contractor shall provide and interface the entire telephone service, and shall properly and timely pay for telephone service for District's non-long-distance use.

B. Electrical Service: Provide all proper connections and continuously pay for service for the duration of the Work.

2.04 FINISHES

A. General: Manufacturer standard finish system over surfaces properly cleaned, pretreated, and prepared to obtain proper bond; all visible surfaces shall be coated.

B. Finish: Color as selected by District from manufacturer standard palette.

PART 3 – EXECUTION

3.01 INSTALLATION

A. General: Properly prepare area and affected items to receive the Work. Set Work accurately in location, alignment, and elevation; rigidly, securely, and firmly anchor to appropriate structure; install plumb, straight, square, level, true, without racking, rigidly anchored to proper solid blocking, substrate, and the like; provide appropriate type and quantity of reinforcements, fasteners, adhesives, self-adhesive and other tapes; lubricants, coatings, accessories, and the like, as required for a complete, structurally rigid, stable, sound, and appropriately finished installation, in accordance with manufacturer's published instructions, and as indicated. The more restrictive and higher quality requirement shall govern. Moving parts shall be properly secured, without binding, looseness, noise, and the like.

B. Installation: Install in accordance with 25 CCR 3.2.3 and as directed by District; jack up trailer and level both ways; mount on proper concrete piers with all load off wheels; provide required tie down and accessories per Section 4368 of referenced CCR, and as directed by District.

C. Rejected Work: Work, materials, unit, items, systems, and the like, not accepted by District shall be deemed rejected, and shall forthwith be removed and replaced with proper and new Work, materials, unit, items, systems, and the like at no cost to District.

D. Standard: Comply with manufacturer's published instructions, or with instructions as shown or indicated; the more restrictive and higher quality requirement shall govern.

E. Location: As directed by District.

F. Fire Resistance: Construct and install in accordance with UL requirements.

G. Maintenance: Contractor shall maintain trailer and adjacent areas in a safe, clean and hygienic condition throughout the duration of the Work, and as directed by District. Properly repair or replace furniture or other items, as directed by District. Properly remove unsafe, damaged, or broken furniture, or similar items, and replace with safe and proper items. Contractor shall pay cost of all services, repair, and maintenance, or replacement of each item.

H. Janitorial Service: Provide professional janitorial services, including, but not limited to, trash, waste paper baskets, fill paper dispensers; clean and dust all furniture, files, and the like; sweep and mop resilient and similar flooring; and vacuum carpeting and similar flooring.

(1) Frequency: Two (2) times per week, minimum.

I. Removal: Properly remove the Office Trailer and contents from the Site upon completion of the Contract, or as directed by District in writing. Forthwith properly patch and repair affected areas; replace damaged items with new items. Carefully and properly inventory, clean, pack, store, and protect District property; submit District property to District at a date, time and location as directed by District.

END OF DOCUMENT

DOCUMENT 01 6400

OWNER-FURNISHED PRODUCTS

PART 1 – GENERAL

1.01 RELATED DOCUMENTS AND PROVISIONS

All Contract Documents should be reviewed for applicable provisions related to the provisions in this document, including without limitation:

A. General Conditions;

B. Special Conditions; and

C. Materials and Equipment.

1.02 SECTION INCLUDES

A. Requirements for the following:

(1) Installing Owner-furnished materials and equipment.

(2) Providing necessary utilities, connections and rough-ins.

1.03 DEFINITIONS

A. Owner: District, who is providing/furnishing materials and equipment.

B. Installing Contactor: Contractor, who is installing the materials and equipment furnished by the Owner.

1.04 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Receive, store and handle products in accordance with the manufacturer's instructions.

B. Protect equipment items as required to prevent damage during storage and construction.

PART 2 – PRODUCTS

2.01 GENERAL PRODUCT REQUIREMENTS

A. Installing Contractor's Responsibilities:

(1) Verify mounting and utility requirements for Owner-furnished materials and equipment items.

(2) Provide mounting and utility rough in for all items where required.

(a) Rough in locations, sizes, capacities, and similar type items shall be as indicated and required by product manufacturer.

B. Owner and Installing Contractor(s) Responsibilities:

(1) Owner-Furnished/Contractor Installed ("OFCI"): Furnished by the Owner; installed by the Installing Contractor.

(a) General: Owner and Installing Contractor(s) will coordinate deliveries of materials and equipment to coincide with the construction schedule.

(b) Owner will furnish specified materials and equipment delivered to the site. Owner/vendor's representative shall be present on Site at the time of delivery to comply with the contract requirements and Specifications Section 01 43 00, Materials and Equipment, Article 1.04.

(c) The Owner furnishing specified materials and equipment is responsible to provide manufacturer guarantees as required by the Contract to the Installing Contractor.

(d) The Installing Contractor shall:

1) Review, verify and accept the approved manufacturer's submittal/Shop Drawings for all materials and equipment required to be installed by the Installer Contractor and furnished by the Owner. Any discrepancies, including but not limited to possible space conflicts, should be brought to the attention of the Project Manager and/or Program Manager, if applicable.

2) Coordinate timely delivery. Installing Contractor shall receive materials and equipment at Site when delivered and give written receipt at time of delivery, noting visible defects or omissions; if such declaration is not given, the Installing Contractor shall assume responsibility for such defects and omissions.

3) Store materials and equipment until ready for installation and protect from loss and damage. Installing Contractor is responsible for providing adequate storage space.

4) Coordinate with other bid package contractors and field measurement to ensure complete installation.

5) Uncrate, assemble, and set in place.

6) Provide adequate supports.

7) Install materials and equipment in accordance with manufacturer's recommendations, instructions, and Shop Drawings, supply labor and material required, and make mechanical, plumbing, and electrical connections required to operate equipment.

8) Be certified by equipment manufacturer for installation of the specific equipment supplied by the Owner.

9) Provide anchorage and/or bracing as required for seismic restraint per Title 24 and all other applicable codes.

10) Provide the contract-required warranty and guarantee for all work, materials and equipment, and installation upon its completion and acceptance by the District. Guarantee includes all costs associated with the removal, shipping to and from the Site, and re-installation of any equipment found to be defective.

C. Compatibility with Space and Service Requirements:

(1) Equipment items shall be compatible with space limitations indicated and as shown on the Contract Documents and specified in other sections of the Specifications.

(2) Modifications to equipment items required to conform to space limitations specified for rough in shall not cause additional cost to the District.

D. Manufacturer's printed descriptions, specifications, and instructions shall govern the Work unless specifically indicated or specified otherwise.

2.02 FURNISHED MATERIALS AND EQUIPMENT

A. All furnished materials and equipment are indicated or scheduled on the Contract Documents.

PART 3 – EXECUTION

3.01 INSTALLATION

A. Install equipment items in accordance with the manufacturer's instructions.

B. Set equipment items securely in place, rigidly or flexibly mounted in accordance with manufacturers' directions.

C. Make electrical and mechanical connections as indicated and required.

D. Touch-up and restore damaged or defaced finishes to the Owner's satisfaction.

3.02 CLEANING AND PROTECTION

A. Repair or replace items not acceptable to the Architect or Owner.

B. Upon completion of installation, clean equipment items in accordance with manufacturer's recommendations, and protect from damage until final acceptance of the Work by the Owner.

END OF DOCUMENT

SECTION 01 66 00

PRODUCT DELIVERY, STORAGE AND HANDLING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS AND PROVISIONS

All Contract Documents should be reviewed for applicable provisions related to the provisions in this document, including without limitation:

A. General Conditions, including, without limitation, Site Access, Conditions and Requirements;

B. Special Conditions.

1.02 PRODUCTS

A. Products are as defined in the General Conditions.

B. Contractor shall not use and/or reuse materials and/or equipment removed from existing Premises, except as specifically permitted by the Contract Documents.

C. Contractor shall provide interchangeable components of the same manufacturer, for similar components.

1.03 TRANSPORTATION AND HANDLING

A. Contractor shall transport and handle Products in accordance with manufacturer's instructions.

B. Contractor shall promptly inspect shipments to confirm that Products comply with requirements, quantities are correct, and products are undamaged.

C. Contractor shall provide equipment and personnel to handle Products by methods to prevent soiling, disfigurement, or damage.

1.04 STORAGE AND PROTECTION

A. Contractor shall store and protect Products in accordance with manufacturer's instructions, with seals and labels intact and legible. Contractor shall store sensitive products in weather-tight, climate controlled enclosures.

B. For exterior storage of fabricated Products, Contractor shall place on sloped supports, above ground.

C. Contractor shall provide off-site storage and protection when Site does not permit on-site storage or protection.

D. Contractor shall cover products subject to deterioration with impervious sheet covering and provide ventilation to avoid condensation.

E. Contractor shall store loose granular materials on solid flat surfaces in a well-drained area and prevent mixing with foreign matter.

F. Contractor shall provide equipment and personnel to store Products by methods to prevent soiling, disfigurement, or damage.

G. Contractor shall arrange storage of Products to permit access for inspection and periodically inspect to assure Products are undamaged and are maintained under specified conditions.

PART 2 – PRODUCTS Not Used.

PART 3 - EXECUTION Not Used.

END OF DOCUMENT

DOCUMENT 01 71 23

FIELD ENGINEERING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS AND PROVISIONS:

All Contract Documents should be reviewed for applicable provisions related to the provisions in this document, including without limitation:

A. General Conditions, including, without limitation, Site Investigation, and Soils Investigation Report;

B. Special Conditions;

C. Site-Visit Certification.

1.02 REQUIREMENTS INCLUDED:

A. Contractor shall provide and pay for field engineering services by a California-registered engineer, required for the project, including, without limitations:

(1) Survey work required in execution of the Project.

(2) Civil or other professional engineering services specified, or required to execute Contractor's construction methods.

1.03 QUALIFICATIONS OF SURVEYOR OR ENGINEERS:

Contractor shall only use a qualified licensed engineer or registered land surveyor, to whom District makes no objection.

1.04 SURVEY REFERENCE POINTS:

A. Existing basic horizontal and vertical control points for the Project are those designated on the Drawings.

B. Contractor shall locate and protect control points prior to starting Site Work and preserve all permanent reference points during construction. In addition Contractor shall:

(1) Make no changes or relocation without prior written notice to District and Architect.

(2) Report to District and Architect when any reference point is lost or destroyed, or requires relocation because of necessary changes in grades or locations.

(3) Require surveyor to replace Project control points based on original survey control that may be lost or destroyed.

1.05 RECORDS:

Contractor shall maintain a complete, accurate log of all control and survey work as it progresses.

1.06 SUBMITTALS:

A. Contractor shall submit name and address of Surveyor and Professional Engineer to District and Architect prior to its/their work on the Project.

B. On request of District and Architect, Contractor shall submit documentation to verify accuracy of field engineering work, at no additional cost to the District.

C. Contractor shall submit a certificate signed by registered engineer or surveyor certifying that elevations and locations of improvements are in conformance or nonconformance with Contract Documents.

PART 2 – PRODUCTS Not Used.

PART 3 - EXECUTION

3.01 COMPLIANCE WITH LAWS:

Contractor is responsible for meeting all applicable codes, OSHA, safety and shoring requirements.

3.02 NONCONFORMING WORK:

Contractor is responsible for any re-surveying required by correction of nonconforming work.

END OF DOCUMENT

DOCUMENT 01 73 29

CUTTING AND PATCHING

PART 1 – GENERAL

1.01 RELATED DOCUMENTS AND PROVISIONS:

All Contract Documents should be reviewed for applicable provisions related to the provisions in this document, including without limitation:

A. General Conditions, including, without limitation, Inspector, Inspections, and Tests, Integration of Work, Nonconforming Work, and Correction of Work, and Uncovering Work;

B. Special Conditions;

C. Hazardous Materials Procedures and Requirements;

D. Hazardous Materials Certification;

E. Lead-Based Paint Certification;

F. Imported Materials Certification.

1.02 CUTTING AND PATCHING:

A. Contractor shall be responsible for all cutting, fitting, and patching, including associated excavation and backfill, required to complete the Work or to:

(1) Make several parts fit together properly.

(2) Uncover portions of Work to provide for installation of ill-timed Work.

(3) Remove and replace defective Work.

(4) Remove and replace Work not conforming to requirements of Contract Documents.

(5) Remove Samples of installed Work as specified for testing.

(6) Provide routine penetrations of non-structural surfaces for installation of piping and electrical conduit.

(7) Attaching new materials to existing remodeling areas – including painting (or other finishes) to match existing conditions.

B. In addition to Contract requirements, upon written instructions from the District, Contractor shall uncover Work to provide for observations of covered Work in accordance with the Contract Documents; remove samples of installed materials for testing as directed by District; and remove Work to provide for alteration of existing Work.

C. Contractor shall not cut or alter Work, or any part of it, in such a way that endangers or compromises the integrity of the Work, the Project, or work of others.

1.03 SUBMITTALS:

A. Prior to any cutting or alterations that may affect the structural safety of Project, or work of others, and well in advance of executing such cutting or alterations, Contractor shall submit written notice to District pursuant to the applicable notice provisions of the Contract Documents, requesting consent to proceed with the cutting or alteration, including the following:

(1) The work of the District or other trades.

(2) Structural value or integrity of any element of Project.

(3) Integrity or effectiveness of weather-exposed or weather-resistant elements or systems.

(4) Efficiency, operational life, maintenance or safety of operational elements.

(5) Visual qualities of sight-exposed elements.

B. Contractor's Request shall also include:

(1) Identification of Project.

(2) Description of affected Work.

(3) Necessity for cutting, alteration, or excavations.

(4) Effects of Work on District, other trades, or structural or weatherproof integrity of Project.

(5) Description of proposed Work:

(a) Scope of cutting, patching, alteration, or excavation.

(b) Trades that will execute Work.

(c) Products proposed to be used.

(d) Extent of refinishing to be done.

(6) Alternates to cutting and patching.

(7) Cost proposal, when applicable.

(8) The scheduled date the Contractor intends to perform the Work and the duration of time to complete the Work.

(9) Written permission of District or other District contractor(s) whose work will be affected.

1.04 QUALITY ASSURANCE:

A. Contractor shall ensure that cutting, fitting, and patching shall achieve security, strength, weather protection, appearance for aesthetic match, efficiency, operational life, maintenance, safety of operational elements, and the continuity of existing fire ratings.

B. Contractor shall ensure that cutting, fitting, and patching shall successfully duplicate undisturbed adjacent profiles, materials, textures, finishes, colors, and that materials shall match existing construction. Where there is dispute as to whether duplication is successful or has been achieved to a reasonable degree, the District's decision shall be final.

1.05 PAYMENT FOR COSTS:

A. Cost caused by ill-timed or defective Work or Work not conforming to Contract Documents, including costs for additional services of the District, its consultants, including but not limited to the Construction Manager, the Architect, the Project Inspector(s), Engineers, and Agents, will be paid by Contractor and/or deducted from the Contract by the District.

B. District shall only pay for cost of Work if it is part of the original Contract Price or if a change has been made to the contract in compliance with the provisions of the General Conditions. Cost of Work performed upon instructions from the District, other than defective or nonconforming Work, will be paid by District on approval of written Change Order. Contractor shall provide written cost proposals prior to proceeding with cutting and patching.

PART 2 - PRODUCTS

2.01 MATERIALS:

A. Contractor shall provide for replacement and restoration of Work removed. Contractor shall comply with the Contract Documents and with the Industry Standard(s), for the type of Work, and the Specification requirements for each specific product involved. If not specified, Contractor shall first recommend a product of a manufacturer or appropriate trade association for approval by the District.

B. Materials to be cut and patched include those damaged by the performance of the Work.

PART 3 – EXECUTION

3.01 INSPECTION:

A. Contractor shall inspect existing conditions of the Site and the Work, including elements subject to movement or damage during cutting and patching, excavating and backfilling. After uncovering Work, Contractor shall inspect conditions affecting installation of new products.

B. Contractor shall report unsatisfactory or questionable conditions in writing to District as indicated in the General Conditions and shall proceed with Work as indicated in the General Conditions by District.

3.02 PREPARATION:

A. Contractor shall provide shoring, bracing and supports as required to maintain structural integrity for all portions of the Project, including all requirements of the Project.

B. Contractor shall provide devices and methods to protect other portions of Project from damage.

C. Contractor shall, provide all necessary protection from weather and extremes of temperature and humidity for the Project, including without limitation, any work that may be exposed by cutting and patching Work. Contractor shall keep excavations free from water.

3.03 ERECTION, INSTALLATION AND APPLICATION:

A. With respect to performance, Contractor shall:

(1) Execute fitting and adjustment of products to provide finished installation to comply with and match specified tolerances and finishes.

(2) Execute cutting and demolition by methods that will prevent damage to other Work, and provide proper surfaces to receive installation of repairs and new Work.

(3) Execute cutting, demolition excavating, and backfilling by methods that will prevent damage to other Work and damage from settlement.

B. Contractor shall employ original installer or fabricator to perform cutting and patching for:

(1) Weather-exposed surfaces and moisture-resistant elements such as roofing, sheet metal, sealants, waterproofing, and other trades.

(2) Sight-exposed finished surfaces.

C. Contractor shall execute fitting and adjustment of products to provide a finished installation to comply with specified products, functions, tolerances, and finishes as shown or specified in the Contract Documents including, without limitation, the Drawings and Specifications.

D. Contractor shall fit Work airtight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces. Contractor shall conform to all Code requirements for penetrations or the Drawings and Specifications, whichever calls for a higher quality or more thorough requirement. Contractor shall maintain integrity of both rated and non-rated fire walls, ceilings, floors, etc.

E. Contractor shall restore Work which has been cut or removed. Contractor shall install new products to provide completed Work in accordance with

requirements of the Contract Documents and as required to match surrounding areas and surfaces.

F. Contractor shall refinish all continuous surfaces to nearest intersection as necessary to match the existing finish to any new finish.

END OF DOCUMENT

DOCUMENT 01 76 00

ALTERATION PROJECT PROCEDURES

PART 1 – GENERAL

1.01 RELATED DOCUMENTS AND PROVISIONS:

All Contract Documents should be reviewed for applicable provisions related to the provisions in this document, including without limitation:

A. General Conditions, including, without limitation, Integration of Work, Purchase of Materials and Equipment, Uncovering of Work and Non-conforming Work and Correction of Work and Trenches;

B. Special Conditions.

PART 2 - PRODUCTS

2.01 PRODUCTS FOR PATCHING AND EXTENDING WORK:

A. New Materials: As specified in the Contract Documents including, without limitation, in the Specifications, Contractor shall match existing products, conditions, and work for patching and extending work.

B. Type and Quality of Existing Products: Contractor shall determine by inspection, by testing products where necessary, by referring to existing conditions and to the Work as a standard.

PART 3 - EXECUTION

3.01 EXAMINATION:

A. Contractor shall verify that demolition is complete and that areas are ready for installation of new Work.

B. By beginning restoration Work, Contractor acknowledges and accepts the existing conditions.

3.02 PREPARATION:

A. Contractor shall cut, move, or remove items as necessary for access to alterations and renovation Work. Contractor shall replace and restore these at completion.

B. Contractor shall remove unsuitable material not as salvage unless otherwise indicated in the Contract Documents. Unsuitable material may include, without limitation, rotted wood, corroded metals, and deteriorated masonry and concrete. Contractor shall replace materials as specified for finished Work.

C. Contractor shall remove debris and abandoned items from all areas of the Site and from concealed spaces.

D. Contractor shall prepare surface and remove surface finishes to provide for proper installation of new Work and finishes.

E. Contractor shall close openings in exterior surfaces to protect existing work from weather and extremes of temperature and humidity. Contractor shall insulate ductwork and piping to prevent condensation in exposed areas. Contractor shall insulate building cavities for thermal and/or acoustical protection, as detailed.

3.03 INSTALLATION:

A. Contractor shall coordinate Work of all alternations and renovations to expedite completion and to accommodate District occupancy.

B. Designated Areas and Finishes: Contractor shall complete all installations in all respects, including operational, mechanical work and electrical work.

C. Contractor shall remove, cut, and patch Work in a manner to minimize damage and to provide a means of restoring Products and finishes to original or specified condition.

D. Contractor shall refinish visible existing surfaces to remain in renovated rooms and spaces, to specified condition for each material, with a neat and square or straight transition to adjacent finishes.

E. Contractor shall install products as specified in the Contract Documents, including without limitation, the Specifications.

3.04 TRANSITIONS:

A. Where new Work abuts or aligns with existing, Contractor shall perform a smooth and even transition. Patched Work must match existing adjacent work in texture and appearance.

B. When finished surfaces are cut so that a smooth transition with new Work is not possible, Contractor shall terminate existing surface along a straight line at a natural line of division and make a recommendation for resolution to the District and the Architect for review and approval.

3.05 ADJUSTMENTS:

A. Where removal of partitions or walls results in adjacent spaces becoming one, Contractor shall rework floors, walls, and ceilings to a smooth plane without breaks, steps, or bulkheads.

B. Where a change of plane of 1/4 inch or more occurs, Contractor shall submit a recommendation for providing a smooth transition to the District and the Architect for review and approval.

C. Contractor shall trim and seal existing wood doors and shall trim and paint metal doors as necessary to clear new floor finish and refinish trim as required.

D. Contractor shall fit Work at penetrations of surfaces.

3.06 REPAIR OF DAMAGED SURFACES:

A. Contractor shall patch or replace portions of existing surfaces, which are damaged, lifted, discolored, or showing other imperfections, in the area where the Work is performed.

B. Contractor shall repair substrate prior to patching finish.

3.07 CULTIVATED AREAS AND OTHER SURFACE IMPROVEMENTS:

A. Cultivated or planted areas and other surface improvements which are damaged by actions of the Contractor shall be restored by Contractor to their original condition or better, where indicated.

B. Contractor shall protect and replace, if damaged, all existing guard posts, barricades, and fences.

C. Contractor shall give special attention to avoid damaging or killing trees, bushes and/or shrubs on the Premises and/or identified in the Contract Documents, including without limitation, the Drawings.

3.08 FINISHES:

A. Contractor shall finish surfaces as specified in the Contract Documents, including without limitations, the provisions of all Divisions of the Specifications.

B. Contractor shall finish patches to produce uniform finish and texture over entire area. When finish cannot be matched, Contractor shall refinish entire surface to nearest intersections.

3.09 CLEANING:

A. Contractor shall continually clean the Site and the Premises as indicated in the Contract Documents, including without limitation, the provisions in the General Conditions and the Specifications regarding cleaning.

END OF DOCUMENT

DOCUMENT 01 77 00

CONTRACT CLOSEOUT AND FINAL CLEANING

PART 1 - GENERAL

1.01 RELATED DOCUMENTS AND PROVISIONS

All Contract Documents should be reviewed for applicable provisions related to the provisions in this document, including without limitation:

A. General Conditions, including, without limitation, Completion of Work;

B. Special Conditions;

C. Temporary Facilities and Controls.

1.02 CLOSEOUT PROCEDURES

Contractor shall comply with all closeout provisions as indicated in the General Conditions.

1.03 FINAL CLEANING

A. Contractor shall execute final cleaning prior to final inspection.

B. Contractor shall clean interior and exterior glass and all surfaces exposed to view; remove temporary labels, tape, stains, and foreign substances, polish transparent and glossy surfaces, wax and polish new vinyl floor surfaces, vacuum carpeted and soft surfaces.

C. Contractor shall clean equipment and fixtures to a sanitary condition.

D. Contractor shall replace filters of operating equipment.

E. Contractor shall clean debris from roofs, gutters, down spouts, and drainage systems.

F. Contractor shall clean Site, sweep paved areas, and rake clean landscaped surfaces.

G. Contractor shall remove waste and surplus materials, rubbish, and construction facilities from the Site and surrounding areas.

1.04 ADJUSTING

Contractor shall adjust operating products and equipment to ensure smooth and unhindered operation.

1.05 RECORD DOCUMENTS AND SHOP DRAWINGS

A. Contractor shall legibly mark each item to record actual construction, including:

(1) Measured depths of foundation in relation to finish floor datum.

(2) Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permit 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

(6) Changes made by modification(s).

(7) References to related Shop Drawings and modifications.

B. Contractor will provide one set of Record Drawings to District.

C. Contractor shall submit all required documents to District and/or Architect prior to or with its final Application for Payment.

1.06 INSTRUCTION OF DISTRICT PERSONNEL

A. Before final inspection, at agreed upon times, Contractor shall instruct District's designated personnel in operation, adjustment, and maintenance of products, equipment, and systems.

B. For equipment requiring seasonal operation, Contractor shall perform instructions for other seasons within six months or by the change of season.

C. Contractor shall use operation and maintenance manuals as basis for instruction. Contractor shall review contents of manual with personnel in detail to explain all aspects of operation and maintenance.

D. Contractor shall prepare and insert additional data in Operation and Maintenance Manual when the need for such data becomes apparent during instruction.

E. Contractor shall review contents of manual with personnel in detail to explain all aspects of operation and maintenance.

1.07 SPARE PARTS AND MAINTENANCE MATERIALS

A. Contractor shall provide products, spare parts, maintenance, and extra materials in quantities specified in the Specifications and in Manufacturer's recommendations.

B. Contractor shall provide District with all required Operation and Maintenance Data at one time. Partial or piecemeal submissions of Operation and Maintenance Data will not be accepted.

PART 2 – PRODUCTS Not Used.

PART 3 – EXECUTION Not Used.

END OF DOCUMENT

DOCUMENT 01 78 23

OPERATION AND MAINTENANCE DATA

PART 1 – GENERAL

1.01 RELATED DOCUMENTS AND PROVISIONS:

All Contract Documents should be reviewed for applicable provisions related to the provisions in this document, including without limitation:

A. General Conditions, including, without limitation, Completion of the Work;

B. Special Conditions.

1.02 QUALITY ASSURANCE:

Contractor shall prepare instructions and data by personnel experienced in maintenance and operation of described products.

1.03 FORMAT:

A. Contractor shall prepare data in the form of an instructional manual entitled "OPERATIONS AND MAINTENANCE MANUAL & INSTRUCTIONS" ("Manual").

B. Binders: Contractor shall use commercial quality, 8-1/2 by 11 inch, three-side rings, with durable plastic covers; two inch maximum ring size. When multiple binders are used, Contractor shall correlate data into related consistent groupings.

C. Cover: Contractor shall identify each binder with typed or printed title "OPERATION AND MAINTENANCE MANUAL & INSTRUCTIONS"; and shall list title of Project and identify subject matter of contents.

D. Contractor shall arrange content by systems process flow under section numbers and sequence of Table of Contents of the Contract Documents.

E. Contractor shall provide tabbed fly leaf for each separate product and system, with typed description of product and major component parts of equipment.

F. Text: The content shall include Manufacturer's printed data, or typewritten data on 24 pound paper.

G. Drawings: Contractor shall provide with reinforced punched binder tab and shall bind in with text; folding larger drawings to size of text pages.

1.04 CONTENTS, EACH VOLUME:

A. Table of Contents: Contractor shall provide title of Project; names, addresses, and telephone numbers of the Architect, any engineers, subconsultants, Subcontractor(s), and Contractor with name of responsible parties; and schedule of products and systems, indexed to content of the volume.

B. For Each Product or System: Contractor shall list names, addresses, and telephone numbers of Subcontractor(s) and suppliers, including local source of supplies and replacement parts.

C. Product Data: Contractor shall mark each sheet to clearly identify specific products and component parts, and data applicable to installation. Delete inapplicable information.

D. Drawings: Contractor shall supplement product data to illustrate relations of component parts of equipment and systems, to show control and flow diagrams. Contractor shall not use Project Record Documents as maintenance drawings.

E. Text: Contractor shall include any and all information as required to supplement product data. Contractor shall provide logical sequence of instructions for each procedure, incorporating manufacturer's instructions.

F. Warranties and Bonds: Contractor shall bind in one copy of each.

1.05 MANUAL FOR MATERIALS AND FINISHES:

A. Building Products, Applied Materials, and Finishes: Contractor shall include product data, with catalog number, size, composition, and color and texture designations. Contractor shall provide information for re-ordering custom manufactured products.

B. Instructions for Care and Maintenance: Contractor shall include Manufacturer's recommendations for cleaning agents and methods, precautions against detrimental agents and methods, and recommended schedule for cleaning and maintenance.

C. Moisture Protection and Weather Exposed Products: Contractor shall include product data listing applicable reference standards, chemical composition, and details of installation. Contractor shall provide recommendations for inspections, maintenance, and repair.

D. Additional Requirements: Contractor shall include all additional requirements as specified in the Specifications.

E. Contractor shall provide a listing in Table of Contents for design data, with tabbed fly sheet and space for insertion of data.

1.06 MANUAL FOR EQUIPMENT AND SYSTEMS:

A. Each Item of Equipment and Each System: Contractor shall include description of unit or system, and component parts and identify function, normal operating characteristics, and limiting conditions. Contractor shall include performance curves, with engineering data and tests, and complete nomenclature, and commercial number of replaceable parts.

B. Panelboard Circuit Directories: Contractor shall provide electrical service characteristics, controls, and communications.

C. Contractor shall include color coded wiring diagrams as installed.

D. Operating Procedures: Contractor shall include start-up, break-in, and routine normal operating instructions and sequences. Contractor shall include regulation, control, stopping, shut-down, and emergency instructions. Contractor shall include summer, winter, and any special operating instructions.

E. Maintenance Requirements: Contractor shall include routine procedures and guide for trouble-shooting; disassembly, repair, and reassembly instructions; and alignment, adjusting, balancing, and checking instructions.

F. Contractor shall provide servicing and lubrication schedule, and list of lubricants required.

G. Contractor shall include manufacturer's printed operation and maintenance instructions.

H. Contractor shall include sequence of operation by controls manufacturer.

I. Contractor shall provide original manufacturer's parts list, illustrations, assembly drawings, and diagrams required for maintenance.

J. Contractor shall provide control diagrams by controls manufacturer as installed.

K. Contractor shall provide Contractor's coordination drawings, with color coded piping diagrams as installed.

L. Contractor shall provide charts of valve tag numbers, with location and function of each valve, keyed to flow and control diagrams.

M. Contractor shall provide list of original manufacturer's spare parts, current prices, and recommended quantities to be maintained in storage.

N. Additional Requirements: Contractor shall include all additional requirements as specified in Specification(s).

O. Contractor shall provide a listing in Table of Contents for design data, with tabbed fly sheet and space for insertion of data.

1.07 SUBMITTAL:

A. Contractor shall submit to the District for review two (2) copies of preliminary draft or proposed formats and outlines of the contents of the Manual within thirty (30) days of Contractor’s start of Work.

B. For equipment, or component parts of equipment put into service during construction and to be operated by District, Contractor shall submit draft content for that portion of the Manual within ten (10) days after acceptance of that equipment or component.

C. Contractor shall submit two (2) copies of a complete Manual in final form prior to final Application for Payment. Copy will be returned with Architect/Engineer comments. Contractor must revise the content of the Manual as required by District prior to District's approval of Contractor's final Application for Payment.

D. Contractor must submit two (2) copies of revised Manual in final form within ten (10) days after final inspection.

PART 2 – PRODUCTS Not Used.

PART 3 – EXECUTION Not Used.

END OF DOCUMENT

DOCUMENT 01 78 36

WARRANTIES

PART 1 - GENERAL

1.01 RELATED DOCUMENTS AND PROVISIONS

All Contract Documents should be reviewed for applicable provisions related to the provisions in this document, including without limitation:

A. General Conditions, including, without limitation, Warranty/Guarantee Information;

B. Special Conditions.

C. It is the district's policy to grant 2 years of GC warranty as default. An allowance of 10% to reflect the default.

1.02 FORMAT

A. Binders: Contractor shall use commercial quality, 8-1/2 by 11 inch, three-side rings, with durable plastic covers; two inch maximum ring size.

B. Cover: Contractor shall identify each binder with typed or printed title "WARRANTIES" and shall list title of Project.

C. Table of Contents: Contractor shall provide title of Project; name, address, and telephone number of Contractor and equipment supplier; and name of responsible principal. Contractor shall identify each item with the number and title of the specific Specification, document, provision, or section in which the name of the product or work item is specified.

D. Contractor shall separate each warranty with index tab sheets keyed to the Table of Contents listing, providing full information and using separate typed sheets as necessary. Contractor shall list each applicable and/or responsible Subcontractor(s), supplier(s), and/or manufacturer(s), with name, address, and telephone number of each responsible principal(s).

1.03 PREPARATION:

A. Contractor shall obtain warranties, executed in duplicate by each applicable and/or responsible subcontractor(s), supplier(s), and manufacturer(s), within ten (10) days after completion of the applicable item or work. Except for items put into use with District's permission, Contractor shall leave date of beginning of time of warranty blank until the date of completion is determined.

B. Contractor shall verify that documents are in proper form, contain full information, and are notarized, when required.

C. Contractor shall co-execute submittals when required.

D. Contractor shall retain warranties until time specified for submittal.

1.04 TIME OF SUBMITTALS:

A. For equipment or component parts of equipment put into service during construction with District's permission, Contractor shall submit a draft warranty for that equipment or component within ten (10) days after acceptance of that equipment or component.

B. Contractor shall submit for District approval all warranties and related documents within ten (10) days after date of completion. Contractor must revise the warranties as required by the District prior to District's approval of Contractor's final Application for Payment.

C. For items of work delayed beyond date of completion, Contractor shall provide an updated submittal within ten (10) days after acceptance, listing the date of acceptance as start of warranty period.

PART 2 - PRODUCTS Not Used.

PART 3 – EXECUTION Not Used.

END OF DOCUMENT

DOCUMENT 01 78 39

RECORD DOCUMENTS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS AND PROVISIONS:

All Contract Documents should be reviewed for applicable provisions related to the provisions in this document, including without limitation:

A. General Conditions, including, without limitation, Documents on Work;

B. Special Conditions.

PART 2 - RECORD DRAWINGS

2.01 GENERAL:

A. As indicated in the Contract Documents, the District will provide Contractor with one set of reproducible, full size original Contract Drawings (mylars).

B. Contractor shall maintain at each Project Site one set of marked-up plans and shall transfer all changes and information to those marked-up plans, as often as required in the Contract Documents, but in no case less than once each month. Contractor shall submit to the Project Inspector one set of reproducible vellums of the Project Record Drawings ("As-Builts") showing all changes incorporated into the Work since the preceding monthly submittal. The As-Builts shall be available at the Project Site. The Contractor shall submit reproducible vellums at the conclusion of the Project following review of the blueline prints.

C. Label and date each Record Drawing "RECORD DOCUMENT" in legibly printed letters.

D. All deviations in construction, including but not limited to pipe and conduit locations and deviations caused by without limitation Change Orders, Construction Claim Directives, RFI's, and Addenda, shall be accurately and legibly recorded by Contractor.

E. Locations and changes shall be done by Contractor in a neat and legible manner and, where applicable, indicated by drawing a "cloud" around the changed or additional information.

2.02 RECORD DRAWING INFORMATION:

A. Contractor shall record the following information:

(1) Locations of Work buried under or outside each building, including, without limitation, all utilities, plumbing and electrical lines, and conduits.

(2) Actual numbering of each electrical circuit to match panel schedule.

(3) Locations of significant Work concealed inside each building whose general locations are changed from those shown on the Contract Drawings.

(4) Locations of all items, not necessarily concealed, which vary from the Contract Documents.

(5) Installed location of all cathodic protection anodes.

(6) Deviations from the sizes, locations, and other features of installations shown in the Contract Documents.

(7) Locations of underground work, points of connection with existing utilities, changes in direction, valves, manholes, catch basins, capped stubouts, invert elevations, etc.

(8) Sufficient information to locate Work concealed in each building with reasonable ease and accuracy.

In some instances, this information may be recorded by dimension. In other instances, it may be recorded in relation to the spaces in the building near which it was installed.

B. Contractor shall provide additional drawings as necessary for clarification.

C. Contractor shall provide reproducible record drawings, made from final Shop Drawings marked "No Exceptions Taken" or "Approved as Noted."

D. After review and approval of the marked-up specifications by the Project Inspector, Contractor shall provide electronic copies of the drawings (in PDF format) with one file with all of the sheets and one set of individual sheet files at the conclusion of the Project.

PART 3 - RECORD SPECIFICATIONS

3.01 GENERAL:

A. Contractor shall mark each section legibly to record manufacturer, trade name, catalog number, and supplier of each Product and item of equipment actually installed.

B. After review and approval of the marked-up specifications by the Project Inspector, Contractor shall provide one electronic copy of the specifications (in PDF format) at the conclusion of the Project.

PART 4 - MAINTENANCE OF RECORD DOCUMENTS

4.01 GENERAL

A. Contractor shall store Record Documents apart from documents used for construction as follows:

(1) Provide files and racks for storage of Record Documents.

(2) Maintain Record Documents in a clean, dry, legible condition and in good order.

B. Contractor shall not use Record Documents for construction purposes.

PART 5 – PRODUCTS Not Used.

END OF DOCUMENT

DOCUMENT 01 9100

COMMISSIONING

PART 1 – GENERAL

1.01 RELATED DOCUMENTS AND PROVISIONS:

All Contract Documents should be reviewed for applicable provisions related to the provisions in this document, including without limitation:

A. General Conditions, including, without limitation, Contractor's Submittals and Schedules, Drawings and Specifications;

B. Special Conditions.

C. Submittal Procedures: Procedures for submittal of product data and quality assurance submittals.

D. Closeout Procedures: General closeout requirements.

E. Sustainable Design Closeout Documentation: Closeout requirements relating to sustainable design certification.

F. Appropriate Sections of Divisions 15 and 16 specify closeout and/or commissioning related requirements for specific pieces of equipment or building operating systems.

1.02 SECTION INCLUDES

A. Equipment and system commissioning, including the following:

(1) Completion of commissioning procedures on specific equipment and systems as indicated under "Related Documents and Provisions" above.

(2) Verification of operational and functional performance of specific equipment and systems for compliance with the "Design Intent" as described in the "Related Documents and Provisions" indicated above.

1.03 DEFINITIONS

A. Commissioning: The process of verifying that the installation and performance of selected building systems meet or exceed the specified design criteria and therefore satisfy the design intent.

B. Deficiencies and Resolutions List: List of noted deficiencies discovered as result of commissioning process.

C. Final Commissioning Report: Overall final commissioning document, prepared by the Systems Commissioning Authority, which details the actual commissioning procedures performed, inspection and testing results, and the final version of the deficiencies and

resolutions list indicating that all issues discovered through the commissioning process have been verified as resolved.

D. Functional Performance Testing Process: Documented testing of system parameters, under actual or simulated operating conditions.

E. Pre-Commissioning Checklists: Installation and start-up items to be completed by the appropriate party prior to operational verification through functional testing.

F. Physical Inspection Process: On-site inspection and review of related system components for conformance to the specifications.

G. Systems Commissioning Authority (SCA): Independent entity under contract directly with the District or District's Representative responsible for performing the specified commissioning procedures.

1.04 DESCRIPTION OF CONSTRUCTION PHASE COMMISSIONING PROCESS

A. As soon as practicable after the bid award the Systems Commissioning Authority (SCA) will conduct a pre-installation commissioning "kick-off" meeting with the contractors. Parties directly affected by the commissioning work will be required to attend. The SCA will explain the commissioning process in detail, and identify specific commissioning related responsibilities of the various parties.

B. Commissioning status meetings will be scheduled to occur during construction to monitor progress and to help facilitate the commissioning process. Contractor representatives will be required to attend these meetings.

C. Once contractors have provided the SCA with written verification indicating completion of installation and startup procedures, the SCA will conduct an on-site physical inspection of the specific systems and equipment.

D. Upon confirmation of system readiness, the SCA will schedule with the contractors to perform functional compliance with the project specifications and drawings. The SCA will oversee the process and will provide the format and documentation for these tests.

E. Deficiencies noted during these tests will be documented on the Deficiencies and Resolutions list. When corrected, issues will be resolved at the time of discovery. The responsible Contractor will resolve all other issues at a later date. All deficiencies will be noted by the SCA as either resolved or pending resolution.

F. The construction commissioning process will be complete when all noted deficiencies have been corrected, proved to be compliance with the project specifications or otherwise resolved to the satisfaction of the District.

1.05 SYSTEMS COMMISSIONING AUTHORITY'S DUTIES AND RESPONSIBILITIES

A. Meet and communicate with the District's representatives, Construction Manager, if any, Contractors, equipment manufacturers' representatives, Architect, Engineer and others as needed, to facilitate the commissioning process.

B. Review commissioning related specifications, submittals and construction documents. Communicate noted deficiencies and concerns to the District, Architect and Engineer.

C. Develop detailed and specific functional testing procedures for equipment and systems to be commissioned.

D. Develop testing, adjusting and balancing (TAB) specifications. Oversee the TAB process.

E. Perform site inspections and verify contractor readiness for the functional testing process. Document deficiencies for future resolution.

F. Witness contractor performed functional testing process as appropriate to verify contractor compliance with the functional testing procedures. Document deficiencies for future resolution.

G. Provide the District, Construction Manager, Contractor, Architect, and Engineer with a Final Commissioning Report to document the commissioning process and to verify that the commissioning process is complete.

1.06 DUTIES AND RESPONSIBILITIES OF OTHERS FOR COMMISSIONING

A. The commissioning process will require the active participation of persons qualified to represent the District, Mechanical Engineer, Electrical Engineer, General Contractor, Equipment Manufacturers' Representatives, Mechanical Contractor, HVAC Contractor, Controls Contractor, TAB Contractor, Electrical Contractor, and other specific subcontractors, as deemed appropriate. The SCA will witness the final functional performance commissioning process. Participants shall include in their contracts all costs necessary to participate in and complete the commissioning process.

B. Contractor will assure the participation and co-operation of Subcontractors, as required to complete the commissioning process.

C. The District will assure the participation of their chosen representatives as required to complete the commissioning process.

D. The Architect will assure the participation of necessary representatives from the Design Team as required to complete the commissioning process. Design team members will provide prompt replies to requests for information issued during the commissioning process.

E. It is the Contractor's specific responsibility to complete their respective start-up and checkout procedures, and to insure the complete readiness of equipment and systems, prior to the start of the functional performance testing phase. The SCA shall request written confirmation of system readiness for performance testing, from the appropriate subcontractor or Contractor. Once the SCA is provided with confirmation of all related systems completion, the actual date and times for the functional performance testing process will be confirmed. Contractors shall provide sufficient time, and qualified representatives, to complete this process.

F. After a second failure of a system to successfully meet the criteria as set forth in the functional performance testing process, the Contractor shall reimburse the District for all costs associated with any additional re-testing efforts made necessary due to remaining

Contractor related system deficiencies previously reported by the Contractor as corrected. These costs shall include salary, travel costs and per diem lodging costs (where applicable) for the SCA. Rates to be used:

Mileage: $0.35/Mile
Per Diem Lodging: $115.00/Day
Salary: $100.00/Hour

G. Training on related systems and equipment operation and maintenance shall only be scheduled to commence after final performance commissioning is satisfactorily completed, and systems are verified to be 100 percent complete and functional.

1.07 SUBMITTALS

A. Submit under provisions of Document 01 33 00 Submittals.

B. Pre-Commissioning Checklist Forms: Submit two (2) signed copies of the checklist forms to the SCA upon completion of all listed items.

C. Equipment Manufacturer's Startup Forms: Submit two (2) completed copies of the installation and startup checklists provided by the equipment manufacturers to the SCA.

D. Test Reports: Submit two (2) copies of test reports for equipment and systems to the SCA.

E. Control Schematics: Submit two (2) copies of the control schematics for equipment, systems, and subsystems to the SCA.

F. Inspection Records: Submit two (2) copies of the records of inspections for code compliance, and approved permits and licenses to operate the equipment and systems to the SCA.

G. Operating Data: Submit two (2) copies of equipment and system operating data including all necessary instructions to facilitate operation to specified performance standards to the District.

H. Maintenance Data: Submit two (2) copies of equipment and system maintenance data including all necessary information required to maintain the equipment and systems in continuous operation, such as the testing, balancing and adjusting report and the as-built drawings.

PART 2 – PRODUCTS Not Used.

PART 3 – EXECUTION Not Used.

END OF DOCUMENT

SECTION 02 4119
MINOR DEMOLITION FOR REMODELING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Remove existing work as indicated and as necessary to permit new work.
   1. Removal of designated building equipment and fixtures.
   2. Removal of designated construction.

B. Disposal of materials.

C. Identification of utilities.

D. Salvaging, storing, and protecting existing work to remain or to be removed and re-installed.

1.02 RELATED REQUIREMENTS

A. Section 01 1100 - Summary: Work sequence and continued occupancy of the building.

B. Section 01 5000 - Temporary Facilities and Controls: Temporary enclosures, dust control barricades, security at occupied areas, and cleanup during construction.

C. Section 01 7419 - Construction Waste Management.

D. Section 01 7513 - Execution Requirements: Re-installation of removed components.

1.03 REFERENCE STANDARDS

A. California Code of Regulations, Title 24, Part 2, California Building Code (CBC), International Building Code.

B. California Code of Regulations, Title 24, Part 11, California Green Building Standards Code, “CAL-Green”.

1.04 SUBMITTALS

A. See Section 01 3300 - Submittals, for submittal procedures.

B. Project Record Documents: Accurately record actual locations of capped utilities.

1.05 REGULATORY REQUIREMENTS

A. Conform to Title 24, CBC code for demolition work, dust control, products requiring electrical disconnection and re-connection .

B. Do not close or obstruct egress from any building exit or site exit.

C. Do not disable or disrupt building fire or life safety systems without 10 (ten) days prior written notice to Owner.

D. Conform to applicable regulatory procedures when hazardous or contaminated materials are discovered.

1.06 SEQUENCING

A. Sequence work under the provisions of Section 01 1100.

1.07 SCHEDULING

A. Schedule work under the provisions of Section 01 3200.

B. Schedule work to coincide with new construction.

C. Coordinate demolition with other trades to assure the proper sequence, limits, methods and time of performance. Schedule work so as to impose a minimum of hardship on the present operation of facilities and the performance of the work of other trades or contracts.

D. Describe demolition and removal procedures in the Project schedule.

E. Perform noisy, malodorous, or dusty work during hours described below. Conform to more stringent requirements of local authorities having jurisdiction, when applicable:
   1. Between the hours of 7:00 am and 5:00 pm.

1.08 PROJECT CONDITIONS

A. Conduct demolition to minimize interference with adjacent and occupied building areas.

B. Use all means necessary to protect existing objects, construction and plantings designated to remain. In the event of damage, make all repairs and replacements necessary for approval of Architect at no additional cost to the Owner.

C. Protective measures: Provide all necessary safeguards, including warning signs and lights, barricades, and the like, for protection of the public, Contractor's employees and existing improvements during demolition. Prevent access of unauthorized persons to area of work

D. Provide at least one person who shall be present at all times during execution of this portion of the work, be thoroughly familiar with the type of work being performed and the best methods for its execution and who shall direct all work performed under this Section.

E. Control the use of water to prevent damage to the existing facilities to remain. Provide wet vacuum equipment where water, such as waste cooling water from concrete sawing or water used as dust emollient, is used adjacent to and in existing buildings.

F. Cease operations immediately if structure appears to be in danger and notify Architect. Do not resume operations until directed.

PART 2 PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

A. VOC Limits for adhesives, sealants, fillers, primers and coatings . Comply with limits specified in related section.

PART 3 EXECUTION

3.01 PREPARATION

A. Provide, erect, and maintain temporary barriers at locations indicated.

B. Inspect the area of work and verify locations of all items designated to be removed or preserved.

C. Do not begin demolition work until temporary barricades, warning signs and other forms of protection are installed.

D. Erect and maintain weatherproof closures for exterior openings.

E. Erect and maintain temporary partitions to prevent spread of dust, odors, and noise to permit continued occupancy of adjacent buildings.

F. Protect existing materials and features that are not to be demolished.

G. Prevent movement of structure; provide bracing and shoring.

1. Be responsible for the adequacy and design of all temporary shoring and bracing systems.

H. Notify affected utility companies before starting work and comply with their requirements.

I. Mark location and termination of utilities.

J. Provide appropriate temporary signage including signage for exit or building egress.

3.02 DEMOLITION

A. Disconnect, remove, and identify designated utilities within demolition areas.

B. Demolish in an orderly and careful manner. Protect existing supporting structural members and features indicated to remain.
1. Cut openings in existing walls or roofs at locations necessary to accommodate new doors, windows, ductwork, piping, conduits, raceways or other building services or elements.
2. Demolish concrete curbs at locations of walls to be removed.
3. Remove dry-rotted wood materials and other unsuitable materials as indicated and as required to provide sound substrates for other work.
4. Use of explosives will not be permitted.

C. Remove existing flooring, wall coverings, trim or other finishes in areas designated to receive new work.

D. Remove existing construction only to the extent necessary for the proper installation of new construction and junction with existing work. Cut back finished surfaces to straight, plumb or level lines as required.

E. Mechanical, Plumbing and Electrical systems : Demolish existing improvements as required to permit installation of new systems indicated. Refer to pertinent sections of Divisions 22, 23 and 26 for additional specific demolition required for mechanical, plumbing and electrical systems.

F. Securely seal exposed ends of existing ductwork systems left open by demolition operations. Prevent entry of foreign matter. Protect these seals from damage until connected to new work.

G. Remove all fasteners, anchors, supports and similar appurtenances from substrates indicated to remain. Leave substrates in good condition to receive new work.
1. Pull nails from wood framing. Unthread screws, do not pull out. Do not drive existing nails or screws flush.
2. Remove suspended ceiling support wires.
3. Remove staples, screws, and miscellaneous anchors from all gypsum board, wood paneling, masonry wall surfaces indicated to remain.

H. Demolish as follows:
1. Portland cement concrete, asphalt concrete paving: Saw cut or core drill; jack-hammering of central areas away from saw-cut joint is acceptable for removing large areas of concrete. Cut back concrete or paving to clean, straight saw-cut lines. Provide wet vacuum equipment as required for control of waste cooling water.
2. Modular materials such as ceiling, resilient and ceramic tile: Remove to a natural point of division in whole units to a joint line with no damaged or defective unit remaining to adjoin new construction.
3. Gypsum wallboard: Remove to a joint line on a support.
4. Wood trim: Remove to a natural existing joint line.

I. Examine substrates and surfaces exposed by demolition for water damage, dryrot, decay, termite infestation or other structural failure. Request direction from the Architect if these conditions are discovered. Additional demolition beyond scope originally indicated may be required to fully remove damaged or unsuitable materials.

J. Work not mentioned to be removed that interferes with new construction shall be cut to clean cut lines to provide for proper interface with new construction, or patching and repair, as required.

K. All holes or trenches created by removal of underground piping or other facilities demolished shall be filled with clean soil and compacted to the density for fills specified. Do not backfill if subsequent excavation will occur at the same location. Do not backfill hole or trenches until inspected by the Soils Engineer or IOR.

L. Remove demolished materials from site except where specifically noted otherwise. Do not burn or bury materials on site.

M. Remove materials as demolition progresses. Upon completion of demolition, leave areas in clean condition.

N. Remove temporary facilities.

3.03 SALVAGE

A. Items indicated to be salvaged shall be removed carefully, cleaned and stored in a protected location on or off the site until re installed; salvaged items to be deliverd to the Owner shall also be removed carefully and presented to the Owner's designated representative.

B. Owner may take possession of any items of salvage for his use if he desires. Provide incidental labor to relocate designated salvage for Owner's storage.

3.04 PATCHING

A. Patch materials to remain when damaged by this work. Finish materials and appearance of the patch or repair work shall match the existing contiguous materials and finishes in all respects and shall be approved by Architect.

B. Where openings are cut oversize or in improper location, replace the excess removed material as instructed by Architect at no additional cost to the Owner.

3.05 CLEAN-UP AND DISPOSAL

A. Debris, waste, and removed materials, other than items to be salvaged, are Contractor's property for legal disposal off the site, as required by applicable Federal and State regulations. Continuously clean up and remove these items. Do not allow demolished items to accumulate. All materials to be disposed, shall meet the requirements of the Construction Waste Management program.

B. Leave the site in a neat and orderly condition prepared for the work of other trades.

3.06 SCHEDULES

END OF SECTION 02 4119

SECTION 03 1000

CONCRETE FORMING AND ACCESSORIES

PART 1 – GENERAL

1.01 SUMMARY

A. Section Includes: All labor, materials and equipment and all operations required to complete all formwork as indicated on the drawings; to produce shapes and configurations as shown, as required; and as specified herein, including:

1. Forms, shores, bracing, removal and other operations as necessary for all cast-in-place concrete placed.
2. Setting and securing anchor bolts and other metal items embedded in concrete into formwork, using materials and layouts furnished and delivered to jobsite as specified under other sections.

B. Related Sections:

1. Pertinent Sections of Division 03 specifying concrete construction.
2. Pertinent Sections of other Divisions specifying work to be embedded in concrete or work penetrating concrete foundations and formwork.

1.02 REFERENCES

A. California Code of Regulations, Title 24, latest adopted edition (herein noted as CBC): Chapter 19A Concrete.

B. American Concrete Institute (ACI) PRC-347 "Guide to Formwork for Concrete".

C. American Plywood Association (APA) “Concrete Forming Guide”.

D. West Coast Lumberman Inspection Bureau (WCLIB) “Standard Grading Rules for West Coast Lumber”.

E. ACI MNL-066 “ACI Detailing Manual”.

F. ACI SPEC-301 “Specifications for Concrete Construction”.

G. Concrete Reinforcing Steel Institute (CRSI) “Manual of Standard Practice”.

1.03 DESIGN REQUIREMENTS

A. Design, engineer, and construct formwork, shoring and bracing to conform to design and code requirements, resist imposed loads; resultant concrete to conform to required shape, line and dimension.

1.04 SUBMITTALS

A. Limitation of review: Structural Engineer's review will be required only where specifically requested for general architectural applications and features only. Contractor is responsible for structural stability, load-resisting characteristics and sufficiency of form work design.

1.05 QUALITY ASSURANCE

A. General: All form materials shall be new at start of work. Produce high quality concrete construction. Minimize defects due to joints, deflection of forms, roughness of forms, nonconforming materials, concrete or workmanship.

B. Reuse of Forms: Plywood forms may be reused, if thoroughly cleaned of all dirt, mortar, and foreign materials, and undamaged at edges and contact face. Reuse shall be subject to permission from the Architect without exception, and issued in writing. Reuse of any panel which will produce a blemish on exposed concrete, will not be permitted.

PART 2 – PRODUCTS

2.01 MATERIALS

A. Form Materials:

1. Non-Exposed Surface Formwork Facing: Forms for concrete which is not exposed to view, may be of plywood as specified for exposed surfaces, or square edge 1x nominal Douglas Fir, Construction Grade, S4S.
2. Exposed Surface Formwork Facing:
   a. Forms for all exterior and interior concrete flat surfaces unless otherwise specified as board formed shall be new Douglas Fir Plywood (APA) ply, 5/8-inch, B-B Plyform, Class 1, Exterior Type, oiled and edged and edge-sealed conforming to U.S. Product Standard PS 1 in large sheet sizes to achieve joint patterns shown.
   b. All exposed concrete edges shall be chamfered 3/4" minimum or as noted on the drawings.

B. Earth Forms: Allowed, subject to soil standing in excavations without ravel or caving.

C. Form Release Agent: Spray-on compound, not affecting color, bond or subsequent treatment of concrete surfaces. Maximum VOC content shall comply with local requirements and California Green Building Code.

D. Accessories: Types recommended by manufacturers or referenced standards to suit conditions indicated;

1. Anchors, spacers, void in-fill materials: sized to resist imposed loads.
2. Form Ties: Prefabricated rod, flat band, or wire snap ties with 1" break-back or threaded internal disconnecting type with external holding devices of adequate bearing area. Ties shall permit tightening and spreading of forms and leave no metal closer than 1" to surface.

E. Corner Chamfers and Rustications: Filleted, wood strip or foam type; sizes and shapes as detailed, or 3/4 x 3/4 inch size minimum if not detailed; maximum possible lengths.

F. Nails, Spikes, Lag Bolts, Through Bolts, Anchorages: Sized as required, of sufficient strength and character to maintain formwork in place while placing concrete.

G. Foam Block Formwork: For use only where specified on drawings to create void space under or within concrete. ASTM D6817. 1 pound per cubic foot maximum density. 10 pounds per square inch minimum compressive strength at 10% deformation. 3.5 pounds per square inch minimum compressive resistance at 1% deformation. 8 pounds per square inch minimum compressive resistance at 5% deformation. InsulFoam Geofoam EPS15, or equivalent.

PART 3 – EXECUTION

3.01 EXAMINATION

A. Inspect the substrate and the conditions under which concrete formwork is to be performed. Correct conditions detrimental to timely and proper completion of the work. Do not proceed with the work until unsatisfactory conditions have been corrected. Commencement of work indicates acceptance of substrates and conditions.

B. Verify lines, levels and centers before proceeding with formwork. Ensure that dimensions agree with drawings.

3.02 EARTH FORMS

A. If natural soil or compacted fill can be accurately cut and maintained, foundations and grade beams may be poured against earth without forming. Provide positive protection of trench top corners.

B. Maintain earth forms free of water and foreign materials.

3.03 ERECTION – FORMWORK

A. General: Construct formwork in accordance with calculations, and recommendations of ACI PRC-347. Construct forms to the sizes, shapes, lines and dimensions shown, and as required to obtain accurate alignment, location, grades, level and plumb work in finished structure. Provide for openings, offsets, sinkages, keyways, recesses, moldings, rustications, reglets, chamfers, blocking, screeds, bulkheads, anchorages and inserts, and other features required. Use selected materials to obtain required finishes.

1. Construct cambers specified in concrete members and slabs in the formwork.
2. Schedule the work and notify other trades in ample time so that provisions for their work in the formwork can be made without delaying progress of the project. Install all sleeves, pipes, etc. for building services systems, or other work. Secure information about and provide for all openings, offsets, recessed nailing blocks, channel chases, anchors, ties, inserts, etc. in the formwork before concrete placement.
3. Deflection: Formwork and concrete with excessive deflection after concrete placement will be rejected. Excessive deflection is that which will produce visible and noticeable waves in the finished concrete.
4. Measure formwork for elevated structural slabs, columns, wall elevations points of maximum camber and submit in writing to the Architect/Engineer prior to placing concrete.

B. Formwork Construction: Erect formwork, shoring and bracing to achieve design requirements, in accordance with requirements of ACI SPEC-301. Uniform, substantial and sufficiently tight to prevent leakage of concrete paste, readily removable without impact, shock or damage to cast-in-place concrete surfaces and adjacent materials. Tie, brace, shore, and support to insure stability against pressures from any source, without failure of any component part and without excessive deflection. Solidly butt joints and provide backup material at joints as required to prevent leakage and fins.

C. Provide all openings, offsets, inserts, anchorages, blocking, and other features of the work as shown or required. See INSERTS, EMBEDDED PARTS, AND OPENINGS for detailed requirements.

D. Warped, checked, or scuffed forms will be rejected.

E. Maintain membranes, reinforcing and other work free of damage; protect with plywood runway boards or other positive, durable means.

F. Align joints and make watertight. Keep form joints to a minimum.

G. Provide fillet and chamfer strips on external corners of exposed locations and as indicated to form patterns in finished work. Extend patterns around corners and into alcoves, on backs of columns and similar locations not otherwise shown.

1. Produce beveled, smooth, solid, unbroken lines, except as otherwise indicated to conform to patterns.
2. Form corners and chamfers with 3/4 inch x 3/4 inch strips, unless otherwise indicated, accurately formed and surfaced to produce uniformly straight lines and tight edge joints. Extend terminal edges to required limit and miter chamfer at changes in direction.

H. Unexposed corners may be formed either square or chamfered.

I. Ties and Spreaders: Arrange in a pattern acceptable to the Architect when exposed. Snap-ties may be used except at joints between pours where threaded internal disconnecting type shall be used.

J. Coordinate this section with other sections of work that require attachment of components to formwork.

K. Reglets and Rebates: Accurately locate, size, and form all reglets and rebates required to receive work of other trades, including flashing, frames, and equipment.

3.04 APPLICATION - FORM RELEASE AGENT

A. Apply form release agent on formwork in accordance with manufacturer's recommendations.

B. Apply prior to placement of reinforcing steel, anchoring devices, and embedded items.

C. Do not allow excess form coating material to accumulate in the forms or to come into contact with reinforcement or surfaces which will be bonded to fresh concrete.

D. Coat steel forms with a non-staining, rust-preventative form oil or otherwise protect against rusting. Rust-stained steel formwork will be rejected.

E. Leave no residue or stain on the face of the concrete, nor affect bonding of subsequent finishes or work specified in other sections.

3.05 INSERTS, EMBEDDED PARTS, AND OPENINGS

A. Provide formed openings where required for items to be embedded in passing through concrete work.

1. Provide openings in concrete formwork to accommodate work of other sections including those under separate contracts (if any). Size and location of openings, recesses and chases shall be in accordance with the section requiring such items. Accurately place and securely support items to be built into forms.

B. Construction Joints: Construct and locate generally as indicated on Drawings and only at locations approved by Structural Engineer, so as not to impair the strength of the structure. Form keys in all cold joints shown or required.

C. Locate and set in place items that will be cast directly into concrete.

D. Rough Hardware and Miscellaneous Metal: Set inserts, sleeves, bolts, anchors, angles, and other items to be embedded in concrete. Set embedded bolts and sleeves for equipment to template and approved shop drawings prepared by trades supplying equipment.

E. Coordinate with work of other sections in forming and placing openings, slots, reglets, recesses, sleeves, bolts, anchors, other inserts, and components of other work.

F. Wood Inserts and Nailers: Provide approved preservative-treated lumber. Set all required nailing blocks, grounds, and other inserts as required to produce results shown. Wood plugs shall not be used.

G. Install accessories in accordance with manufacturer's instructions, so they are straight, level, and plumb. Ensure items are not disturbed during concrete placement.

H. Piping: Do not embed piping in structural concrete unless locations specifically approved by Structural Engineer and DSA.

I. Conduit: Place conduit below slabs-on-grade and only as specifically detailed on structural drawings. Minimum clear distance between conduits shall be 3 diameters. Location shall be subject to Engineer's and DSA’s written approval and shall not impair the strength of the structure.

J. Provide temporary ports or openings in formwork where required to facilitate cleaning and inspection. Locate openings at bottom of forms to allow flushing water to drain.

1. Provide openings for the introduction of vibrators at intervals necessary for proper placement.
2. Close temporary openings with tight fitting panels, flush with inside face of forms, and neatly fitted so joints will not be apparent in exposed concrete surfaces.

K. Install waterstops in accordance with manufacturer's recommendations to provide continuous waterproof barrier.

3.06 FORM CLEANING

A. Clean forms as erection proceeds, remove foreign matter within forms.

B. Clean formed cavities of debris prior to placing concrete.

1. Remove all dirt, chips, sawdust, rubbish, water and foreign materials detrimental to concrete.
2. Flush with water or use compressed air to remove remaining foreign matter. Ensure that water and debris drain to exterior through clean-out ports.

3.07 FOOTINGS

A. Verify elevations and provide final excavation required for footings prior to placing of concrete.

3.08 EQUIPMENT BASES

A. Form concrete bases for all mechanical and electrical equipment in accordance with approved shop details furnished by other sections.

B. Sizes and locations as indicated and as required to produce results shown.

C. Provide coved base for all equipment bases placed on concrete slabs.

3.09 SUPPORT STAKES

A. Where required to support formwork, steel stakes located within the concrete placement area shall be sleeved with PVC pipe of as small of size practical to fit the stake. Sleeves shall be filled with grout after removal of stake. Such stakes shall be located no closer than 48 inches on center each way.

B. Wood stakes shall not be used within the area of concrete placement.

3.10 FORMWORK TOLERANCES

A. Construct formwork to maintain tolerances required by ACI SPEC-301.

3.11 FOAM BLOCK FORMWORK

A. Blocks shall be placed on prepared leveling course for level bearing. Place adjacent blocks in tight contact together. Where placed in multiple layers, orient long axis of upper layer at 90° to lower layer, and so forth for subsequent layers. Anchor blocks as required to prevent movement prior to and during concrete placement. Do not expose to hydrocarbons, solvents, or coal tar.

3.12 FIELD QUALITY CONTROL

A. Inspect erected formwork, shoring, and bracing to ensure that work is in accordance with formwork design, and to verify that supports, fastenings, wedges, ties, and items are secure.

B. Do not reuse wood formwork more than 2 times for concrete surfaces to be exposed to view. Do not patch formwork.

C. Clean and repair surfaces to be re-used in the work. Split, frayed, delaminated or otherwise damaged form facing material will not be acceptable. Apply new form coating compound material to concrete contact surfaces as specified for new formwork.

D. When forms are extended for successive concrete placement, thoroughly clean surfaces, remove fins and laitance, and tighten forms to close all joints. Align and secure joints to avoid offsets.

3.13 FORM REMOVAL

A. Do not loosen or remove forms before minimum curing period has elapsed without employment of appropriate alternate curing methods, approved by the Architect in writing.

B. Remove forms without damage to the concrete using means to insure complete safety of the structure and without damage to exposed beams, columns, wall edges, chamfers and inserts. Loosen forms carefully. Do not wedge pry bars, hammers, or tools against finish concrete surfaces scheduled for exposure to view.

C. Do not remove forms until the concrete has hardened sufficiently to permit safe removal and the concrete has attained sufficient strength to safely support imposed loads. The minimum elapsed time for removal of forms after concrete has been placed shall be as follows:

1. Footings: 7 days minimum. If backfilled immediately, side forms may be removed 24 hours after concrete is placed.

D. Durations listed above are minimums and are subject to extension at the sole judgment of the Architect/Engineer.

E. Do not subject concrete to superimposed loads (structure or construction) until it has attained full specified design strength, nor for a period of at least 14 days after placing.

F. Store removed forms to prevent damage to form materials or to fresh concrete. Discard damaged forms.

3.14 CLEANING

A. Remove excess material and debris associated with this work from the job site.

END OF SECTION

SECTION 03 2000

CONCRETE REINFORCING

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. Reinforcing steel work for all concrete and masonry work as indicated on the drawings and specified herein.
2. Coordinate this work with other work affected by these operations, such as forms, electrical work, mechanical work, structural steel and concrete.

B. Related Sections:

1. Pertinent Sections of Division 01 specifying Quality Control and Testing Laboratory services.
2. Pertinent Sections of Divisions 03 specifying concrete construction.
3. Pertinent Sections of other Divisions specifying work to be embedded in concrete or work penetrating concrete work.

1.02 REFERENCE STANDARDS

A. California Code of Regulations, Title 24, latest adopted edition (herein noted as CBC) Chapter 19A Concrete.

B. American Concrete Institute (ACI) SPEC-301 “Specifications for Concrete Construction”.

C. ACI CODE-318 “Building Code Requirements for Structural Concrete and Commentary”.

D. ACI MNL-066 “ACI Detailing Manual”.

E. ASTM A615 “Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement”.

F. ASTM A706 “Standard Specification for Deformed and Plain Low-Alloy Steel Bars for Concrete Reinforcement”.

G. Concrete Reinforcing Steel Institute (CRSI) “Manual of Standard Practice”.

1.03 SUBMITTALS

A. Submit in accordance with pertinent sections of Division 01 specifying submittal procedures. Submit for review prior to fabrication.

B. Limitation of Review: Structural Engineer's review will be for general conformance with design intent as indicated in the Contract Documents and does not relieve Contractor of full responsibility for conformance with the Contract Documents. The General Contractor shall review and approve shop drawings prior to submittal to the Architect/Engineer.

C. Shop Drawings: Show complete fabrication and placing details of all reinforcing steel. Comply with requirements of ACI MNL-66. Include:

1. Bar sizes and schedules;
2. Shapes of bent bars, layout and spacing of bars, location of splices.
3. Stirrup spacing, arrangements and assemblies,
4. References to Contract Document detail numbers and designations.
5. Wall elevations corresponding to elevations shown in Contract Documents.

D. Product Data: Submit manufacturer's product data, specifications, location and installation instructions for proprietary materials and reinforcement accessories. Provide samples of these items upon request.

E. Certificates: Submit all certifications of physical and chemical properties of steel for each heat number as manufactured, including location of material in structure as specified below in Article titled QUALITY ASSURANCE. All materials supplied shall be tagged with heat numbers matching submitted Mill Test Report analyses.

F. Samples: Provide to the Owner's Testing laboratory as specified in Article SOURCE QUALITY CONTROL.

1.04 QUALITY ASSURANCE

A. Perform work of this Section in accordance with CRSI DA4, CRSI P1, ACI SPEC-301, and ACI CODE-318.

B. Requirements of Regulatory Agencies, refer to pertinent Sections of Division 01 and CBC.

C. Certification and Identification of Materials and Uses: Provide Owner's Testing Agency with access to fabrication plant to facilitate inspection of reinforcement. Provide notification of commencement and duration of shop fabrication in sufficient time to allow inspection and all material identification/test information listed below.

1. Provide manufacturer's Mill Test Reports for all materials. Include chemical and physical properties of the material for each heat number manufactured. Tag all fabricated materials with heat number.
2. Provide letter certifying all materials supplied are from heat numbers covered by supplied mill certificates. Include in letter the physical location of each grade of reinforcing and/or heat number in the project (i.e. foundations, walls, etc.).
3. Unidentified Material Tests: Where identification of materials by heat number to mill tests cannot be made, Owner's Testing Agency shall test unidentified materials as described below.

D. Testing and Inspection: Tests and Inspections required by Independent Testing Agency are specified below in Articles SOURCE QUALITY CONTROL and FIELD QUALITY CONTROL. Duties and limitations of Independent Testing Agency, test costs and test reports in conformance with pertinent Sections of Division 01.

1.05 DELIVERY, STORAGE AND HANDLING

A. Comply with pertinent requirements of Division 01.

B. Deliver reinforcement to project site in bundles marked with durable tags indicating heat number, mill, bar size and length, proposed location in the structure and other information corresponding with markings shown on placement diagrams.

C. Handle and store materials above ground to prevent damage, contamination or accumulation of dirt or rust.

PART 2 PRODUCTS

2.01 MATERIALS

A. Reinforcing Steel: Deformed billet steel bars, ASTM A706 Grade 60 or ASTM A615 Grade 60.

1. All reinforcement to be unfinished.

B. Tie Wire: No. 16 AWG or heavier, black annealed.

C. Concrete Blocks: On-grade conditions only, as required to support reinforcing bars in position.

D. Reinforcing Supports: Plastic or galvanized steel chairs, bolsters, bar supports, or spacers sized and shaped for adequate support of reinforcement and construction loads imposed during concrete placement, meeting ACI and CRSI standards.

1. For use over formwork: Galvanized wire bar type supports complying with CRSI recommendations. Provide plastic tips where exposed to view or weather after removal of formwork. Do not use wood, brick, or other unacceptable materials.

2.02 FABRICATION

A. Fabricate concrete reinforcing in accordance with CRSI (DA4), unless specifically shown otherwise. Details not specifically shown or indicated shall conform to SP-066 and specified codes and standards.

1. Accurately shop-fabricate to shapes, bends, sizes, gauges and lengths indicated or otherwise required.
2. Bend bars once only. Discard bars improperly bent due to fabricating or other errors and provide new material; do not re-bend or straighten unless specifically indicated. Rebending of reinforcement in the field is not allowed.
3. Do not bend reinforcement in a manner that will injure or weaken the material or the embedding concrete.
4. Do not heat reinforcement for bending. Heat-bent materials will be rejected.

B. Unacceptable materials: Reinforcement with any of the following defects will not be permitted in the work.

1. Bar lengths, depths and bends exceeding specified fabrication tolerances.
2. Bends or kinks not indicated on Drawings or final shop drawings.

3. Bars with reduced cross-section due to rusting or other cause.

C. Tag reinforcement with durable identification to facilitate sorting and placing.

D. Shop Fusion Welded Stirrup/Tie/Spiral Cages

1. Shop fusion welding of stirrup/tie/spiral cages is permitted to aid in fabrication and handling. The following requirements shall be met.
2. All reinforcing bars receiving weld shall be ASTM A706.
3. Longitudinal holding wires shall be ASTM A1064.
4. Shop welding shall be performed by machines under a continuous, controlled process.
5. Quality control tests shall be performed on shop-welded specimens and the test results shall be available, upon request, to the Architect/Engineer.
6. Tack welding of reinforcing steel is not permitted.
7. Welding of any type shall not occur at 90°, 135°, or 180° bends. Circular ties and spirals may be shop fusion welded outside of areas with 90°, 135°, or 180° hook bends.
8. Longitudinal bars shall not be welded to stirrups/ties/spirals.

2.03 SOURCE QUALITY CONTROL

A. The Testing Agency, as specified in the Article QUALITY ASSURANCE, will perform the following:

1. Sampling and Tests of Reinforcing Bars per CBC 1910A.2.
2. Material Testing:
   a. Identified Steel: When samples are taken from bundled steel identified by heat number, matched with accompanying mill analyses as delivered from the mill, Owner's Testing Agency will perform one tensile test and one bend test per each ten tons or fraction thereof for each required size of reinforcing steel.
   b. Unidentified Steel: When identification of materials by heat number matched to accompanying mill analyses cannot be made, perform one tensile test and one bend test per each two and one-half tons or fraction thereof for each required size of reinforcing steel. Tests of unidentified steel shall be performed by the Owner's Testing Agency and costs for these tests shall be paid by the Contractor by deductive change order.

PART 3 EXECUTION

3.01 EXAMINATION

A. Inspect the conditions under which concrete reinforcement is to be placed. Do not proceed with the work until unsatisfactory conditions have been corrected.

B. Coordinate with work of other sections to avoid conflicts or interference. Bring conflicts between reinforcement and other elements to Architect's attention. Resolve conflicts before concrete is placed.

C. Notify Architect, Structural Engineer, and Authority Having Jurisdiction for review of steel placement not less than 48 hours before placing concrete.

3.02 PLACEMENT

A. General: Comply with the specified codes and standards, and Concrete Reinforcing Steel Institute recommended practice for "Placing Reinforcing Bars", for details and methods of reinforcement placement and supports, and as herein specified.

B. Clean bars free of substances which are detrimental to bonding. Maintain reinforcement clean until embedded in concrete.

C. Place reinforcement to obtain the minimum coverages for concrete protection. Do not deviate from required position. Maintain required distance, spacing and clearance between bars, forms, and ground.

D. Location and Support: Provide metal chairs, runners, bolsters, spacers and hangers, as required.

E. Provide additional steel reinforcement as necessary or as directed, to act as spreaders or separators to maintain proper positioning.

F. Tying and Attachment: Securely tie at all intersections and supports with wire. Prevent dislocation or movement during placement of concrete. Direct twisted ends of wire ties away from exposed concrete surfaces.

G. Separate reinforcing from pipes or conduits with approved non-metallic separators. Do not use wood or steel form stakes or reinforcement used as stakes as support for reinforcement.

H. Accommodate placement of formed openings required by other sections.

I. Obstructions:

1. Where obstructions, block-outs, or penetrations (conduits, raceways, ductwork) prevent continuous placement of reinforcement as indicated, provide additional reinforcing as detailed and as directed by the Structural Engineer and approved by DSA to supplement the indicated reinforcement around the obstruction.
2. Place additional trim bars, ties, stirrups, or other elements as detailed and as directed at all opening, sleeves, pipes or other penetrations through structural elements.

3.03 REINFORCING SPACING AND COVERAGE

A. Spacing: Do not space bars closer than four (4) diameters of the largest of two adjacent bars, except at bar laps, which shall be placed such that a minimum of 2 bar diameters is clear between bars.

B. Where reinforcing in members is placed in two layers, the distance between layers shall not be less than four bar diameters of the largest bar and the bars in the upper layers shall be placed directly above those in the bottom layer, unless otherwise detailed or dimensioned.

C. Coverage of bars (including stirrups and columns ties) shall be as follows, unless otherwise shown:

1. Footings: 3 inches to any soil face, 2 inches to top.
2. Slabs (on grade): 2 inches to grade face, 1-1/2 inches to top face.

3.04 DOWELS, SPLICES, OFFSETS AND BENDS

A. Provide standard reinforcement splices at splices, corners, and intersections by lapping ends, placing bars in contact, and tightly tying with wire at each end. Comply with details shown on structural drawings and requirements of ACI CODE-318.

B. Provide minimum 1-1/2 inch clearance between sets of splices. Stagger splices in horizontal bars so that adjacent splices will be 4 feet apart.

C. Splices of reinforcement shall not be made at points of maximum stress. Provide splice lengths as noted on the structural drawings, with sufficient lap to transfer the stress between bars by bond and shear.

D. Spacing:

1. Space bars minimum distance specified and all lapped bars 2 bar diameters (minimum) clear of the next bar.
2. Stagger splices of adjacent bars where possible and where required to maintain bar clearance.
3. Beam or slab top bars shall be spliced mid-span of column support and bottom bars spliced at column supports.
4. Request Architect/Engineer review prior to placement for all splices not shown on the drawings.

3.05 WELDING

A. No reinforcing shall be welded unless specifically indicated. No reinforcing shall be welded without prior approval of the Structural Engineer and the Authority Having Jurisdiction.

3.06 MISPLACED REINFORCEMENT

A. Notify Architect/Engineer immediately if reinforcing bars are known to be misplaced after concrete has been placed.

B. Perform no correction or cutting without specific direction. Do not bend or kink misplaced bars.

C. Correct misplaced reinforcing only as directed in writing by the Architect/Engineer. Bear all costs of redesign, new, or additional reinforcing required because of misplaced bars at Contractor's expense.

3.07 FIELD QUALITY CONTROL

A. The Testing Agency as specified in the Article QUALITY ASSURANCE, will inspect the work for conformance to contract documents before concrete placement.

1. Inspection: Provide inspection and verification of installed reinforcement. Confirm that the surface of the rebar is free of form release oil or other coatings.

2. Inspect all preheat and welding activities for steel reinforcement, when these occur.
3. Exception: Non-structural patios, driveways, and sidewalks do not require special inspection.

3.08 CLEANING

A. Remove excess material and debris associated with this work from the job site.

END OF SECTION

SECTION 03 3000

CAST-IN-PLACE CONCRETE

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes: Provide all labor, materials, equipment and services to complete all concrete work required, including, but not limited to, the following:

1. Foundations, slabs-on-ground.
2. Installation of all bolts, inserts, sleeves, connections, etc. in the concrete.
3. Joint devices associated with concrete work.
4. Miscellaneous concrete elements, including, but not limited to: equipment pads, light pole bases, flagpole bases, thrust blocks, and manholes.
5. Concrete curing.
6. Coordination with other sections:
   a. Make all preparations and do all work necessary to receive or adjoin other work. Install all bolts and anchors, including those furnished by other sections, into formwork and provide all required blocking.
   b. Install all accessories embedded in the concrete and provide all holes, blockouts and similar provisions necessary for the work of other sections. Provide all patching or cutting made necessary by failure or delay in complying with this requirement at the Contractor's expense.
   c. Coordinate with other sections for the accurate location of embedded accessories.

B. Related Sections:

1. Pertinent Sections of Division 01 specifying Quality Control and Testing Laboratory services.
2. Pertinent Sections of Division 03 specifying concrete construction.
3. Pertinent Sections of other Divisions specifying work to be embedded in concrete or work penetrating concrete.
4. Pertinent sections of other Divisions specifying floor finishes and sealants applied to concrete substrates.

1.02 REFERENCES

A. California Code of Regulations, Title 24, latest adopted edition (herein noted as CBC) Chapter 19A Concrete.

B. American Concrete Institute (ACI) PRC-211.1 “Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete”

C. ACI SPEC-301 “Specifications for Concrete Construction”.

D. ACI PRC-302.1 “Guide for Concrete Floor and Slab Construction”.

E. ACI PRC-304 “Guide for Measuring, Mixing, Transporting, and Placing Concrete”.

F. ACI SPEC-305.1 “Specification for Hot Weather Concreting”.

G. ACI SPEC-306.1 “Standard Specification for Cold Weather Concreting”.

H. ACI SPEC-308.1 “Specification for Curing Concrete”.

I. ACI CODE-318 “Building Code Requirements for Structural Concrete and Commentary”.

1.03 SUBMITTALS

A. Submit in accordance with pertinent sections of Division 01 specifying submittal procedures. The General Contractor shall review and approve shop drawings prior to submittal to the Architect/Engineer. Submittals that do not meet these requirements will be returned for correction without review. Submit for review prior to fabrication.

B. Limitation of Review: Structural Engineer's review will be for general conformance with design intent as indicated in the Contract Documents and does not relieve Contractor of full responsibility for conformance with the Contract Documents.

C. Product Data: Submit manufacturers' data on manufactured products and other concrete related materials such as bond breakers, cure/sealer, admixtures, etc. Demonstrate compliance with specified characteristics. Provide samples of items upon request. Submit material certificates for concrete aggregates and cementitious materials. Certificates shall show compliance to applicable ASTM’s, the CBC, and additional requirements stated herein.

D. Mix Designs: Submit Mix Designs for each structural concrete type required for work per requirements of articles CONCRETE MIXES and QUALITY ASSURANCE. Resubmit revised designs for review if original designs are adjusted or changed for any reason. Non-Structural mixes need not be submitted for review by Structural Engineer.

E. Shop Drawings: Proposed location of construction and cold joints. Proposed location of all slab construction/dowel joints, control joints, and blockouts.

F. Manufacturer's Installation Instructions: Indicate installation procedures and interface required with adjacent construction for concrete accessories.

G. Batch Plant Certificates: Include with delivery of each load of concrete. Provide Certificates to the Testing Agency and the Architect/Engineer as separate submittals. Concrete delivered to the site without such certificate shall be rejected and returned to the plant. Each certificate shall include all information specified in Article SOURCE QUALITY CONTROL below.

H. Engineering Analysis: Prepared by a California-licensed Civil or Structural Engineer, justifying construction-imposed loads on slabs, beams, and walls which exceed those allowed by CBC for the specified use.

1. 2000 lbs maximum allowable construction load without analysis.
2. 10,000 lbs maximum allowable construction load with analysis.

I. Project Record Documents: Accurately record actual locations of embedded utilities and components that will be concealed from view upon completion of concrete work.

1.04 QUALITY ASSURANCE

A. Perform work of this section in accordance with ACI SPEC-301 and ACI CODE-318.

B. Concrete construction verification and inspection to conform to CBC 1705A.3.

C. Common Sourcing: Provide each of the following materials from consistent sources for entire project.

1. Cement.
2. Fly ash.
3. Aggregate.
4. Slag Cement.

D. Follow requirements of ACI SPEC-305.1 when concreting during hot weather. Follow requirements of ACI SPEC-306.1 when concreting during cold weather.

E. Services by the Independent Testing Agency (includes "Special" Inspections) as specified in this Section and as follows:

1. Perform tests and inspections specified below in articles SOURCE QUALITY CONTROL and FIELD QUALITY CONTROL. Duties and limitations of Independent Testing Agency, test costs and reports to be in conformance with pertinent Sections of Division 01.

F. Contractor shall bear the entire cost of remediation, removal, and/or replacement of concrete determined defective or non-conforming, including Architect/Engineer fees for redesign.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Materials specified by brand name shall be delivered in unbroken packages bearing manufacturer's label and shall be brand specified or an approved equal.

B. Delivery, Handling and Storage of other materials shall conform to the applicable sections of the current editions of the various reference standards listed in this Section.

C. Protect materials from weather or other damage. Sort to prevent inclusion of foreign materials.

D. Specific Requirements:

1. Cement: Protect against dampness, contamination, and warehouse set. Store in weather tight enclosures.
2. Aggregates: Prevent excessive segregation, or contamination with other materials or other sizes of aggregates. Use only one supply source for each aggregate stock pile.
3. Admixtures:
   a. Store to prevent contamination, evaporation, or damage.
   b. Protect liquid admixtures from freezing and extreme temperature ranges.
   c. Agitate emulsions prior to use.

1.06 ENVIRONMENTAL REQUIREMENTS

A. Cold Weather (Freezing or near-freezing temperatures) per ACI SPEC-306.1:

1. Heat concrete materials before mixing, as necessary to deposit concrete at a temperature of at least 50°F but not more than 90°F.
2. Do not place concrete during freezing, near-freezing weather, snow, rain or sleet unless protection from moisture and/or cold is provided.
3. Protect from freezing and maintain at a temperature of at least 50°F for not less than seven days after placing. Take special precautions to protect transit-mixed concrete.
4. No salts, chemical protection or admixture are permitted without written approval of Architect/Engineer.
5. Contractor shall maintain an air temperature log for the first 7 days after placement with entry intervals not to exceed 8 hours.

B. Hot Weather per ACI SPEC-305.1:

1. Cool concrete materials before mixing, or add ice in lieu of mix water as necessary to deposit concrete at a temperature below 85°F.
2. Do not place concrete in hot/windy weather without Architect/ Engineer review of procedures.
3. Provide sunshades and/or wind breakers to protect concrete during finishing and immediate curing operations. Do not place concrete at air temperature exceeding 90°F.
4. Provide modified mix designs, adding retarders to improve initial set times and applying evaporation reducers during hot/windy weather for review by Independent Testing Agency prior to use.

1.07 SCHEDULING AND SEQUENCING

A. Organize the work and employ shop and field crew(s) of sufficient size to minimize inspections by the Testing Agency.

B. Provide schedule and sequence information to Testing Agency in writing upon request. Update information as work progresses.

PART 2 PRODUCTS

2.01 FORMWORK

A. Comply with requirements of Section 03 1000.

2.02 REINFORCEMENT

A. Comply with requirements of Section 03 2000.

2.03 MATERIALS

A. General Requirements: All materials shall be new and best of their class or kind. All materials found defective, unsuitable, or not as specified, will be condemned and promptly removed from the premises.

B. Cementitious Materials:

1. Portland Cement: ASTM C150, Type II, low alkali.
2. Fly Ash (Pozzolan): ASTM C618, Class F.
3. Slag Cement: ASTM C989, Grade 100 or 120.

C. Concrete Aggregates:

1. Coarse and Fine Aggregates: ASTM C33; Stone aggregate and sand. Specific source aggregate and/or sand or shrinkage characteristics as required for class of concrete specified.
2. Lightweight aggregate: ASTM C330 and C332.
3. Source shall remain constant throughout the duration of the job. The exact portions of the fine aggregates and coarse aggregates to be used in the mix shall be determined by the mix design.
4. Aggregates shall be tested for alkali reactivity per CBC section 1903A.5. Where test results exceed allowable limits, additional testing of mitigation procedures shall be provided, as outlined per CBC section 1903A.5.

D. Water: ASTM C1602. Potable, clean, from domestic source.

E. Admixtures: All admixtures shall be used in strict accordance with the manufacturer's recommendations. Admixtures containing calcium chlorides or other accelerators shall not be used without the approval of the Architect/Engineer and the Owner's Testing Laboratory.

1. Normal or Mid Range Water Reducing Admixtures: ASTM C494 Type A, “MasterPozzolith” series or "MasterPolyeed" series by Master Builders Solutions, "WRDA" series by W.R. Grace, or equal.
2. Water Reducing Admixture and Retarder: ASTM C494 Type B or D, "MasterSet R" series or “MasterSet DELVO” series by Master Builders Solutions, "Plastiflow-R" by Nox-crete, or equal.
3. High Range Water-Reducing Admixtures: ASTM C494 Type F, "MasterRheoBuild 1000" or “MasterGlenium” series by Master Builders Solutions or equal.
4. Air Entraining Admixtures: ASTM C260, “MasterAir” series by Master Builders Solutions or equal.
5. Viscosity Modifiers: ASTM C494 Type S.

F. Slurry: Same proportion of cement to fine aggregates used in the regular concrete mix (i.e. only coarse aggregate omitted); well mixed with water to produce a thick consistency.

G. High Strength Grout: See section 05 1200 or 05 1100 for requirements.

H. Dry Pack: Dry pack (used only for cosmetic concrete repairs) shall consist of:

1. One part cement to 2-1/2 parts fine aggregate (screen out all materials retained on No.4 sieve), mixed with a minimum amount of water, added in small amounts.
2. Mix to consistency such that a ball of the mixture compressed in the hand will retain its shape, showing finger marks, but without showing any surface water.

2.04 ACCESSORIES

A. Bonding Agent: ASTM C881, Type II Grade 2 Class B or C. Do not allow epoxy to set before placing fresh concrete.

1. "MasterEmaco ADH 326" by Master Builders Solutions;
2. "Rezi-Weld 1000" by W.R. Meadows.

B. Chemical Hardener: Fluorosilicate solution designed for densification of cured concrete slabs. "MasterKure HD 300 WB" by Master Builders Solutions, "LIQUI-HARD" W.R. Meadows Co, or equal.

C. Moisture-Retaining Cover: ASTM C171, type 1, one of the following;

1. Regular Curing Paper, Type I, reinforced waterproof: Fortifiber Corporation "Orange Label Sisalkraft", "Pabcotite" paper, or equal.
2. Polyethylene Film: ASTM D 2103, 4 mil thick, clear or white color.
3. White-burlap-polyethylene sheet, weighing not less than 10 oz/per linear yd.

D. Liquid Curing Compound: ASTM C 309, Type 1, Class B, clear or translucent, 25% minimum solids, water base acrylic cure/sealer which will not discolor concrete and compatible with bonding of finishes specified in related sections. W.R. Meadows Co. "Vocomp 25" or equal. Maximum VOC content shall comply with local requirements and California Green Building Code.

E. Underslab Water Vapor Retarder: See Section 07 2500 "Weather Barriers".

F. Evaporation Reducer: "MasterKure ER 50", by Master Builders Solutions.

G. Permeability Reducer: Use only where specifically referred to.

1. ASTM C494 Type S.
2. Admixture Type: Xypex Chemical Corporation "XYPEX Admix C-500" or Master Builders Solutions "MasterLife 300" series. Dosage: per manufacturer.
3. Surface-Applied Type: Xypex Chemical Corporation "XYPEX Concentrate. Brush application: 1.25-1.50lb/sq. yd., 5 parts powder to 2 parts water. Master Builders Solutions "MasterSeal 500". Slurry coat: one part water to 2.25-2.5 parts powder by volume.
4. Approved equal.

2.05 JOINT DEVICES AND MATERIALS

A. Waterstops: Resilient type, meeting Corps of Engineers CRD-C 572. Consult manufacturer for appropriate product for specific use. Submit for review. Install per manufacturers recommendation. Provide W. R. Meadows "Seal Tight" PVC waterstop, Sika "Greenstreak" PVC waterstop, or approved equal.

B. Expansion Joint Filler: ASTM D1751, Nonextruding, resilient asphalt impregnated fiberboard or felt, 3/8 inch thick and 4 inches deep; tongue and groove profile.

1. Products: "Serviced Products", W.R. Meadows, Inc., "National Expansion Joint Company", "Celotex Corporation", or equal.

C. Joint Filler: ASTM D944, Compressible asphalt mastic with felt facers, 1/4 inch thick and 4 inches deep.

D. Sealant and Primer: As specified in Section 07 9200.

E. Slab Joint Sealant: Compatible with floor finishes specified in related sections.

2.06 CONCRETE MIXES

A. General requirements for mix design and submittal of structural class concrete:

1. Provide Contractor submittals to Architect/Engineer not less than 15 days before placing concrete.
2. Contractor shall review mix designs and proposed placing requirements prior to submittal for compatibility to ensure that the concrete as designed can be placed in accordance with the drawings and specifications.
3. Changes or revisions require re-submittal: All variations to approved mix designs, including changing type and/or quantity of admixtures shall be resubmitted to the Architect/Engineer for review prior to use.
4. Mix design(s) for all structural classes of concrete to be prepared by qualified person experienced in mix design. Allow for time necessary to do trial batch testing when required.
5. Preparer to provide backup data and certify in writing that mix design meets:
   a. Requirements of the specifications for concrete durability and quality;
   b. Requirements of the California Building Code and ACI CODE-318, including break histories, trial batching test results, and/or a mix designed by a California Registered Civil Engineer per ACI CODE-318 and bearing the Engineer's seal & signature.
6. Clearly note on mix designs with specified maximum W/CM if design permits addition of water on site, or clearly identify in the mix design that no water is to be added on site.
7. Deviations: Clearly indicate proposed deviations, and provide written explanation explaining how the deviating mix design(s) will provide equivalent or better concrete product(s) than those specified.
8. Include adjustments to reviewed mix designs to account for weather conditions and similar factors.

B. Proportioning - General: The following provisions apply to all mix designs:

1. Proportion concrete mixes to produce concrete of required average strength (as defined by ACI CODE-318). Select slump, aggregate sizes, shrinkage, and consistency that will allow thorough compaction without excessive puddling, spading, or vibration, and without permitting the materials to segregate, or allow free water to collect on the surface.
2. Select aggregate size and type to produce dense, uniform concrete with low to moderate shrinkage, free from rock pockets, honeycomb and other irregularities.
3. Mix designs may include water reducing and retarding admixtures to meet or exceed minimum set times (time required to place and finish) and to minimize Water-Cementitious Materials Ratios (W/CM). Minimum and maximum criteria presented in this section are guidelines and do not represent a specific mix design.

4. Cement Content: Minimum cement content indicates minimum sacks of cementitious material. Increasing cement content to increase early strengths or to achieve specified W/CM while maintaining water content is discouraged in order to minimize effects of shrinkage.
   a. Substitution of fly ash for Portland cement on an equivalent weight basis up to 15% replacement is permitted without exception. Substitution of fly ash for Portland cement on an equivalent weight basis between 15-25% replacement is permitted, except at high early strength concrete, and shall comply with DSA IR 19-3, with proportioning based on field experience or trial mixtures, or both per ACI 318, Section 26.4. Proportioning without field experience or trial mixtures is not permitted. Replacement in excess of 25% is not permitted unless part of a specified mix design that has been submitted for review.
   b. Substitution of slag cement for Portland cement on an equivalent weight basis up to 45% replacement is permitted, except at high early strength concrete. Replacement in excess of 45% is not permitted unless part of a specified mix design that has been submitted for review.
   c. Such substitution requests may be denied by the Engineer.
5. Water Content: Mix designs with a specified maximum W/CM may be designed with a lower W/CM than specified in order to allow addition of water at the site.
6. Concrete Strength: Establish required average strength for each type of concrete on the basis of field experience or trial mixtures, as specified in ACI SPEC-301 and this section.
   a. For trial mixtures method, employ independent testing agency acceptable to Architect/Engineer for preparing and reporting proposed mix designs.
7. Placement Options: Mix designs may, at the Contractor's option, be designed for either pump or conventional placement with aggregate size, slumps, etc. to be maintained as specified in this section.

C. Proportioning Normal Weight Concrete: Comply with ACI PRC-211.1 recommendations and this section.

D. Special mix design requirements for interior concrete floor slabs-on-ground:

1. Proportion concrete mixes per this specification, ACI PRC-211.1, and the requirements below:
2. Fly Ash shall be substituted for cement on a 1 lb. per 1 lb. basis, with a minimum replacement of 25% and a maximum of 35%. Alternatively, Slag Cement shall be substituted for cement on a 1 lb. per 1 lb. basis, with a minimum replacement of 30% and a maximum of 45%. Mix designs utilizing 15% or more fly ash shall comply with DSA IR 19-3, with proportioning based on field experience or trial mixtures, or both per ACI 318, Section 26.4. Proportioning without field experience or trial mixtures is not permitted.
3. 200 lbs. of 3/8(-) aggregate shall be added to reduce total sand.
4. Reduce total sand to minimum practical.
5. Admixture dosage shall be per manufacturer’s recommendations. Dosage may be increased for workability as long as set times are not excessive for placement and finishing.

E. Mix Design Minimum Requirements:

Concrete Class	Coarse Aggregate Size (Inches) & Fine Aggregate[3]	Maximum W/CM or Maximum Nominal Slump & Tolerance (Inches)[1,2]	Minimum 28-Day Design Strength	Minimum Cement Sacks/per yd[4]
NON-STRUCTURAL				
1) Lean Concrete (use only where specified)	---	---	---	3.0
STRUCTURAL				
2) Interior Slab on Ground[5]	1" x #4	W/CM = .45	3,000	6.1
3) Foundation (including stem walls)	1" x #4	W/CM = .53	3,000	5.0

1. The tolerance is the maximum deviation allowable without rejection. The mix design shall be based on the nominal value specified and is without water reducing mixtures. Slump to be measured at the end of the hose.
2. The maximum W/CM is limited at time of placement as noted. No water is to be added on site such that the specified W/CM or maximum slump is exceeded without approval of the testing laboratory and the Architect/Engineer. Workability is to be achieved utilizing an acceptable mid range to high range water reducing admixture.
3. Gradation of aggregate is per ACI CODE-318 and ASTM C33.
4. Minimum cement content includes all cementitious materials.
5. See Article 2.06D for additional requirements at slabs on ground.

2.07 MIXING CONCRETE

A. Batch final proportions in accordance with approved mix designs. All adjustments to approved proportions, for whatever reason, shall be reviewed by the Architect/Engineer prior to use.

B. Batch and mix concrete in accordance with ASTM C94, at an established plant. Site mixed concrete will be rejected.

C. Provide batch and transit equipment adequate for the work. Operate as necessary to provide concrete complying with specified requirements.

D. Place mixed concrete in forms within 1-1/2 hours from the time of introduction of cement and water into mixer or 300 revolutions of the drum whichever comes first. Use of, re-mixing, and/or tempering mixed concrete older than 1 hour will not be permitted.

E. Do not add water at the site to concrete mixes with a maximum specified W/CM unless the water content at batch time provides for a W/CM less than specified and this provision, including the quantity of water which may be added at the site, is specifically noted on the mix design and certification by the mix preparer. See ASTM C94 for additional requirements.

2.08 SOURCE QUALITY CONTROL

A. Services by independent Testing Agency:

1. Where aggregate alkali reactivity testing (and, when applicable, mitigation testing) per the MATERIALS section is not available, the Testing Agency shall perform this testing to verify materials conformance to CBC section 1903A.5.
2. Batch Plant inspection at automated plants to occur at commencement of concrete work each day (first truck). Batch Plant inspection at non-automated plants and when accuracy is questionable shall be continuous. Additionally, water cement ratio (WCR) is to be verified where a WCR is specified herein. The computed WCR is to be written on the Batch Plant Certificate to be taken to the job site prior to the truck leaving the plant. See requirements of CBC 1705A.3.3.
3. Batch Plant Certificates: Obtain the weighmaster's Batch Plant Certificate at arrival of truck at the site. If no batch plant certificate is provided, recommend to the General Contractor that the truckload of concrete be rejected. So note in daily log, along with the location of the load of concrete in the structure if the load is not rejected. See requirements of CBC 1705A.3.3.
    a. Laboratory's inspector shall obtain for each transit mixer Batch Plant Certificates to verify mix design quantities and condition upon delivery to the site.
    b. Certificates to include: Date, time, ingredient quantities, water added at plant and on job, total mixer revolutions at time of placement, and time of departure.
    c. Concrete with specified water cement ratio: Add no water on site unless mix design and batch records each show additional water may be added. See ASTM C94 for additional requirements.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify lines, levels, and dimensions before proceeding with work of this section.

B. Verify work of other sections is complete and tested as required before proceeding.

3.02 PREPARATION

A. Observation, Inspection and Testing:

1. Architect/Engineer: Notify not less than 2 working days before each concrete placement, for observation and review of reinforcing, forms, and other work prior to placement of concrete.
2. Testing Agency: Notify not less than 24 hours before each placement for inspection and testing.

B. Placement Records: Contractor shall maintain records of time, temperature and date of concrete placement including mix design and location in the structure. Retain records until completion of the contract. Make available for review by Testing Agency and Architect/Engineer.

C. Coordinate placement of joint devices with erection of concrete formwork and placement of form accessories.

D. Verify location, position and inclusion of all embedded and concealed items.

E. Verify installation of vapor retarder under interior slabs on ground, as specified in related section, is complete.

F. Cleaning and Preparation:

1. Remove loose dirt, mud, standing water, and foreign matter from excavations and cavities.
2. Close cleanout and inspection ports securely.
3. Thoroughly clean reinforcement and other embedded items free from loose rust and foreign matter. Maintain reinforcing securely in place. Do not place concrete on hot reinforcing.
4. Dampen form materials and substrates on which concrete is to be placed at least 1 hour in advance of placing concrete; repeat wetting as necessary to keep surfaces damp. Do not saturate. Do not place concrete on saturated material.
   a. Thoroughly wet wood forms (except coated plywood), bottom and sides of trenches, adjacent concrete or masonry and reinforcement.
   b. Concrete slabs on base rock, dampen rock.
   c. Concrete slabs on vapor retarder, do not wet vapor retarder.
5. Verify that metal forms are clean and free of rust before applying release agent.
6. Thoroughly clean metal decking. Do not place concrete on wet deck surface.
7. Prepare previously placed concrete by cleaning with steel brush and applying bonding agent in accordance with manufacturer's instructions.

G. Drill holes in existing concrete at locations where new concrete is doweled to existing work. Insert steel dowels and prepare connections as detailed.

H. Do not overcut at existing concrete work to remain. Contractor is responsible for repair/replacement of overcut concrete to the Owner’s satisfaction.

3.03 PIPES AND CONDUITS IN CONCRETE

A. Slabs-on-Ground:

1. No pipe or conduit exceeding 1 inch outside diameter shall be embedded within the specified slab thickness except as specifically detailed.
2. Do not stack or abut pipes, maintain 3 inches minimum clearance.

B. Sleeving and Wrapping:

1. Foundations: Sleeve or wrap all individual pipe penetrations, minimum 1-1/2 inches clear to reinforcing all around.
   a. Sleeves: PVC. Provide 1 inch minimum clear all around O.D. pipe to I.D sleeve, UNO at ends, fill void space with mastic or plastic bituminous cement.
   b. Wrapped Vertical Pipes: Provide 1/8 inch nominal sheet foam with three wraps minimum, UNO.
   c. Wrapped Horizontal Pipes: Provide 1/8 inch nominal sheet foam with eight wraps minimum, UNO.

d. Underground Fire Lines 4" and Larger: At sleeves provide 2 inch minimum clear all around O.D. pipe to I.D sleeve. At wrapped pipes, provide 1/8 inch nominal sheet foam with sixteen wraps minimum.

2. Slabs or Curbs: Wrap pipes as described above.

C. Space groups of pipes/conduits at least 3 sleeve diameters apart, do not interrupt specified concrete and reinforcement.

1. Provide block-outs as detailed when grouping of pipes/conduits in foundation or other structural member prevents spacing as described. Notify Architect/Engineer for review of any conditions not conforming to details.
2. Center pipe/conduit penetrations in the depth and/or thickness of foundations.
3. Maximum size of pipe/conduit penetrations shall not exceed the least dimension of concrete divided by 3.

3.04 CONCRETE PLACEMENT

A. Transporting:

1. Provide clean, well-maintained equipment of sufficient quantity and capacity to execute the work and produce concrete of quality specified.
2. Handle and transport concrete from mixer to final deposit location as rapidly as practicable. Prevent separation or loss of ingredients.

B. Perform concrete placement by methods which will not puncture, damage or disturb vapor retarder membrane. Repair all damage to vapor retarder membrane before covering.

C. Placement - General: Placement, once started, shall be carried on as a continuous operation until section of approved size and shape is completed. Provide construction joints as detailed on the drawings. Engineer's and DSA's written approval required for all deviations.

1. Deposition:
   a. Deposit concrete to maintain an approximately horizontal plastic surface until the completion of the unit placement.
   b. Deposit as neatly as practicable in final position, minimize re-handling or flow.
   c. Do not drop concrete freely where reinforcing bars, embeds, or obstructions occur that may cause segregation. Provide spouts, elephant trunks, or other means to prevent segregation during placement.
2. Depth: Layered placement in columns and walls shall not exceed ten feet vertical depth.
   a. Place concrete in minimum 32 inch horizontal lifts.
   b. Schedule placement to ensure that concrete will not take initial set before placement of next lift.
   c. No horizontal cold joints are allowed in columns or walls.
3. Progress Cleaning: Remove all concrete spilled on forms or reinforcing steel in portions of structure not immediately concreted. Remove completely before concrete sets.
4. Interruptions: Shut down placement operations and dispose of all remaining mixed concrete and concrete in hoppers or mixers following all interruption in placement longer than 60 minutes.
   a. If such interruption occurs, provide new or relocate existing construction joints as directed by Engineer and approved by DSA.

b. Cut concrete back to the designated line, cleaning forms and reinforcing as herein specified.
c. Prepare for resumption of placement as for new unit when reason for interruption is resolved.

D. Placement - Elevated Structural Systems: Place as noted for "General" above and as follows:

1. Metal Decking and Structural Steel Beam Systems that are not to be shored: Locate screed lines on primary structural members. Review proposed screed line locations and expected structural deflections with the Architect/Engineer prior to placement of concrete.
2. Place screed lines to match camber of primary girders made of material other than concrete. Locate screeds to provide the minimum specified thickness of concrete at all locations.
3. Compensate for deflection of intermediate structural members and decking by placement of additional concrete.
4. Adjust embedded items to compensate for camber and deflection. Maintain locations within specified tolerances.

E. Consolidation:

1. Consolidate all concrete thoroughly during placement with high-speed mechanical vibrators and other suitable tools. Perform manual spading and tamping to work around reinforcement, embedded fixtures, and into corners of formwork as required to obtain thorough compaction.
   a. Provide vibrators with sufficient amplitude for adequate consolidation.
   b. Use mechanical vibrators at each point of concrete placement.
   c. Keep additional spare vibrators, in addition to those required for use, at the site for standby service in case of equipment failure.
2. Consolidate each layer of concrete as placed.
   a. Insert vibrators vertically at points 18 to 30 inches apart; work into top area of previously placed layer to reconsolidate, slowly withdraw vibrator to surface.
   b. Avoid contact of vibrator heads with formwork surfaces.
   c. Systematically double back and reconsolidate wherever possible. Consolidate as required to provide concrete of maximum density with minimized honeycomb.

F. Unacceptable Materials:

1. Do not place concrete that has started to set or stiffen. Dispose of these materials.
2. Do not add water on site to concrete except as specified in the approved mix design, see PART 2 above.

G. Protection of installed work:

1. Do not introduce any foreign material into any specified drainage, piping or duct systems.
2. Contractor shall bear all costs of work required to repair or clean affected work as a result of failure to comply with this requirement.

3.05 CONCRETE JOINTS

A. Structural Joints (Construction/Cold Joints):

1. Locate joints only where shown, or as approved.
2. Review Required: Joints not indicated on the plans shall be located to meet the minimum requirements below, shall not impair the strength of the structure and shall be submitted to Architect/Engineer for review prior to placement of concrete.
   a. Indicate proposed location(s) of construction/cold/expansion joints on shop drawing submittals for review prior to placing concrete.
3. Clean and roughen all surfaces of previously placed concrete at construction joints by washing and sandblasting to expose aggregate to 1/4 inch amplitude.
4. Slabs-On-Ground: Maximum Length of continuous placement shall not exceed 60 feet without special review by the Architect/Engineer. Alternate or stagger placement sections.
5. Foundations, Beams, Elevated Slabs and Joists: Maximum Length of continuous placement shall not exceed 200 foot increments. Provide "keyed" shut-off locations made up with form boards. Extend reinforcing one lap length or more through shut-off.
   a. All reinforcement shall be continuous through construction/cold joint, lapping to adjacent reinforcing in future placement.
6. Horizontal Construction Joints: Place 2 inch slurry (specified concrete mix less coarse aggregate) at beginning of pour at the bottom of walls unless a prior review of a mock-up section demonstrates that segregation of aggregate will not occur.

B. Expansion/Construction Joints (Dowel Joints and Control Joints):

1. Interior Slabs-on-Ground:
   a. Expansion/Construction Joints: Provide dowel joints or control joints at a maximum dimension (in feet) of three times the slab thickness (in inches) in each direction unless noted otherwise (15'-0" maximum). Install joints to match slab level and in straight lines. Locate joints at all reentrant corners including blockouts.
   b. Proportions: Install joints to divide slab into rectangular areas with long dimensions less than 1.5 times short dimension.

C. Joint Types:

1. Dowel Joint: A keyed joint with smooth dowels passing through to allow unrestricted movement due to contraction and expansion. Joints are as specified on the drawings.
2. Control Joint(s): Shrinkage crack control joints may be of the following types when shown on the drawings. Install joints in a straight line between end points with edges finished appropriate to type. Depth shall be 25% of the slab thickness, unless noted otherwise. Fill joints with sealant as shown on the drawings or as required by related sections.
   a. 1/4 inch wide troweled joint.
   b. Keyed joint: Only at locations where concealed by other finishes.
   c. Masonite Strip, 1/8 inch: Only at locations where concealed by other finishes.
   d. Saw Cut, 1/8 inch: Must be performed within eight hours of completion of finishing. Do not make saw cuts if aggregate separates from cement paste during cutting operation. Prevent marring of surface finish. Fill with flexible sealant.

3.06 VAPOR RETARDER

A. Vapor Retarder Installation: Install as specified in Section 07 2500 "Weather Barriers", ASTM E1643, and per manufacturer's recommendations including taping and lapping of seams, sealing of penetrations, and repair of damage. Do not extend vapor retarder below footings.

3.07 FLATWORK

A. General Requirements for All Concrete Formed & Finished Flat:

1. Edge Forms and Screeds: Set accurately to produce indicated design elevations and contours in the finished surface, edge forms sufficiently strong to support screed type proposed.
2. Jointing: Located and detailed as indicated.
3. Consolidation: Concrete in slabs shall be thoroughly consolidated.

B. Flatwork Schedule:

1. Interior Slabs-On-Ground:
   a. Sub-Base: Clean free-draining, crushed base rock, 4 inch minimum thickness, thoroughly compacted.
   b. Vapor Retarder: Install over sub-base.

3.08 FORMED SURFACES

A. Form all concrete members level and plumb, except as specifically indicated. Comply with tolerances specified in ACI CODE-318, ACI SPEC-301, and this specification, except that maximum permissible deviation is 1/4 inch end-to-end for any single member.

B. Cambers: Provide all cambers indicated in the formwork construction. Set screeds to produce specified cambers in the finished concrete.

3.09 CONCRETE FINISHES

A. Flatwork Finishing:

1. All exposed concrete flatwork surfaces shall be non-slip. See Architectural, Civil, and Landscape drawings.
2. Perform with experienced operators.
3. Finish surfaces monolithically. Establish uniform slopes or level grades as indicated. Maintain full design thickness.
4. In areas with floor drains, maintain design floor elevation at walls; slope surfaces uniformly to drains as indicated on drawings.
5. Flatwork Finish Types:
   a. Wood Float Finish: Surfaces to receive quarry tile, ceramic tile, or cementitious terrazzo with full bed setting system, or wood frame for raised finished floors.
   b. Steel Trowel Finish: Surfaces to receive carpeting, resilient flooring, seamless flooring, thin set terrazzo, thin set tile or similar finishes specified in related sections. Trowel twice, minimum.
   c. Broom Texture Finish: Exterior surfaces as indicated or for which no other finish is indicated. Finish as for steel trowel finish, except immediately following first troweling, (depending on conditions of concrete and nature of finish required) provide uniform surfaces texture using a medium or coarse fiber broom.

B. Other Concrete: Provide as required to achieve appearance indicated on structural and architectural drawings and related sections.

1. Repair surface defects, including tie holes, immediately after removing formwork.
2. Unexposed Form Finish: Rub down or chip off fins or other raised areas 1/4 inch or more in height.
3. Exposed Form Finish: Finish concrete to match forms. Rub down or chip off and smooth fins or other raised areas 1/4 inch or more in height. Provide finish as follows:
   a. Smooth Rubbed Finish: Wet concrete and rub with carborundum brick or other abrasive, not more than 24 hours after form removal.
   b. Grout Cleaned Finish: Wet areas to be cleaned and apply grout mixture by brush or spray; scrub immediately to remove excess grout. After drying, rub vigorously with clean burlap, and keep moist for 36 hours.
   c. Cork Floated Finish: Immediately after form removal, apply grout with trowel or firm rubber float; compress grout with low-speed grinder, and apply final texture with cork float.
4. Intermediate joint and score marks and edges: Tool smooth and flush unless otherwise indicated or as directed by the Architect.
5. Use steel tools of standard patterns and as required to achieve details shown or specified. All exposed corners not specified to be chamfered shall have radiused edges.

3.10 TOLERANCES

A. Minimum Flatwork Tolerances: Measure flatness of slabs with in 48 hours after slab installation in accordance with ACI PRC-302.1 and ASTM E1155 and to achieve the following FF and FL tolerances:

1. Exterior surfaces: 1/8 inch minimum per foot where sloped to drain. Level otherwise. FF20 and FL15.
2. Interior surfaces not otherwise shown or required: Level throughout. FF25 and FL20
3. Interior surfaces required to be sloped for drainage: 1/8 inch in 10 ft.
4. Finish concrete to achieve the following tolerances:
   a. Under Glazed Tile on Setting Bed: FF30 and FL20.
   b. Under Resilient Finishes: FF35 and FL25.
   c. Flooring manufactureer and pertainent section of Division 9.

B. Formed Surface Tolerances:

1. Permanently Exposed Joints and Surfaces: Provide maximum differential height within two feet of, and across construction joints of 1/16 inch.
2. Vertical Elevations: Elevation of surfaces shall be as shown or approved.

3.11 SEPARATE FLOOR TOPPINGS

A. Prior to placing floor topping, roughen substrate concrete surface and remove deleterious material. Broom and vacuum clean.

B. Place required dividers, edge strips, reinforcing, and other items to be cast in.

C. Apply bonding agent to substrate in accordance with manufacturer's instructions.

D. Apply sand and cement slurry coat on base course, immediately prior to placing toppings.

E. Place concrete floor toppings to required lines and levels. Place topping in checkerboard panels not to exceed 20 feet in either direction.

F. Screed toppings level, maintaining surface tolerances per above.

3.12 CONCRETE CURING

A. Curing - General: Cure in accordance with ACI SPEC-308.1. Maintain concrete water content for proper hydration and minimize temperature variations. Begin curing immediately following finishing.

B. Protection During Curing: Immediately after placement, protect concrete from premature drying, excessively hot or cold temperatures, and mechanical injury. The General Contractor is responsible for the protection of the finished slab from damage.

1. Avoid foot traffic on concrete for minimum of 24-hours after placement.
2. Protect concrete from sun and rain.
3. Maintain concrete temperature at or above 50 degrees F. during the first 7 days after placement. See Article ENVIRONMENTAL REQUIREMENTS.
4. Do not subject concrete to design loads until concrete is completely cured, and until concrete has attained its full specified 28-day compressive strength or until 21 days after placement, whichever is longer.
5. Protect concrete during and after curing from damage during subsequent building construction operations. See Article PROTECTION.

C. Maintain concrete with minimal moisture loss at relatively constant temperature for period necessary for hydration of cement and hardening of concrete.

1. Normal concrete: Not less than 7 days.
2. High early strength concrete: Not less than 4 days.

D. Begin curing immediately following finishing.

E. Surfaces Not in Contact with Forms:

1. Start initial curing as soon as free water has disappeared and before surface is dry. Keep continuously moist for not less than 3 days by water ponding, water-saturated sand, water-fog spray, or saturated burlap.
2. Begin final curing after initial curing but before surface is dry.
   a. Moisture-retaining cover: Seal in place with waterproof tape or adhesive.
   b. Curing compound: Apply in two coats at right angles, using application rate recommended by manufacturer.
3. In addition, see specific conditions noted below.

F. Slabs on Ground: Cure by one of the following methods:

1. Water Cure (Ponding): Maintain 100 percent coverage of water over floor slab areas, continuously for minimum 7 calendar days.
2. Spraying: Spray water over floor slab areas and maintain wet for 7 days.
3. Moisture-Retaining Film or Paper: Lap strips not less than 6 inches and seal with waterproof tape or adhesive; extend beyond slab or paving perimeters minimum 6 inches and secure at edges; maintain in place for minimum 7 days.
4. Absorptive Moisture-Retaining Covering: Saturate burlap-polyethylene and place burlap-side down over floor slab areas, lapping ends and sides and extend beyond slab or paving perimeters 6 inches minimum; maintain in place for minimum 7 days.
5. Liquid Membrane-forming Curing Compound: Provide only when subsequent concrete treatments or finish flooring specified in related sections will not be affected by cure/sealer. Apply curing compound in accordance with manufacturer's instructions at the maximum recommended application rate in two coats, with second coat applied at right angles to first.

G. Foundations: Apply curing compound immediately after floating.

3.13 CONCRETE HARDENER

A. Apply hardener to all floor slabs not receiving other finishes after 30 days minimum curing. Clean slabs of non-compatible cure/sealers or other foreign material(s) and apply in strict accordance with the manufacturer's directions.

3.14 GROUTING AND DRY PACK

A. Set steel plates on concrete or masonry with high strength grout bed, completely fill all voids; thoroughly compact in place. See Section 05 1200 or 05 1100.

B. Bolts or inserts dry packed or grouted in place shall cure for minimum 7 days before tensioning.

3.15 FIELD QUALITY CONTROL

A. Testing and Inspections by Independent Testing Agency: Provided verification and inspection of concrete per CBC Table 1705A.3. Provide written reports for to Engineer, Architect, Contractor and Building Official for the following tests and inspections:

B. Testing & Inspection: Provide periodic inspection of reinforcing steel. Provide continuous inspection during placement of structural class concrete, 3000 psi or more. Non-structural class concrete with a design strength of 2500 psi or less to have periodic inspection on a 150 cubic yard basis as required to assure conformance.

1. Provide periodic inspection of bolts in concrete prior to and during placement where so noted on the construction documents.
2. Structural Concrete Cylinder Tests: Form in accordance with ASTM C31.
   a. Take four standard 6 inch x 12 inch (or five 4 inch x 8 inch) cylinder specimens on the site, of each class of concrete as specified in PART 2, not less than once a day or for each 50 cubic yards or 2000 sq ft or fraction thereof placed each day.
   b. Record the location of each concrete batch in the building in a log and also note on each specimen.
   c. Perform standard compression test of cylinders in accordance with ASTM C39, one at 7 days and two (three for 4x8 cylinders) at 28 days.

d. Hold fourth (fifth) cylinder untested until specified concrete strengths are attained.

3. Structural Concrete Slump Test and Air Tests: Perform slump in accordance with ASTM C143 and air content in accordance with C231 or C173 at the time of taking test cylinders, and/or at one-hour intervals during concrete placing.
4. Measure and record concrete temperature in accordance with ASTM C1064 upon arrival of transit mixers and when taking specimens. Note weather conditions and temperature.
5. Determine concrete density in accordance with ASTM C138 at the time of forming test cylinders.
6. Propose adjustments to reviewed mix designs for Architect / Engineer review to account for variations in site or weather conditions, or other factors as appropriate.
7. Water Vapor Transmission Tests: Floors receiving floor finishes specified in related sections will be tested prior to installation of flooring systems. Refer to sections specifying floor finishes for related requirements.

C. Services by Contractor:

1. Rejection of Concrete Materials: Do not use the following without prior written approval of the Architect/Engineer;
   a. Materials without batch plant certificates.
   b. Materials not conforming to the requirements of these specifications.

3.16 ADJUSTING

A. Inspect all concrete surfaces immediately upon formwork removal. Notify Architect/Engineer of identified minor defects. Repair all minor defects as directed.

B. Surface and Finish Defects: Repair as directed by the Architect/Engineer, at no added expense to the Owner. Repairs include all necessary materials; reinforcement grouts, dry pack, admixtures, epoxy and aggregates to perform required repair.

1. Repair minor defective surface defects by use of drypack and surface grinding. Specific written approval of Architect/Engineer is required. Submit proposed patching mixture and methods for approval prior to commencing work.
2. Slabs-on-Ground: Review for "curled" slab edges and shrinkage cracks prior to installation of other floor finishes. Grind curled edges flush, fill cracks of 1/16 inch and greater with cementitious grout.
3. Grind high spots, fins or protrusions caused by formwork; Fill-in pour joints, voids, rock pockets, tie holes and other void not impairing structural strength. Provide surfaces flush with surrounding concrete.

3.17 DEFECTIVE CONCRETE

A. Defective Concrete: Concrete not conforming to required compressive strength, lines, details, dimensions, tolerances, finishes or specified requirements; as determined by the Architect/Engineer.

B. Repair or replacement of defective concrete will be determined by the Architect/Engineer who may order additional testing and inspection at his option. The cost of additional testing shall be borne by Contractor when defective concrete is identified.

C. Specific Defects:

1. "Low-Strength"; Concrete Not Meeting Specified Compressive Strength after 28 days:
   a. Concrete with less than 25% Fly Ash or 35% Slag as cementitious material: Test remaining cylinder(s) at 56 days. If strength requirements are met, concrete strength is acceptable.
   b. Concrete with 25% or more Fly Ash or 35% or more Slag as cementitious material: Test remaining cylinder(s) at 70 days. If strength requirements are met, concrete strength is acceptable.
2. Excessive Shrinkage, Cracking, Crazing or Curling; Defective Finish: Remove and replace if repair to acceptable condition is not feasible.
3. Lines, Details, Dimensions, Tolerances: Remove and replace if repair to acceptable condition is not feasible.
4. Slab sections not meeting specified tolerances for trueness/flatness or lines/levels: Remove and replace unless otherwise directed by the Architect/Engineer. Minimum area for removal: Fifteen square feet area unless directed otherwise by the Architect/Engineer.
5. Defective work affecting the strength of the structure or the appearance: Complete removal and replacement of defective concrete, as directed by the Architect/Engineer.

3.18 CLEANING

A. Maintain site free of debris and rubbish. Remove all materials and apparatus from the premises and streets at completion of work. Remove all drippings; leave the entire work clean and free of debris.
B. Slabs to Receive Floor Finishes Specified in other sections: Remove non-compatible cure/sealers or other foreign material(s) which may affect bonding of subsequent finishes. Leave in condition to receive work of related sections.

3.19 PROTECTION

A. Protect completed work from damage until project is complete and accepted by Owner.

B. Construction Loads: Submit engineering analysis for equipment loads (including all carried loads) specified in article submittals.

C. Keep finished areas free from all equipment traffic for a minimum of 4 additional days following attainment of design strength and completion of curing.

D. Protection of Drainage Systems:

   1. Care shall be taken not to introduce any foreign material into any specified drainage, piping or duct system.
   2. Cost of work to repair or clean drainage system as a result of failure to comply with this requirement will be back charged to the contractor.

E. Cover traffic areas with plywood sheets or other protective devices; maintain protection in place and in good repair for as long as necessary to protect against damage by subsequent construction operations.

END OF SECTION

SECTION 03 3511
CONCRETE FLOOR FINISHES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Surface treatments for concrete floors and slabs.

1.02 RELATED REQUIREMENTS

A. Pertinent Sections specifying Volatile Organic Compound (VOC) Content Restrictions.

B. Pertinent sections of Division 03 specifying concrete floor slabs to receive finishes specified in this section.

C. Section 07 9200 - Joint Sealers.

D. Pertinent sections of Division 09 specifying concrete floor preparation for applied finishes.

1.03 REFERENCE STANDARDS

A. ACI SPEC 301 - Specifications for Structural Concrete for Buildings; American Concrete Institute International.

B. ACI PRC 302.1R - Guide for Concrete Floor and Slab Construction; American Concrete Institute International.

C. ASTM C39/C39M - Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens.

D. ASTM C 309 - Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete.

E. ASTM C779 - Standard Test Method for Abrasion Resistance of Horizontal Concrete Surfaces.

F. ASTM C805 - Standard Test Method for Rebound Number of Hardened Concrete.

G. 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.

H. California Code of Regulations, Title 24, Part 11 California Green Building Standards Code, “CAL-Green”.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordinate the work with concrete floor placement and concrete floor curing.

1.05 SUBMITTALS

A. See Section 01 3300 - Submittals, for submittal procedures.

B. Product Data: Manufacturer's published data on each finishing product, including information on compatibility of different products and limitations.

C. VOC Submittals: Product Data – VOC Limits: For adhesives, sealants, fillers and primers, documentation including printed statement of VOC contents, comply with limits specified in related section.

D. Maintenance Data: Provide data on maintenance and renewal of applied finishes.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials in manufacturer's sealed packaging, including application instructions.

1.07 FIELD CONDITIONS

A. Maintain light level equivalent to a minimum 200 W light source at 8 feet above the floor surface over each 20 foot square area of floor being finished.

B. Do not finish floors until interior heating system is operational.

C. Maintain ambient temperature of 50 degrees F minimum.

PART 2 PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

A. VOC Limits for adhesives, sealants, fillers, primers and coatings . Comply with limits specified in related section.

2.02 CONCRETE FLOOR FINISH APPLICATIONS

A. Liquid Densifier/Hardener:
   1. Apply at locations indicated on the Drawings.

2.03 DENSIFIERS AND HARDENERS

A. Liquid Densifier/Hardener: Penetrating chemical compound that reacts with concrete, filling the pores and dustproofing; for application to concrete after set.
   1. Products:
      a. Curecrete Distribution Inc.; Ashford Formula: www.ashfordformula.com.
      b. Substitutions: See Section 01 6000 - Product Requirements.
   2. Performance Requirements:
      a. Volatile Organic Content: 0 g/l.
      b. Abrasion resistance (ASTM C779): At least 32.5% increase at 30 minutes.
      c. Curing: At least 93% greater moisture retention during the initial critical 24 hour curing period compared to untreated samples.
      d. Compressive strength (ASTM C39):
         1) At least 40% increase in compressive strength at 7 days compared to untreated samples.
         2) At least 38% increase at 28 days compared to untreated samples.
      e. Impact resistance (ASTM C805): At least 13.3% increase in impact resistance compared to untreated samples.
      f. Permeability 0.00073 oz (0.022 cc)/hour seepage rate using a 7'-0" (2.13 m) head of water and a 4.91 in2 (3168 mm2) treated area.
      g. Coefficient of Friction (ASTM C1028): 0.86 dry, 0.69 wet.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that floor surfaces are acceptable to receive the work of this section.

B. Verify that flaws in concrete have been patched and joints filled with methods and materials suitable for further finishes.

3.02 GENERAL

A. Apply materials in accordance with manufacturer's instructions.

3.03 FLOOR SURFACE TREATMENT

A. Verify that surface is free of previous coatings, sealers, curing compounds, water repellents, laitance, efflorescence, fats, oils, grease, wax, soluble salts, residues from cleaning agents, and other impediments to adhesion.

B. Protect adjacent non-coated areas from drips, overflow, and overspray; immediately remove excess material.

C. Apply products to scheduled floor surfaces in accordance with manufacturer's instructions.

3.04 CLEANING AND PROTECTION

A. Protect completed work from damage until cured as described by manufacturer and ready for traffic.

END OF SECTION 03 3511

SECTION 05 1100

STRUCTURAL AND MISCELLANEOUS STEEL

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes: All labor, materials, equipment and operations required to complete structural and miscellaneous metals in shapes and configurations indicated; including:

1. Structural steel columns, beams, bracing, base plates, bolts and stud bolts welded to structural steel.
2. Miscellaneous structural steel and connections; fabricated connectors and hangers installed by related sections.
3. Anchor bolts and steel inserts embedded in concrete, installed by related sections.
4. Fabricated steel items embedded in concrete installed by related sections.
5. Supervision of anchor bolt setting, leveling and elevations to ensure required fit of steel work.
6. Shop priming and field touch-up, galvanizing.
7. Bracing, Shoring, Fabrication and Erection.

B. Related Sections:

1. Pertinent sections of Division 01 specifying Quality Control and Testing Agency services.
2. Pertinent Sections of other Divisions specifying concrete reinforcement, formwork, concrete, structural and miscellaneous metal fabrications, steel joists, metal decking, cold-formed metal framing, rough carpentry.

1.02 REFERENCES

A. California Code of Regulations, Title 24, latest adopted edition (herein noted as CBC): Chapter 22A Steel.

B. American Institute of Steel Construction (AISC) 303 “Code of Standard Practice for Steel Buildings and Bridges”.

C. AISC 360 “Specification for Structural Steel Buildings”.

D. American Welding Society (AWS) D1.1 “Structural Welding Code - Steel”.

E. Underwriters Laboratories (UL) FRD “Fire Resistance Directory”.

1.03 SUBMITTALS

A. Submit in accordance with pertinent sections of Division 01 specifying submittal procedures. The General Contractor shall review and approve shop drawings prior to submittal to the Architect/Engineer. Submittals that do not meet these requirements will be returned for correction without review.

B. Limitation of Review: Structural Engineer's review will be for general conformance with design intent as indicated in the Contract Documents and does not relieve Contractor of full responsibility for conformance with the Contract Documents.

C. Product Data: Submit manufacturer's product data, specifications, location and installation instructions for proprietary materials and reinforcement accessories. Provide samples of these items upon request.

D. Shop drawings: Submit each building as a complete unit. Do not mix components from multiple buildings or units of work in a submittal. Include all of the following;

1. Profiles, sizes, spacing, locations of structural members, openings, attachments, and fasteners.
2. Fabrication tolerances for all steel.
3. Connections: All, including type and location of shop and field connections.
4. Indicate welded connections with AWS A2.4 welding symbols. Indicate net weld lengths, type, size, and sequence. Designate demand critical welds.
5. Cross-reference all shop drawing detail references to contract document detail references.
6. Secure all field measurements as necessary to complete this work prior to submitting shop drawings for review.
7. Provide holes, welded studs, etc. as necessary to secure work of other sections.
8. Provide the following as separate submittals for each building or unit of work:
   a. Bolt and anchor setting plans.
   b. Layout, fabrication and erection drawings.

E. Certifications:

1. Steel Materials: Submit the following for identified materials.
   a. Manufacturer's Mill Certificate: Certify that products meet or exceed specified requirements.
   b. Mill Test Reports: Indicate structural strength, destructive test analysis, and non-destructive test analysis.
   c. Contractor's affidavit certifying that all identified steel materials provided are of the grades specified and match the certificates supplied.
2. Welders Certificates: Certify welders employed on the Work, verifying AWS qualification per AWS D1.1.

F. Samples: Provide samples to the Testing Agency as specified in Article SOURCE QUALITY CONTROL, at no additional costs.

1.04 QUALITY ASSURANCE

A. Requirements of Regulatory Agencies, refer to pertinent sections of Division 01 and CBC Chapter 17A.

B. All tests shall be performed by a recognized testing agency as specified in pertinent sections of Division 01.

C. Certification and Identification of Materials and Uses: Provide Testing Agency with access to fabrication plant to facilitate inspection of steel. Provide notification of commencement and duration of shop fabrication in sufficient time to allow inspection and all material identification/test information listed below.

1. Test all steel as required by ASTM A6.
2. Provide manufacturer's Mill Test Reports for all materials. Include chemical and physical properties of the material for each heat number manufactured. Tag all fabricated materials with heat number.
3. Provide letter certifying all materials supplied are from heat numbers covered by supplied mill certificates. Include in letter the physical location of each material type and/or heat number in the project (i.e. walls, braced frames etc.).
4. Unidentified Material Tests: Where identification of materials by heat number or mill tests cannot be made, Owner's Testing Agency shall test unidentified materials.
5. Provide all certification, verifications, and other test data required to substantiate specified material properties at no additional cost to the Owner.

D. Testing and Inspection: Tests and Inspections performed by Independent Testing Agency are specified below in Articles SOURCE QUALITY CONTROL and FIELD QUALITY CONTROL. Duties and limitations of Independent Testing Agency, test costs and test reports in conformance with pertinent sections of Division 01.

E. The following standards are the minimum level of quality required. Provide higher quality work as specifically indicated in the Contract Documents.

1. Workmanship and details of structural steel work shall conform to the CBC and AISC 360.
2. The quality of materials and the fabrication of all welded connections shall conform to AWS D1.1.
3. Comply with Section 10 of AISC 303 for architecturally exposed structural steel.

F. The Testing Agency will review all submittals and testing of materials.

G. All re-inspections made necessary by non-conforming work shall be at the Contractor's expense.

1.05 DELIVERY, STORAGE AND HANDLING

A. Deliver materials to project site in bundles marked with durable tags indicating heat number, mill, member size and length, proposed location in the structure and other information corresponding with markings shown on placement diagrams.

B. Handle and store materials above ground to prevent damage, contamination or accumulation of dirt or rust.

1.06 SCHEDULING AND SEQUENCING

A. Organize the work and employ shop and field crew(s) of sufficient size to minimize inspections by the Testing Agency.

B. Provide schedule and sequence information to Testing Agency in writing upon request. Update information as work progresses.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Structural Steel Plates: ASTM A36 or ASTM A572 Gr. 50 or ASTM A529 Gr. 50

B. Structural Steel Channels, Angles: ASTM A36 or ASTM A572 Gr. 50.

C. HSS (Hollow Structural Sections):

1. Rectangular or Square: ASTM A500, Gr. C.

D. Bolts, Nuts, and Washers: ASTM A307 Grade A machine bolts with ASTM A563 Grade A nuts and ASTM F844 washers to match. See FINISHES section for galvanization, where required.

E. Anchor Bolts/Rods, Nuts, and Washers: ASTM F1554 Gr. 36 or 55 with ASTM A563 Grade A nuts, and ASTM F436 Type 1 washers. Grade DH nuts where Grade 105 rod is specified. No upset thread allowed.

F. Arc-Welding Electrodes: AWS Standards E70 or equivalent, except no E70T-4 allowed.

G. Other Welding Materials: AWS D1.1; type required for materials being welded.

H. Welded Headed/Threaded Studs: ASTM A108 and AWS D1.1 Section 7. Minimum yield strength is 51,000 pounds per square inch.

I. Deformed Bar Anchors: ASTM A1064.

2.02 ACCESSORIES

A. High Strength Grout: ASTM C1107, non-shrink, premixed compound consisting of aggregate, cement, and water reducing plasticizing agents. Minimum compressive strength f'c = 7000 psi at 28 days. Non-metallic where exposed to view. BASF "MasterFlow 928" or equivalent.

B. Building Structural Steel Primers: Comply with local VOC limitations of authorities having jurisdiction and the California Green Building Code. Verify compatibility with finish coats specified in other sections. Follow manufacturers printed instructions. Apply one coat unless otherwise directed.

1. Type A: Self-Crosslinking Hydrophobic Acrylic passing 2000 hours ASTM D4585 & 7000 hours ASTM D5894. "Series 115 Uni-Bond DF" by Tnemec (2.0 to 4.0 mils DFT).
2. Type B: Organic Zinc-Rich Urethane passing 50,000 hours ASTM B117 and 15000 hours ASTM G855. "Series 90-97 Tneme-Zinc" by Tnemec (2.5 to 3.5 mils DFT) or "Series 94-H20 Hydro-Zinc" by Tnemec (2.5 to 3.5 mils DFT).
3. Type C: MIO-Zinc Filled Urethane passing 10,000 hours ASTM B117 and 5000 hours ASTM D4585. "Series 394 PerimePrime" by Tnemec (2.5 to 3.5 mils DFT).

C. Galvanizing: ASTM A153 and A123.

D. Touch-Up Primer for Galvanized Surfaces: Type B primer.

2.03 FABRICATION

A. Shop fabricate to greatest extent possible.

B. Continuously seal built up members by continuous welds where exposed to weather.

C. Fabricate connections for bolt, nut, and washer connectors.

D. Protect all materials, before and after fabrication, from rust, corrosion, dirt, grease, and other foreign matter.

E. Fabricate framing members free from twists or bends. Form holes, cut and sheared edges neatly without kinks, burrs, or warped edges.

F. Exposed Steel: Straight, smooth, free of nicks, scars or dents.

G. Gas Cutting: Gas cutting of holes in a member shall not be permitted.

H. Splicing of members: Members requiring splicing due to length requirements may be spliced using full penetration butt welds when such welds and procedures are inspected and certified by the Testing Agency, in conformance with AWS and AISC standards. The location of splices shall be approved by the Architect/Engineer in writing prior to fabrication.

I. Welding: Welding of structural steel connections shall be performed by qualified welders in accordance with AWS Standards. All weld sizes shall match those shown on the drawings.

1. Preparation: Clean all surfaces free of rust, paint and all foreign matter. Remove paint or scale by brushing, chipping or hammering as required. Chip clean and wire brush burned or flame cut edges before welding. Space and alternate welds, clamping as necessary to prevent warp or misalignment.
2. Sequence Welding: When welds enclose, or partially enclose, the perimeter or portion of the surface of a member, make weld bead in sequence, or staggered. Minimize internal stresses. Weld groups of members occurring in a single line in staggered sequence to minimize distortion of the structural frame.
3. Faulty and Defective Welding: Welds failing to meet AWS standards and the Contract Documents shall be rejected and remade at Contractor expense. All welds showing cracks, slag inclusion, lack of fusion, bad undercut or other defects, ascertained by visual or other means of inspection shall be removed and replaced with conforming work.
4. Minimum Weld Strengths: All welds shall match the minimum weld sizes recommended by AISC. Details of fabrication not specifically shown shall match similar details which are specifically shown. All bevel and groove welds shall be full penetration unless size is noted otherwise.
5. Threaded studs, headed studs, and deformed bar anchors shall be full-fusion welded conforming to ASW D1.1.

J. Camber: Fabricate all beams cambered as indicated on the drawings.

1. Fabricate beams without camber for installation with any "natural" crown up.
2. Exception: Fabricate cantilever beams with "crown" down.

K. Grinding: Grind smooth the following structural steel and connections;

1. Exposed cut ends of structural and fabricated shapes.
2. All welds exposed to view.
3. Mitered and fit-up corners and intersections.

L. Back-Up Bars: Required for all complete penetration welds.

M. Bolt Holes: Edge, end distances and spacing shall conform to dimensions shown on the drawings, and as follows;

1. Round: Size indicated and 1/16 inch maximum oversize, except 1 inch and larger bolts may have 1/8 inch maximum oversize.
2. Slotted: At locations specifically noted on the drawings, provide size indicated and 1/16 inch by 1/4 inch oversize slotted in direction perpendicular to applied loads.
3. Holes in base plates for anchor bolts may be 1/8 inch oversize.

N. Comply with Section 10 of AISC 303 for architecturally exposed structural steel (AESS). See architectural & structural drawings for locations of AESS.

2.04 FINISHES

A. Steel exposed to inclement atmospheric conditions or weather (such as coastal moisture or seasonal rain) shall be sufficiently primed or otherwise protected against corrosion. If condition of steel is suspect due to weathering/corrosion, Contractor shall bear cost of inspection to determine if excessive corrosion is present and if steel member(s) requires repair or replacement. Contractor shall bear cost of repair or replacement.

B. Prepare and finish structural and miscellaneous steel component surfaces as follows, unless a higher standard-of-care is determined necessary per item A:

1. Unpainted, interior, dry exposure surfaces need not be primed.
2. Finished painted, interior, dry exposure surfaces:
   a. Surface Preparation: SSPC-SP2 Hand-Tool and/or SP3 Power-Tool Cleaning. Apply Primer Type A. Field touchup with same primer.
   b. Where jobsite exposure is expected to exceed 6 months, SSPC-SP6 / NACE No. 3 Commercial Blast-Cleaning is required. Apply Primer Type B or C. Field touchup with same primer.
3. Finish painted surfaces with exterior exposure, interior exposure subject to wet conditions or fumes, or surfaces to receive high performance finish coatings (for example epoxy or urethane coatings).
   a. Surface Preparation: SSPC-SP6 / NACE No. 3 Commercial Blast-Cleaning to create a dense, uniform angular surface profile of 2.0 mils minimum. For severe (immersion) exposure, SSPC-SP10 / NACE No. 2 Near-White Blast-Cleaning is required.
   b. Apply Primer Type B. Field touchup with same primer.
4. Surfaces to be fire proofed need not be primed unless required by the fireproofing manufacturer or if jobsite exposure is expected to be inclement per item A. Where unprimed steel is to receive fireproofing, prepare steel surface as required by fireproofing manufacturer. If fireproofed surfaces are to be primed, provide primer as follows:
   a. Surface Preparation: SSPC-SP3 Power-Tool Cleaning.
   b. Apply Primer Type C. Field touchup with same primer.

5. Exterior exposed (unpainted) surfaces and as otherwise indicated to receive galvanizing:
   a. Galvanize per ASTM A123 Class 55 minimum. Passivation agents are not permitted on galvanized metal that is to be painted. Provide vent holes per ASTM A385 at closed sections (such as HSS). Submit proposed location of vent holes for review by Engineer.
   b. Connection hardware shall be hot-dip galvanized per ASTM A153 or F2329. Mating bolts and nuts shall receive the same zinc-coating process.
   c. Repair all uncoated, damaged, or altered galvanized surfaces per ASTM A780.

C. Do not prime the following surfaces unless otherwise indicated:

1. Connections to be field welded.
2. Steel in contact with concrete.
3. Surfaces to receive welded metal decking.

D. Do not cover up work with finish materials until inspection is complete and work is approved by the Testing Agency.

2.05 SOURCE QUALITY CONTROL

A. An independent Testing Agency will perform source quality control tests and submit reports, as specified in pertinent sections of Division 01.

B. Steel Materials Testing:

1. No testing is required for materials identified in accordance with CBC 2202A.1 (heat number, grade stencil, etc.).
2. Unidentified steel- General: Test all structural shapes. In addition, test to verify Fy and Fu values when engineering requirements exceed Fy = 25 ksi for design.

C. Shop Welding Inspection:

1. Testing Agency shall inspect and certify all structural welds.
2. Welder Qualifications: Welding inspector shall verify that all the welders are properly qualified prior to steel fabrication and state the qualifications of each welder in the welding inspection report.
3. Welding Inspection: Continuous inspection required unless otherwise noted below. Comply with requirements of AWS D1.1.
   a. Welding Inspector shall check all welds, materials, equipment and procedures.
   b. Welding Inspector shall provide reports certifying the welding is as required and has been done in conformity with the plans, specifications and codes.
   c. Welding Inspector shall use radiographic, ultrasonic, magnetic particle, or any other necessary aid to visual inspection to assure adequacy of welds. Ultrasonic Testing (UT) shall be required for all complete joint penetration (CJP) welds of material 5/16 inch thick or greater.
4. Periodic Inspection Acceptable:
   a. Single pass fillet welds not exceeding 5/16 inch.

D. Bolts, Nuts, and Washers: Provide samples to Testing Agency for required testing, at no additional cost.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that conditions are appropriate for erection of structural steel and that the work may properly proceed.

3.02 ERECTION

A. Erect structural steel in compliance with AISC 303.

B. Framing:

1. Erect all structural steel true and plumb.
2. Verify proper final alignment prior to making final connections.

C. Field Connections:

1. Workmanship of field bolted and welded connections shall conform in all respects to methods and tolerances specified for fabrication.
2. Field weld components indicated on shop drawings. Sequence field welds to minimize built-up stress and distortion of the structural frame. Verify sequence with Engineer. Coordinate field welding schedule with Testing Laboratory.
3. Welded Studs: Install in accordance with manufacturer's instructions and structural welding code AWS D1.1.

D. Templates: Provide bolt setting templates for all anchor bolts. Provide instructions for the setting of anchors and bearing plates, verify these items are set correctly as work progresses.

E. Column base plates: Set level to correct elevations, support temporarily on steel wedges, shims, or leveling nuts where shown, until the supported members are plumbed and base plate is grouted.

1. Grout solid the full bearing area under base plates prior to installation of floor and/or roof decks.
2. Comply with manufacturer's instructions for high strength grout. Trowel grouted surfaces smooth, splaying neatly to 45 degrees.

F. Bolting:

1. Inspect mating surfaces to ensure that bolt head and nut will have full bearing and that metal plies will mate flush between bolts.
2. Install bolts in matching holes. Do not distort metal or enlarge holes by drifting during assembly. Remake mismatched components to achieve tolerances indicated.
3. Holes mismatched in excess of 1/8 inch will be rejected.
4. Holes mismatched less than 1/8 inch may be reamed to the next larger size bolt.
5. Do not enlarge holes by flame cutting or air/arc (“plasma“) cutting.
6. Provide flat washer(s) at over-size holes.

7. Provide washer at bolt head and nut where connected part is less than ¼ inch thick.
8. Provide ASTM F436 beveled washers when the slope of the surfaces of parts in contact with the bolt head or nut is greater than 1:20.
9. Do not install bolts with damaged threads.
10. Threads shall commence outside of the shear plane.
11. Machine Bolts (MB): Install and tighten to a snug condition (ST) such that laminated surfaces bear fully on one another, using an impact wrench or "full effort" of an installer using a standard spud wrench.

G. Supports, Shoring and Bracing: Allow for erection loads and provide sufficient temporary bracing to maintain structure in safe condition, plumb, and in true alignment until completion of erection and installation of permanent bracing. Conform to requirements of all applicable laws and governing safety regulations. Resist imposed loads, including those of stored materials and equipment.

1. Provide all temporary supports, shoring and bracing necessary to achieve work of tolerances indicated.
2. Provide all necessary temporary flooring, planking and scaffolding required for erection of steel, and support of erection machinery.
3. Construction Loading: Do not overload the structure or temporary supports with stored materials, equipment or other loads.
4. Maintain temporary bracing and shoring until work is complete, and longer as required to ensure stability and safety of structure.

H. Do not make final connections until structure is aligned to meet specified tolerances.

3.03 ERECTION TOLERANCES

A. Maximum Variation From Plumb: 1/4 inch per story, non-cumulative.

B. Maximum Offset From True Alignment: 1/4 inch.

3.04 FIELD QUALITY CONTROL

A. The independent Testing Agency will perform field quality control tests, as specified in pertinent sections of Division 01.

B. Field Welding Inspection: Conform to all requirements of section SOURCE QUALITY CONTROL.

1. Inspect mating surfaces.
2. Test all materials prior to use. Use only materials meeting specified requirements.

3.05 ADJUSTING

A. Touch-up damaged finishes with compatible specified primer.

B. Replace defective or damaged work with conforming work. Replace all defective work at Contractor's expense.

C. Straighten materials by means that will not injure the materials.

D. Replace defective or damaged work which cannot be corrected in the field with new work, or return defective items to the shop for repair.

E. Architect/Engineer shall review all proposals for the repair or replacement of damaged, defective, or missing work.

F. Pay expenses incurred by Owner for Architect/Engineer's costs for (re-)design and obtaining approvals of Authorities Having Jurisdiction (AHJ) necessitated by incomplete, inefficiently scheduled, improperly performed, defective or nonconforming work, as specified in pertinent sections of Division 01.

G. Pay expenses due to re-testing and re-inspection necessitated by incomplete, inefficiently scheduled, improperly performed, defective or nonconforming work, as specified in pertinent sections of Division 01.

3.06 CLEANING AND PROTECTION

A. Clean all surfaces upon completion of erection; leave free of grime and dirt. Remove unused materials, tools, equipment and debris from the premises and leave surfaces broomed clean.

B. Protect work from damage by subsequent operations.

END OF SECTION

SECTION 05 5000
METAL FABRICATIONS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. All miscellaneous metal fabrications not classified as structural steel.

B. Iron and steel fabrications for wood or metal framing, including bracing.

C. Inserts and anchorages: Furnish only, inserts and anchoring devices for installation of miscellaneous metal work. Provide setting drawings, templates, instructions and directions for installation of anchorage devices. Coordinate delivery with other work.

D. Miscellaneous nonferrous metal items not specified under other sections.

E. Fabrication and installation of metal work, including shop and field welding, drilling, cutting, connecting and shop painting.

F. Miscellaneous shapes, plates, angles, clip angles, supports, bolts, and specialty iron and steel items indicated and as necessary to complete the work, including, but not limited to, the following:
   1. Pipe sleeves.
   2. Steel pipe rain water leaders and brackets.
   3. Pipe bollards.

1.02 RELATED REQUIREMENTS

A. Pertinent Sections specifying Volatile Organic Compound (VOC) Content Restrictions.

B. Section 05 1200 - Structural Steel.

C. Division 06 Sections: Installation of anchorage and support items. Framing connectors for wood framing.

D. Section 07 6200 - Sheet Metal Flashing and Trim

E. Section 08 1113- Steel Doors and Frames.

F. Division 09 Sections: Metal-framed anchorage and support items.

G. Refer to pertinent sections of Division 09 for interior and exterior painting

H. Other sections requiring metal fabrications or referencing this section for fabrication and installation.

I. Pertinent Division 22, 23 and 26 sections: Sleeves and inserts for mechanical piping and ducts, and electrical conduit, bracing and support of mechanical and electrical equipment.

J. Pertinent sections of Division 33 specifying storm drain piping requiring connection to rain water leaders.

1.03 REFERENCE STANDARDS

A. AAMA 2605 - Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels.

B. ASTM A36/A36M - Standard Specification for Carbon Structural Steel.

C. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.

D. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.

E. ASTM A283/A283M - Standard Specification for Low and Intermediate Tensile Strength Carbon Steel Plates.

F. ASTM A307 - Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60 000 PSI Tensile Strength.

G. ASTM A500/A500M - Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.

H. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

I. ASTM A1011/A1011M - Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength.

J. ASTM B209/B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.

K. 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.

L. ASTM E 935 - Test Methods for Performance of Permanent Metal Railing Systems and Rails for Buildings.

M. AHDGA - American Hot Dip Galvanizing Association.

N. NAAMM MBG 531 - Metal Bar Grating Manual; The National Association of Architectural Metal Manufacturers; 2000 (ANSI/NAAMM MBG 531).

O. AWS A2.4 - Standard Symbols for Welding, Brazing, and Nondestructive Examination.

P. AWS D1.1/D1.1M - Structural Welding Code - Steel.

Q. AWS D1.2/D1.2M - Structural Welding Code - Aluminum.

R. SSPC-Paint 15 - Steel Joist Shop Primer/Metal Building Primer.

S. SSPC-Paint 20 - Zinc-Rich Primers (Type I, "Inorganic," and Type II, "Organic").

T. SSPC-SP 2 - Hand Tool Cleaning.

U. SSPC (PM2) - Painting Manual, Vol. 2, Systems and Specifications; Steel Structures Painting Council.

V. ADA Standards - Americans with Disabilities Acat (ADA) Standards for Accessible Design; 2010.

W. California Code of Regulations, Title 24, Part 2, California Building Code (CBC), International Building Code.

X. California Code of Regulations, Title 24, Part 11, California Green Building Standards Code, “CAL-Green”.

1.04 SUBMITTALS

A. See Section 01 3300 - Submittals, for submittal procedures.

B. Shop Drawings: Indicate profiles, sizes, connection attachments, reinforcing, anchorage, size and type of fasteners, and accessories. Include erection drawings, elevations, and details where applicable.
   1. Include details of cuts, connections, camber, holes, and other pertinent data.
   2. Indicate welded connections using standard AWS A2.4 welding symbols. Indicate net weld lengths, sizes and types.

C. Product Data: For each type of product indicated, demonstrate compliance with specified attributes.
   1. Catalog cuts for all manufactured items demonstrating compliance with specified requirements.
   2. Structural steel primer paint.

D. CAL-GREEN Submittals: Product Data – VOC Limits: For adhesives sealants, fillers, primers and coatings, documentation including printed statement of VOC contents, comply with limits specified in related section.

E. Welding procedures: For welding structural steel as required in accordance with AWS D1.1, submit prequalified joints.

F. Certification: Copy of approved fabricator's license.

G. Manufacturer's data: Submit certified copies of the following prior to any fabrication. Include laboratory test reports and other data as required to show compliance with these specifications, including specified standards.
   1. Structural steel, including certified copies of mill reports covering the chemical and physical properties.
   2. Unfinished bolts and nuts.

1.05 SUBMITTALS FOR RECORD

A. Section 01 3300 - Submittals: Procedures for submittals. Architect will not review these submittals.

B. Welders' Certificates: Provide certification that welders to be employed in the work have satisfactorily passed AWS qualification tests within the previous 12 months, and are qualified in the State of California.

1.06 QUALITY ASSURANCE

A. Design criteria: Design, fabricate and erect miscellaneous metal items complete, in accord with AISC's Design, Fabrication and Erection of Structural Steel for Buildings.

B. Coordinate the Work under provisions of pertinent sections of Division 01.

C. Welder Qualifications: Welding processes and welding operators qualified in accordance with AWS D1.1/D1.1M and AWS D1.2/D1.2M and dated no more than 12 months before start of scheduled welding work.

D. Welding Inspection: All structural welding shall be specially inspected according to CBC 1704A and DSA IR-17-3 except as otherwise provided below.
   1. Special inspection shall not be required if welding is done in an approved fabricator’s shop licensed in accordance with CBC 1704A.

1.07 PRODUCT HANDLING

A. Comply with pertinent provisions of Section 01 6000.

B. Deliver anchor bolts, anchorage devices, sleeves and inserts, which are to be incorporated into other work in ample time to avoid delay.

C. Store materials to permit easy access for inspection and identification. Store steel materials off the ground, using pallets, platforms or other supports. Protect steel members, package materials and identifications from deterioration.

D. Store material to prevent twisting, bending, or abrasion, and to provide ventilation. Slope metal sheets to ensure drainage.

E. Prevent contact with materials which may cause discoloration or staining. Clean materials which are discolored or stained.

F. Replacements: In the event of damage, immediately make repairs and replacements necessary to the approval of the Architect and Division of the State Architect without change in contract amount or time.

PART 2 PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

A. VOC Limits for adhesives, sealants, fillers, primers and coatings . Comply with limits specified in related section.

2.02 MATERIALS

A. General: Furnish new tested stock complying with reference specifications.

B. Steel Sections: ASTM A36/A36M.

C. Steel Tubing: Hot formed, welded or seamless, ASTM A 501, or cold-formed, ASTM A500, Grade B cold-formed.

D. Plates: ASTM A283/A283M.

E. Pipe: ASTM A53/A53M, Grade B Schedule 40, black and hot-dip galvanized finish, as indicated.

F. Slotted Channel Framing: ASTM A653/A653M, Grade 33.

G. Slotted Channel Fittings: ASTM A1011/A1011M.

H. Bars and bar-size shapes: ASTM A 663, Grade 65, or ASTM A 36.

I. Sheets: ASTM A 446 with zinc-coating in accord with ASTM A 525, G-90.

J. Hot-rolled carbon steel bars and bar-size shapes: ASTM A 575, Grade as selected by fabricator.

K. Steel plate, checkered pattern: Steel with checkered (diamond) pattern, galvanized, ASTM A 525, coating designation G90.

L. Carbon steel sheets and strips:
   1. Hot-rolled: ASTM A 568 and ASTM A 569, pickled and oiled.
   2. Cold-rolled: ASTM A 366.
   3. Galvanized sheets: ASTM A 525, or A 526 with G-90 zinc coating

M. Masonry anchorage devices: Expansion shields, FS FF-S-325.

N. Toggle bolts: Tumble-wing type, FS FF-B-588, type, class and style as required.

O. Fasteners: Select fasteners for type, grade and class required for the installation of miscellaneous metal items, compatible for material in contact. Provide hot-dipped galvanized at exterior exposures or when in contact with pressure-treated wood materials..

P. Bolts, Nuts, and Washers: ASTM F3125/F3125M, Type 1, plain.
1. Standard bolts and nuts: Regular square or hexagon head type, ASTM A 307, Grade A.
2. Lag bolts: Square head type, galvanized.
3. Machine screws: Cadmium-plated steel, ASTM F 468 and FS FF-S-92.
4. Plain washers: ANSI B18.22.1 and FS FF-W-92.
5. Anchors: Manufactured by Ramset Fastening System Division, Olin Corp., Rawlplug Co., Diamond Division, General Cable, Hilti or ITT Phillips Drill Division. Provide type best suited for intended application and indicate on shop drawings.
6. Lock washers: FS FF-W-84, helical spring type carbon steel.
7. Anchor Bolts: ASTM A307.

Q. Brackets, flanges and anchors: Cast or formed metal of the same type material and finish as supported rails, unless otherwise indicated.

R. Concrete inserts: Threaded or wedge type, galvanized ferrous castings, either malleable iron ASTM A 47 or cast steel ASTM A 27. Provide bolts, washers and shims as required, hot-dip galvanized, ASTM A 153.

S. Welding Materials: AWS D1.1; type required for materials being welded. Comply with AWS D1.1, D1.3 and CBC Title 24 Part 2.

T. Non-shrink Grout for Guardrail post inserts: Masterflow 928 Grout by Master Builders or equal.

U. Zinc-rich paint (cold galvanizing): ZRC-221 by ZRC WorldWide, or equal.

V. Shop and Touch-Up Primer: SSPC-Paint 15, complying with VOC limitations of authorities having jurisdiction, compatible with intermediate and finish coatings specified in other Sections.

W. Touch-Up Primer for Galvanized Surfaces: ZRC Zero-VOC by ZRC Wordwide, or equal, compatible with intermediate and finish coatings specified in other Sections

2.03 FABRICATION

A. Field Measurements: Take field measurements prior to preparation of shop drawings and fabrication, where possible, to ensure proper fitting of the work. Allow for trimming and fitting where field conditions preclude accurate measurements or where final dimensions cannot be established prior to fabrication.

B. Fit and shop assemble items in largest practical sections, for delivery to site.
1. Minimize field splicing and site assembly. Disassemble only to the extent necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation.
2. Complete assembly, including welding, before start of finishing operations. Provide finish surfaces of members exposed in the final structure free of markings, burrs, and other defects.
3. Use materials and items necessary to complete the work, using the best materials and methods ordinarily used for this type of work whether explicitly specified, indicated and detailed or not.

C. Fabricate items with joints tightly fitted and secured.

D. Machine-roll components or elements required to be curved or radiused. Do not field bend or "walk-down". Provide curves true to indicated dimensions, minimizing joints; segmented fabrication not allowed unless specifically noted.

E. Continuously seal joined members by continuous welds.
   1. Grind exposed joints flush and smooth with adjacent finish surface. Make exposed joints butt tight, flush, and hairline. Ease exposed edges to small uniform radius.
   2. Exposed Mechanical Fastenings: Flush countersunk screws or bolts; unobtrusively located; consistent with design of component, except where specifically noted otherwise.
   3. Supply components required for anchorage of fabrications. Fabricate anchors and related components of same material and finish as fabrication, except where specifically noted otherwise.

F. Use only materials smooth and free of blemishes including pitting, seam marks, roller marks, trade names and roughness.

G. Fabricate steel members in accordance with drawings and as recommended by A.I.S.C. Verify all dimensions with field conditions prior to fabrication.
   1. Clean, prepare and shop-prime steel members. Do not prime surfaces to be field welded or in direct contact with concrete.
   2. Galvanizing: ASTM A153, ASTM A123; all steel exposed to weather.
   3. Cutting and drilling: Provide holes for fabrication and for attachment of work specified elsewhere. Countersink holes for bolts and screws.

H. Welding: Comply with the AWS Structural Welding Code, and with the following:
   1. Welds shall be free from excessive oxides, nonmetallic inclusions, and gas pockets.
   2. Welds shall be uniform in section, smooth in weld metal, feather edged, without overlaps.
   3. Surfaces to be welded shall be free from loose scale, rust, paint, or other foreign matter.
   4. Tack welds located in way of design welds shall be melted out when encountered in final welding, or shall be thoroughly fused in with final weld.
   5. Use proper care and procedures to minimize locked-in stress and distortion.
   6. Welder qualification requirements, welding procedure and welding electrodes shall conform to CBC 2204A and most recent editions of AWS D1.1, D1.3; CBC IR-17-3.

2.04 STEEL PIPE RAIN WATER LEADERS (RWL)

A. Steel pipe or tube rain water leaders: Fabricate to dimensions and details shown, with welded joints ground smooth and flush, hot-dipped galvanized.
   1. Structural Performance: Rain water leaders shall withstand the following structural loads:
      a. Concentrated Load: 200 lbs., applied non-concurrently, in any direction.
      b. Uniform Load:50 lb/ft. applied simultaneously in both vertical and horizontal direction.
      c. Concentrated loads and uniform loads need not be assumed to act concurrently.
   2. Shop fabricate to greatest extent possible.
   3. Interconnect rainwater leader members by butt-welding or by welding with internal connectors, unless otherwise indicated.
   4. At intersections and changes of direction, notch ends of intersection members to fit contour of pipe and weld all around. Seal weld all joints water-tight.
   5. Form changes in direction of water flow by mitered connections, maintaining cylindrical cross-section of pipe throughout bend without buckling, twisting, cracking or otherwise deforming exposed surface of pipe.

6. Provide support brackets of sizes and types indicated and with configurations required to suit substrates and framing spacing.

2.05 FINISHES - STEEL

A. Hot-dip galvanize steel items fully or partially exposed to exterior conditions or to wet environments such as locker rooms, food service, custodial or toilet rooms. Prime paint steel items in all other locations.
   1. Exceptions: Galvanize items to be embedded in concrete or masonry.
   2. Exceptions: Do not prime surfaces in direct contact with concrete, where field welding is required, and items to be covered with sprayed fireproofing.

B. Prepare surfaces to be primed in accordance with SSPC-SP2 SSPC SP-3, "Power Tool Cleaning", minimum. Remove oil, grease and similar contaminants in accordance with SSPC SP-1 "Solvent Cleaning".
   1. Review coating systems specified in other Sections. Provide level of substrate surface finish required or recommended by coating manufacturer for each specified system.

C. Prime Painting: One coat, primer in accordance with the coating manufacturer's printed instructions. Select products compatible with coating systems specified in other Sections.

D. Galvanizing of Non-structural Items: Galvanize after fabrication to ASTM A123/A123M requirements.

E. Superior Performance Organic Coating System: AAMA 2605 multiple coat, thermally cured polyvinylidene fluoride system; color as selected from manufacturer's standard colors.

2.06 FABRICATION TOLERANCES

A. Squareness: 1/8 inch maximum difference in diagonal measurements.

B. Maximum Offset Between Faces: 1/16 inch.

C. Maximum Misalignment of Adjacent Members: 1/16 inch.

D. Maximum Bow: 1/8 inch in 48 inches.

E. Maximum Deviation From Plane: 1/16 inch in 48 inches.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that field conditions are acceptable and are ready to receive work. Correct conditions detrimental to the proper and timely performance of this work before proceeding with installation. Commencement of work indicates acceptance of substrates.

3.02 PREPARATION

A. Clean and strip primed steel items to bare metal where site welding is required.

B. Supply setting templates to the appropriate entities for steel items required to be cast into concrete or embedded in masonry.

3.03 INSTALLATION - GENERAL

A. Install items plumb and level, measured from established lines and levels, accurately fitted, free from distortion or defects.

B. Provide temporary bracing or anchors in formwork for items which are to be built into concrete or similar construction.

C. Provide for erection loads, and for sufficient temporary bracing to maintain true alignment until completion of erection and installation of permanent attachments.

D. Fastening to In-Place Construction: Provide anchorage devices and fasteners where necessary for securing miscellaneous metal items to in-place construction; including threaded fasteners for concrete inserts, toggle bolts, through-bolts, lag bolts, wood screws, and other connectors as required.

E. Cutting and fitting:
1. Perform cutting, drilling and fitting required for installation of miscellaneous metal items. Fit exposed connections accurately together to form tight hairline joints.
2. Weld connections which are not to be left as exposed joints, but cannot be shop welded because of shipping size limitations.
3. Do not weld, cut or abrade the surfaces of exterior units which have been hot dip galvanized after fabrication, and are intended for bolted or screwed field connections.

F. Field weld components as indicated on drawings or as required to assemble shop-fabricated work on site. If field-welding is not specifically indicated on drawings, option is the Contractor's for efficient assembly.

G. Perform field welding in accordance with AWS D1.1/D1.1M.

H. Obtain approval prior to site cutting or making adjustments not scheduled.

I. Immediately after erection, clean and prime welds, abrasions, and surfaces not shop primed or galvanized, except surfaces to be in contact with concrete with the same materials used for shop finishing.

3.04 INSTALLATION - SPECIFIC

A. Rainwater Leader Installation: Plumb units in each direction.
1. Accurately locate rainwater leaders in proximity to underground storm drain connections. Coordinate with work of other sections for accurate placement and alignment of the work.
2. Secure Rainwater Leaders to walls using wall brackets. Secure brackets and return fittings as follows:
   a. Wood framing: Stainless steel lag screws.
   b. Steel Framing: Stainless steel threaded self- tapping screws.
   c. Masonry or Concrete: Stainless steel threaded tap-in anchor bolts.
   d. Structural Steel column or member: Weld.
3. Locate supporting brackets at approximately equal intervals, not less than 5'-4" on center, not less than 18 inches from ends, with a minimum of three per supports per unit, and additional brackets within 18 inches of change in direction or substrate mounting material.
4. Connect rain water leaders to storm drains with water-tight connection.

3.05 TOLERANCES

A. Maximum Variation From Plumb: 1/4 inch per story, non-cumulative.

B. Maximum Offset From True Alignment: 1/4 inch.

C. Maximum Out-of-Position: 1/4 inch.

3.06 PROTECTION

A. Protect finished work from damage until acceptance by Owner.

B. Repair and replacement: In the event of damage, immediately make repairs and replacements necessary to satisfaction of Architect without change in contract sum or time.

3.07 CLEAN-UP

A. When work of this section has been completed, and at such other times as may be directed, remove all trash, debris, surplus materials, tools and equipment from site.

B. Comply with pertinent requirements of Division 01 sections specifying Contract Closeout.

END OF SECTION 05 5000

SECTION 06 1000

ROUGH CARPENTRY

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes: All labor, materials and equipment and all operations required to complete all rough carpentry and structural framing as indicated on the drawings; to produce shapes and configurations as shown, as required; and as specified herein, including:

1. Structural wall and roof framing.
2. Wall and roof sheathing.
3. Rough hardware, framing connectors and fasteners.
4. Treatment of wood.
5. Concealed wood blocking for support of toilet and bath accessories, wall cabinets, wood trim, and other work requiring supporting blocking.
6. Miscellaneous wood nailers and furring strips, including roof applications, other wood framing, furring, shims or blocking as required to complete the work.

B. Related Sections:

1. Pertinent sections of Division 01 specifying Quality Control and Testing Agency services.
2. Pertinent sections of Division 01 specifying Structural Product Requirements: Structural Product Options, Substitution procedures and limitations, transportation, handling and storage.
3. Pertinent sections of Division 03 specifying wood formwork construction and/or setting anchors in concrete.
4. Pertinent section of Division 06 specifying wood construction and materials.
5. Pertinent sections of other divisions specifying steel or concrete construction.

1.02 REFERENCES

A. California Code of Regulations, Title 24, latest adopted edition (herein noted as CBC): Chapter 23 Wood.

B. American National Standards Institute (ANSI) / American Wood Council (AWC) “NDS - National Design Specification for Wood Construction”.

C. National Institute of Standards and Technology (NIST) / Engineered Wood Association (APA) “PS 1 - Voluntary Product Standard for Structural Plywood”.

D. NIST / APA “PS 2 - Performance Standard for Wood-Based Structural-Use Panels”.

E. NIST “PS 20 - American Softwood Lumber Standard”.

F. Redwood Inspection Bureau (RIS) “Standard Specifications for Grades of California Redwood Lumber”.

G. West Coast Lumber Inspection Bureau (WCLIB) “Standard Grading Rules for West Coast Lumber No. 17”.

H. Western Wood Products Association (WWPA) "Western Lumber Grading Rules".

I. American Wood Preservers Association (AWPA) "Book of Standards".

1.03 SUBMITTALS

A. Submit in accordance with pertinent sections of Division 01 specifying submittal procedures. Submit for review prior to fabrication. Submittals that do not meet these requirements will be returned for correction without review.

1. Substitutions for products specified require conformance to substitution requirements in Division 01.
2. Review of materials and hardware for substitution to products specified is at the additional expense of the Contractor.

B. Limitation of Review: Structural Engineer's review will be for general conformance with design intent as indicated in the Contract Documents and does not relieve Contractor of full responsibility for conformance with the Contract Documents. The General Contractor shall review and approve shop drawings prior to submittal to the Architect/Engineer.

C. Product Data:

1. Submit manufacturer's product data, specifications, and installation instructions for & location of framing connectors, wood preservative materials, application instructions, and fasteners. Include complete, accurate equivalence data when submitting alternate products to those specified. Provide samples of these items upon request.
2. Submit product data and current ICC-ES report for machine-driven nails, fasteners, and equipment, including dimensions of all fasteners, including head, shank diameter and length.

D. Shop drawings: For manufactured wood products, submit each building as a complete unit. Do not mix components from multiple buildings or units of work in a submittal. Include all of the following;

1. Indicate profiles, sizes, and spacing locations of structural members.
2. Cross-reference all shop drawing detail references to contract document detail references.
3. Secure all field measurements as necessary to complete this work.

E. Manufacturer's Certificate: Submit all certifications of physical and chemical properties of materials as specified below in Article titled QUALITY ASSURANCE.

1. Certify that wood products supplied for rough carpentry meet or exceed specified requirements, including specified moisture content.

1.04 QUALITY ASSURANCE

A. Requirements of Regulatory Agencies, refer to pertinent sections of Division 01 and CBC Chapter 17A.

B. All tests shall be performed by a recognized testing agency as specified in pertinent sections of Division 01.

C. Inspection of fabricators is required per CBC 1704A.2 unless fabricator is registered and approved by the building official. Wood product quality standards:

1. All wood products to comply with article REFERENCES.
2. Factory-mark each piece of lumber and sheathing with type, grade, mill, and grading agency, except omit marking from surfaces to be exposed with transparent finish or without finish.
3. Sheathing panels to be marked by APA (The Engineered Wood Association).

D. End-Jointed lumber shall not be used.

E. Hardware and engineered wood products shall have current ICC ES Evaluation/research reports that are equivalent to products specified.

F. Employ competent workers experienced in work of the types specified and required.

1.05 MOCK-UP

A. Construct mock-ups of machine-driven nailed sheathing panels using submitted products and demonstrating conditions indicated. Locate where directed.

B. Mock-up shall be accepted and approved by the Inspector of Record (IOR) before commencement of machine-driven nailing activity.

C. Accepted mock-up shall remain exposed for reference for the duration of machine-driven nailing activity.

D. Remove all mock-ups at the completion of the work.

1.06 DELIVERY, STORAGE AND HANDLING

A. Comply with pertinent requirements of Division 01.

B. Delivery: Time delivery and installation of carpentry products to avoid delaying other trades whose work is dependent on or affected by this section and to comply with moisture content, protection and storage requirements.

C. Keep materials dry at all times. Protect against exposure to weather and contact with damp or wet surfaces. Stack lumber and sheathing panels to prevent deformation and provide air circulation within stacks.

1. Store materials for which a maximum moisture content is specified only in areas where relative humidity has been reduced to a level where specified moisture content can be maintained.
2. Handle and store materials above ground to prevent damage, contamination, or accumulation of dirt or foreign materials.
3. Provide special protection for horizontal sheathing panels. Deformation of panels due to moisture is not acceptable.

1.07 PROJECT/SITE CONDITIONS

A. Verify all conditions at project site affecting the work; work to field dimensions as required. Coordinate carpentry installation with size, location, and installation of service utilities.

B. Sequence rough carpentry installation activities to allow sufficient time for:

1. Review of all submittals.
2. Fabrication of mock-ups and required durations as specified.
3. Indicate submittal review, procurement, mock-up, and testing activities in the project schedule prior to the start of installation. Installation durations shall be based on hand-nailed installation methods specified.
4. Attainment of specified maximum lumber moisture content.

PART 2 PRODUCTS

2.01 DIMENSIONED LUMBER

A. General

1. Size per industry standards for nominal sizes shown; S4S (sanded four sides).
2. Warped/twisted and excessively checked members shall not be used regardless of grade marks.
3. At the Contractor's option, engineered lumber of equivalent size and material properties may be substituted for solid sawn lumber where material is difficult to source due to length, availability, etc. Submit proposed substitution to Engineer for review and approval by DSA prior to purchasing materials.

B. Moisture content of framing:

1. All lumber to be maximum 19% at time of fastener installation. All lumber to be maximum 19% at time of close-in, unless noted otherwise.
2. The Owner's Testing Laboratory will test for moisture content prior to commencement of close-in.
3. The Contractor shall recognize that excessive shrinkage of lumber results from excess moisture content at the time of installation. The Contractor will compensate for use of such lumber by waiting for acceptable moisture content before close in and/or by replacing/repairing lumber that has sagged, twisted, or warped prior to close in.
4. Deviation from this specification would require structural redesign of connections and fasteners.

C. Sills/ledgers on concrete: No. 2 pressure treated Douglas Fir and as called for on the drawings.

D. Interior structural framing shall be Douglas Fir (D.F.) with grades as noted below, unless otherwise specified on the drawings. All grades are per WCLIB standard grading rules.

1. All permanently exposed (interior or protected from weather) framing shall be select structural grade with no box heart.
2. Except per 1 above, unless noted otherwise, minimum grades are:
   a. Roof joists/rafters (2x) and 2x8 & larger studs & plates: D.F. No. 1

b. 2x4 and 2x6 studs and plates: D.F. No. 1
c. 4x and larger: D.F. No. 1
d. Blocking: D.F. No. 2
e. 6x8 and larger posts and beams may be SGL/CGL per below unless noted otherwise on the drawings.

E. Exterior structural framing (exposed to weather) shall be redwood select structural grade or pressure treated D.F. No. 1, unless noted otherwise.

F. Framing not otherwise shown or specified: Douglas Fir construction grade per WCLIB paragraphs applicable to uses and sizes required.

2.02 MANUFACTURED LUMBER

A. Structural (Certified) Glued Lumber (SGL): SGL shall be manufactured following the American Lumber Standards Committee (ALSC) "Glued Lumber Policy" and meet the requirements of Voluntary Product Standard PS 20 "American Softwood Lumber Standard". Grading shall be per the West Coast Lumber Inspection Bureau (WCLIB) or Western Wood Products Association (WWPA). SGL shall be manufactured with waterproof adhesive. "Stud use only" SGL is not permitted.

1. Acceptable products:
   a. “RMT” by Rosboro.
   b. Approved equal.
2. Where specified for use on plan, SGL shall be entirely Douglas Fir lumber. SGL shall be grademarked to match the grade as would be specified for solid sawn lumber in the same location/use.
3. At the contractor's option, SGL may be substituted for solid sawn lumber. SGL species and grade shall match that for the solid sawn member. SGL shall not be substituted for glued-laminated (glulam) members.

B. Laminated Veneer Lumber (LVL): for use as joists, beams, blocking, or studs when so noted on the drawings. Conform to ICC AC 47. Minimum F_b = 2,600 PSI. Minimum E=2,000,000 PSI. Acceptable products:

1. “Microllam LVL” by Trus Joist, ICC ESR-1387
2. “Redlam LVL” by RedBuilt, ICC ESR-2993
3. Approved equal

2.03 STRUCTURAL SHEATHING PANELS

A. Plywood: Structural sheathing shall conform to product standard PS-1 or PS-2. All panels shall have a minimum bond classification of “Exposure 1” and bear the trademark of the Engineered Wood Association (APA) or other qualified agency. Grades shall be “Rated Sheathing” or “Structural 1” as required on the drawings.

B. Oriented Strand Board (OSB): All structural OSB shall be grade marked by a qualified agency for conformance with Product Standard PS-2 and shall be fabricated with exterior glue. Grades shall be as required on the drawings.

2.04 TREATED WOOD:

A. Treated Lumber and Plywood: Comply with requirements of AWPA Standard U1. See Standard U1 for "Use Category" designations. Do not provide higher Use Category lumber than that specified. Maximum moisture content shall be the same as required for "dimensioned lumber" as specified above.

B. Preservative Treated Lumber

1. General
   a. Preservatives shall be waterborne. Preservative retention rate shall be as required per AWPA Standards U1 & T1. Lumber shall be Douglas Fir No. 2 (or better). Cut faces of treated wood shall be brush treated (two complete applications) prior to installation.
   b. Lumber less than 8 inches above grade and lumber less than 6 inches above exterior hard-surface flatwork shall be treated.
   c. Each piece of wood shall be stamped by the wood preservative applicator to identify its treatment and preservative retention.
2. Lumber at interior, non-weather exposed locations installed adjacent to concrete or masonry shall be Use Category UC2. Examples include sill plates & ledgers and lumber in contact with roofing, flashing, or water proofing. Borate treated lumber meeting AWPA UC2 is acceptable in this application.
3. Lumber at exterior locations, not in contact with soil/ground, shall be Use Category UC3B. Examples include Douglas Fir decking and deck framing.
4. Lumber in contact with soil/ground shall be Use Category UC4A. Examples include timber retaining walls.
5. Poles, posts, and sheathing panels shall be treated as recommended by AWPA Standard U1 per use and exposure.
6. Maximum Volatile Organic Compound (VOC) content of field-applied preservative shall meet local air quality standards and the California Green Building Code. Provide either of the following:
   a. Copper Azole (CA-B) per ICC-ES AC326.
   b. Alkaline/Copper/Quaternary (ACQ).

C. Fire Retardant Treatment: Product and application process must be recommended by manufacturer of treatment as being suitable for painting. Application shall be by a California State Fire Marshal approved licensed contractor.

1. Exterior Type: Use Category UCFB, chemically treated, and pressure impregnated; capable of providing a maximum flame spread rating of 25 when tested in accordance with ASTM E84, with no evidence of significant combustion when test is extended for an additional 20 minutes both before and after accelerated weathering test performed in accordance with ASTM D2898.
   a. Treat exposed exterior rough carpentry items, including stairways, balconies, and covered walkways.
   b. Do not use treated wood in direct contact with the ground.
2. Interior Type: Use Category UCFA, low temperature (low hygroscopic) type, chemically treated, and pressure impregnated; capable of providing a maximum flame spread rating of 25 when tested in accordance with ASTM E84, with no evidence of significant combustion when test is extended for an additional 20 minutes.
   a. Treat rough carpentry items as indicated.

b. Do not use treated wood in applications exposed to weather or where the wood may become wet.

2.05 FASTENERS AND ACCESSORIES

A. General requirements for fasteners:

1. Fasteners shall be of adequate size, spacing, and number to resist design loads under intended use, and types shall be appropriate for the materials or conditions for which used.
2. Provide washers, pre-drilling, etc. as required for proper installation and to prevent damage to framing.
3. Fasteners shall be hot-dip galvanized (ASTM A153), mechanically galvanized (ASTM B695 class 55 minimum), stainless steel (type 303, 304, 305, or 316), silicon bronze, or copper by approved methods for the following applications:
   a. Exterior, exposed use.
   b. In contact with preservative or fire-retardant treated wood.
   c. Nails in contact with preservative treated wood containing ammonia shall be stainless steel.
4. Fasteners in moist corrosive atmosphere to be of stainless steel (type 303, 304, 305, or 316).
5. Where the retention level of ACQ or MCQ preservative is greater than 0.40 pcf, CBA-A preservative is greater than 0.41 pcf, or CA-B preservative is greater than 0.21 pcf, provide stainless steel fasteners (type 303, 304, 305, or 316).
6. All fasteners specified by manufacturer shall be installed in framing hardware, unless noted otherwise.
7. At borate treated lumber a clear zinc coating per ASTM F1941 is acceptable.

B. Nails and nailing not otherwise shown or specified:

1. Comply with requirements of governing building code.
2. For securing materials to hardened concrete or masonry provide hardened steel masonry nails or Simpson Strong-Tie “Titen” screws.
3. For framing and general woodwork: Common bright wire nails (not box nails) with centered full-round heads per ASTM F1667 including Supplement S1. 16d cement coated sinker nails may be used in lieu of common nails for framing, where noted on the drawings. Unless otherwise noted on drawings, nail sizes shall be as follows:
   a. 8d Common: 0.131”ø x 2-1/2” long with 0.281”ø head.
   b. 10d Common: 0.148”ø x 3” long with 0.312”ø head.
   c. 16d Common: 0.162”ø x 3-1/2” long with 0.344”ø head.
4. Nails for sheathing panels shall be of common wire with full round heads and shall be of sufficient length to fully develop the nails.
5. Machine-driven nails of all types must comply with the requirements of this section. All proposed nails shall match diameter and penetration of specified nails.
6. Staples shall conform to length and gauges specified and shall be installed to match specified patterns and spacing.
7. Power Actuated Fasteners (PAF): Use only as approved by the Architect/Engineer; operators shall be qualified.

C. Bolts: Malleable iron washers or steel plate washers, unless otherwise shown, shall be provided under all bolt heads and nuts.

1. Machine Bolts: ASTM A307 and ANSI/ASME B18.2.1, standard semi-finished machine bolts as shown or required. Nuts shall be standard size unless noted otherwise and shall be per ASTM A563.
2. Anchor bolts or threaded rod anchors shall conform to ASTM F1554, ASTM A307, or ASTM A36. Anchor bolts shall be headed or end in two nuts tightened against one another, unless noted otherwise. Provide embedded plate washer as indicated on drawings. No upset threads allowed. No L or J bolts allowed.

D. Lag screws: Standard hex lag screws per ANSI/ASME B18.2.1.

E. Wood screws: Standard wood screws per ANSI/ASME B18.6.1.

F. Power Actuated Fasteners (PAF): Hilti X-CP72, ICC ESR-2379; Simpson PDPAWL-300 MG, ICC ESR-2138.

G. Framing hardware: Fabricated sheet metal timber framing connectors shall be manufactured from painted or galvanized G90 steel by Simpson Strong-Tie (connectors specified on drawings are per Simpson Strong Tie, USP Lumber Connectors, or approved equivalent. Connectors shall be at least 16 gauge material, (1/8 inch plate materials where welded), unless otherwise noted, punched for nailing. All heavy hardware to be fabricated from A36 steel per Division 05, Metals. All hardware intended for exterior exposed use shall be galvanized per G185 ASTM A653 or stainless steel.

1. For contact with preservative or fire-retardant treated wood, provide minimum G185 galvanizing per ASTM A653.
2. Nails and nailing shall conform to the manufacturer's instructions with a nail provided for each punched hole. Nails to be used with framing accessories are subject to the requirements specified in this Section for fasteners and anchors.

2.06 SOURCE QUALITY CONTROL

A. The Testing Agency, as specified in the Article QUALITY ASSURANCE, will perform testing for moisture content of all lumber at time of fastener installation.

B. The Testing Agency will submit reports as specified in Division 01.

PART 3 EXECUTION

3.01 REQUIREMENTS FOR STRUCTURAL FRAMING

A. General

1. Refer to drawings for layouts, notes and details, provide framing as required; comply with governing building code requirements.
2. Provide framing to achieve true alignments as surfaces receiving finish materials.
3. It shall be the responsibility of the Contractor to provide and install all wood blocking, furring strips, or grounds detailed or required to provide anchorage for all finishes, accessories, fixtures, etc. as required to complete all work. All blocking and/or backing shall be securely bolted or otherwise anchored in place.
4. Contractor shall be responsible for layout of anchor bolts, and other hardware embedded in concrete when placed by other trades.

5. Provide and install all structural framing, blocking, fasteners, brackets, clips, etc. as required to complete work specified in the Construction Documents.

B. Framing

1. Sill Plates and Ledgers:
   a. Sill plates and ledgers on concrete shall be anchored with bolts, unless noted otherwise, shall have full bearing on concrete, and shall be placed for sheathing panel nailing as indicated. All bolt nuts shall be provided with a cut plate steel washer for bearing on wood.
   b. Provide a minimum of two sill anchor bolts per sill piece with a bolt no less than 4 ½" and no more than 12" from the end of the sill. Bolts to be 5/8" diameter x 12" (18" at curb) long at 48" on centers, unless otherwise shown or noted. Provide additional anchor bolts each side of a notch or hole, as per a typical plate splice, where notch or hole is in excess of 1/3 the plate width. At shear walls, provide a plate washer 3" x 3" x 0.229" minimum between the sill and nut at anchor bolts. Plate washer to extend within ½ inch of the structural wall sheathing. Offset and/or stagger anchor bolts, or provide larger plate washer as required.
   c. Anchor bolt holes in sill plates or ledgers shall be 1/16" maximum larger than anchor bolt.
2. Stud Walls and Framing:
   a. Cut studs and posts with square ends, unless otherwise shown or noted. All posts and beams shall be "cut to bear" unless otherwise detailed.
   b. All studs in walls shall be placed with the shortest dimension parallel to the run of the wall. Bearing studs shall extend full height to be the supporting framing as shown; non-bearing studs shall extend to the supporting framing.
   c. Provide double studs on each side of all openings, unless shown or noted otherwise.
   d. All openings in stud walls and partitions shall be framed with headers across the top, as shown, with a minimum size (6" nominal depth x stud width) resting on short cripple studs, and as shown on the drawings.
   e. All stud partitions and walls shall have horizontal solid blocking not less than 2x and of the same width as the stud, fitted and nailed into the studs at mid-height of stud, for studs over 8 feet in height, except as otherwise shown or specified. This blocking shall be so spaced that there shall be no concealed air spaces greater than eight feet in any dimension.
   f. Stud partitions containing plumbing, heating or other pipes shall be so framed as to give proper clearance for piping. Plumbing, heating and vent pipes exceeding 1-1/2" in inside diameter shall not be placed in partitions used as bearing or shear walls unless completely furred clear of the wall. No notching shall be allowed. Pipes shall be placed in the center of the plate using a neat bored hole and the plates shall be strapped on each side with 3" x 36" x 14 gauge steel punched for 10d nails 3" on center, staggered, or as shown on the drawings.
3. Top Plates
   a. Top plates shall be double, set single. Corners where stud wall or partitions meet shall be framed with studs on all surfaces and blocking to form a "rigid" corner with nailing for all corners. Double top plates shall be lapped at corners. Lap splices and nailing per the drawings.
4. Roof and Ceiling Framing
   a. Joists and beams shall be accurately aligned and the position and spacing of all joists and beams shall be as shown and be coordinated with other framing and to other trades prior to actual construction.

b. Place all joists and beams with crown up. Cantilevered joists and beams shall be placed with the crown down.
c. Cutting of wood girders, beams or joists for electrical and mechanical lines shall be limited to cuts and bored holes not deeper than 1/5 of the beam depth from the top and located not farther from the support than three times the beam depth and not less than the beam depth. Cuts in excess of this, or single bored holes with a diameter of more than 1" are not permitted without special provisions for framing the beams. Location of all cuts in framing shall receive the prior review of the Architect/Engineer.
d. Provide vent holes in rafters and/or blocking as shown and/or directed by the Architect.

3.02 STRUCTURAL SHEATHING

A. General

1. Sheathing nailing shall be as required on the drawings. Do not overdrive (Do not break skin of sheathing face sheet). Over driving will be cause for rejection.
2. Form sheathing may be re-used for concealed sheathing provided the lumber at the time of re-use is approved by the Architect, meets with the framing grade requirements specified herein, is in good condition, and is thoroughly cleaned with all nails removed.
3. Pneumatic nailing devices shall be adjustable so that nail heads do not penetrate skin of sheathing. Contractor shall submit equipment and nails for review prior to use. Refer to PART 2 for other nailing requirements.

B. Roof Sheathing: Lay with face grain perpendicular to roof rafters, roof trusses or floor joists. Stagger sheets. Block all unsupported sheet edges with 2x material unless noted otherwise.

C. Wall Sheathing: Lay with face grain either parallel or perpendicular to studs. Exposed bottom edges shall be sealed as recommended by manufacturer. Block all unsupported sheet edges with 2x materials unless noted otherwise.

3.03 ROUGH HARDWARE

A. General: Nails, spikes, screws, fabricated sheet metal anchors, ties, hangers and any other materials shown or required for the attachment of wood to concrete and wood to steel and wood to wood shall be furnished and installed as part of this work.

B. Framing Nailing: All framing nailing shall conform to minimum requirements of the Building Code, and with details shown on the drawing.

C. Bolts, Lag Screws and Washers:

1. Bolts in wood shall be machine bolts unless otherwise noted and shall be of such length that the bearing length of the threads does not exceed ¼ of the full bearing length in the member holding the threads. Bolt holes in wood shall be 1/32" oversized. Bolt holes for sill plates may be 1/16" maximum oversize. Holes in steel shall be 1/16" oversize. See Section 3.1 for anchor bolts at sill plates and ledgers.

2. Provide square plate or malleable iron washer and nut at head where bearing is against wood; cut washer under nut where it is against steel. Washer will not be required under head of carriage bolts. Provide malleable iron washers where exposed.
3. All nuts shall be tightened when placed and retightened at completion of the job or immediately before closing with final construction.
4. Lag screws shall be screwed (not driven) into place. Drill pilot hole to 70% of shank diameter. Drill clearance hole to full shank diameter and depth of unthreaded screw length.

D. Wood Screws: Minimum penetration is 10 diameters unless noted otherwise. Where fastening hardwood timber species or where wood tends to split, provide pilot hole 70% of screw shank diameter.

E. Proprietary Fasteners and Hardware: Install per manufacturer's published installation instructions (MPII) and code approval report (e.g. ICC ESR, IAPMO ER, etc). Provide MAX quantity, size, and length of fastener at hardware (i.e. joist hangers, framing, clips, etc) unless otherwise noted per plan.

3.04 INSTALLATION OF ACCESSORIES AND MISCELLANEOUS WOOD

A. Coordinate installation of wood decking, metal-web wood joists, glued-laminated wood construction, shop-fabricated wood trusses, and wood I- joists.

B. Curb roof openings except where prefabricated curbs are provided. Form corners by alternating lapping side members. Fasten curbs corner-to-corner and to rafters with framing connectors configured for this application.

C. Blocking:

1. Provide fire blocking at locations and spacing's as required by CBC Chapter 7. Locate other blocking, supplementary framing, backing plates and bracing to facilitate installation of finish materials, fixtures, equipment, services, accessories, and trim requiring attachment and support.
2. Solid block joists and rafters over all supports with blocking of the same size and material as the joist or rafter.

D. Furring:

1. Nominal 1 inch x 3 inch minimum, continuous and spaced at 16 inches on center, maximum.
2. Install plumb, rigid, and level. Shim where necessary to provide a true, even plane suitable to receive the finish required.
3. Attach to concrete and masonry as shown in the contract drawings.

E. Bridging: Use 2 inch solid cross bridging. Nail bottom ends of bridging only after sheathing has been nailed.

F. Install miscellaneous metal angles, bolts, and other items; secure into formwork where embedded in concrete.

G. Install accessory items not otherwise set under other sections; after completion of painting and other finishing work; in locations shown or directed by the Architect. Set items plumb, level, and secure using appropriate fastening as applicable.

3.05 FIELD APPLIED WOOD TREATMENT

A. Field treat all end cuts and holes in preservative treated materials per PART 2.

B. Apply two brush coats; or full-immersion dip not less than 15 minutes; or as required to thoroughly saturate all surfaces after cutting.

C. Air dry 2-hours minimum before installation.

3.06 TOLERANCES

A. Framing Members: 1/4 inch from true position, maximum.

B. Variation from Plane: 1/8 inch in 10 feet maximum, and 1/4 inch in 30 feet maximum. Provide framed substrates meeting requirements for application of finishes specified in other sections.

C. Exposed surfaces shall be free from dents and tool marks, unsanded rough or torn faces and corners, and other defects.

3.07 FIELD QUALITY CONTROL

A. The Testing Agency, as specified in the Article QUALITY ASSURANCE, will perform the following tests and submit reports as specified in Division 01:

1. Moisture content of all lumber at time of close-in.
2. Periodic special inspection of nailing, bolting, and other fastening within the seismic-force-resisting system including shear walls, wood diaphragms, etc. per CBC Section 1705A.12.2.
3. Special inspection of high load diaphragms per CBC Section 1705A.5.1 where designated on documents.

3.08 ADJUSTING

A. Replace all defective work at Contractor's expense.

B. Replace defective or damaged work with conforming work.

C. Correct defects using means that will not injure the materials.

D. Replace defective or damaged work which cannot be corrected in the field with new work, or return defective items to the shop for repair.

E. Repair or replace framing lumber sagged, twisted or warped due to shrinkage from excessive moisture content at time of installation, or from other causes.

F. Adjust to meet specified tolerances.

G. Architect/Engineer shall review all proposals for the repair or replacement of damaged, defective, or missing work.

H. Pay expenses incurred by Owner for Architect/Engineer's costs for (re-)design and obtaining approvals of Authorities Having Jurisdiction (AHJ) necessitated by incomplete, inefficiently scheduled, improperly performed, defective or nonconforming work.

I. Pay expenses due to re-testing and re-inspection necessitated by incomplete, inefficiently scheduled, improperly performed, defective or nonconforming work.

3.09 CLEANING AND PROTECTION

A. Clean all surfaces upon completion of erection, leave free of grime and dirt. Remove unused materials, tools, equipment, and debris from the premises and leave surfaces broomed clean.

B. Waste Disposal: Comply with the requirements of pertinent sections of Division 01 specifying cleaning and disposal.

1. Comply with applicable regulations.
2. Do not burn scrap on project site.
3. Do not burn scraps that have been pressure treated.
4. Do not send materials treated with pentachlorophenol, CCA, or ACA to co-generation facilities or “waste-to-energy” facilities.

C. Do not leave any wood, shavings, sawdust, etc. on the ground or buried in fill.

D. Prevent sawdust and wood shavings from entering the storm drainage system.

E. Protect work from damage by subsequent operations.

END OF SECTION

SECTION 06 1800

GLUED LAMINATED CONSTRUCTION

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes: All labor, materials and equipment for glued laminated timber necessary to complete work shown, implied, specified and required.

B. Related Sections:

1. Pertinent sections of Division 01 specifying Quality Control and Testing Agency services.
2. 06 1000 Rough Carpentry

1.02 REFERENCES

A. California Code of Regulations, Title 24, latest adopted edition (herein noted as CBC): Chapter 23 Wood.

B. American National Standards Institute (ANSI) A190.1 "Standard for Wood Products - Structural Glued Laminated Timber".

C. ANSI 117 "Standard Specification for Structural Glued Laminated Timber of Softwood Species".

D. American Society for Testing and Materials (ASTM) D3737 "Standard Practice for Establishing Allowable Properties for Structural Glued Laminated Timber (Glulam)".

1.03 SUBMITTALS

A. Submit in accordance with pertinent sections of Division 01 specifying submittal procedures. The General Contractor shall review and approve shop drawings prior to submittal to the Architect/Engineer. Submittals that do not meet these requirements will be returned for correction without review.

B. Limitation of Review: Structural Engineer's review will be for general conformance with design intent as indicated in the Contract Documents and does not relieve Contractor of full responsibility for conformance with the Contract Documents.

C. Shop Drawings: Submit each building as a complete unit. Do not mix components from multiple buildings or units of work in a submittal. Include all of the following:

1. Indicate profiles, sizes, lengths, appearance grade, and locations of structural members. Indicate adhesive type and sealer application area(s).
2. Cross-reference all shop drawing detail references to contract document detail references.
3. Secure all field measurements as necessary to complete this work, prior to submittal.

D. Certifications:

1. ANSI/AITC Certificate of Conformance.

2. Special Inspection Certification.

E. Warranty:

1. Two copies of a five-year warranty, signed by an officer of the manufacturer, shall be submitted to the Architect/Engineer stating that the workmanship shall be corrected to the satisfaction of the Architect/Engineer at no cost to the Owner.

1.04 QUALITY ASSURANCE

A. Each glued laminated member shall bear the ANSI/AITC Quality Mark to indicate conformance to ANSI A190.1.

B. All tests shall be performed by a recognized testing agency as specified in pertinent sections of Division 01.

C. Certification and Identification of Materials and Uses: Provide Testing Agency with access to fabrication plant to facilitate inspection of fabrication. Provide notification of commencement and duration of shop fabrication in sufficient time to allow inspection and all material identification.

D. Testing and Inspection: Tests and Inspections performed by Independent Testing Agency are specified below in Article SOURCE QUALITY CONTROL. Duties and limitations of Independent Testing Agency, test costs, and test reports to be in conformance with pertinent sections of Division 01.

PART 2 PRODUCTS

2.01 MATERIALS

A. Lumber

1. Conform to ANSI/AITC 117.
2. Laminations shall be 2 inch nominal thickness unless otherwise noted.
3. 16% maximum moisture content (MC) at time of manufacture (12% for mechanically reinforced members).

B. Adhesive: Shall be exterior grade for wet surface condition above 16% and shall meet requirements of ANSI 405.

C. Interior use glue laminated members shall be manufactured entirely from Douglas Fir.

1. Simple span beams shall be combination 24F-V4-1.8E.
2. Beams with intermediate supports and/or cantilevers shall be combination 24F-V8-1.8E.
3. Posts and truss members shall be combination 3-1.9E.

D. Glue laminated members that are protected from weather by a roof, eave, or similar covering may be Douglas Fir. The ends shall be flashed and treated with approved wood preservative to prevent decay.

E. Glue laminated members with exterior exposure shall be fabricated entirely from Alaskan

Yellow Cedar (AYC). No sap wood permitted.

1. Simple span beams shall be combination 20F-V12-1.5E.
2. Beams with intermediate supports and/or cantilevers shall be combination 20F-V13-1.5E.
3. Posts and truss members shall be combination 20F-V13-1.5E.

F. Radial Tension Reinforcement: ANSI/AITC 404.

2.02 CAMBER

A. All beams shall be cambered as noted on the drawing. Where no camber is noted, provide 5,000 ft radius camber at simple span beams.

B. Cambers specified shall be provided within tolerances per ANSI A190.1. The Contractor shall verify all beam cambers prior to the erection and report his findings in writing to the engineer for review and comment.

2.03 APPEARANCE

A. Glued laminated members shall be Industrial Appearance Grade when not exposed to permanent view and Architectural Appearance Grade otherwise. Appearance to meet the requirements of ANSI A190.1.

2.04 PROTECTION

A. Protection during shipping and field handling to meet requirements of AITC 111, including protective wrapping and proper storage of members to prevent increased moisture content and damage. Individually wrap members with Architectural Appearance Grade.

B. Ends shall be sealed after end trimming and entire surface of members shall be factory sealed with a penetrating sealer that has been approved by the Architect. Field cuts, notches, and daps shall receive one coat of the same sealer prior to erection.

2.05 SOURCE QUALITY CONTROL

A. Special Inspection is not required for non-custom members with maximum 6 inch nominal width, maximum 18 inch depth, and maximum 32 feet clear span per CBC section 1705A.5.4. Provide an ANSI/AITC certificate for each member.

B. Members not meeting the above criteria shall be continuously inspected during fabrication by a glue fabrication inspector specifically approved for that purpose. The Inspection shall conform to CBC requirements. An ANSI/AITC Certificate will not meet this requirement.

1. An independent Testing Agency will perform source quality control tests and submit reports, as specified in pertinent sections of Division 01 and CBC Chapter 17A.
2. The inspector shall issue four copies of certificates to the Architect/Engineer certifying that materials, manufacture and fabrication are in accordance with these Specifications and the Drawings and shall specify the following:
   a. Species, grade and slope of grain of lumber. Lumber grading inspection shall be done by lumber graders authorized under the provisions of the American Lumber Standards Committee and verified by the special independent inspector.

b. Glue quality specified.
c. Glue bond over entire surface.
d. Continuous inspection of gluing operation.
e. Moisture content of laminations during manufacture.
f. Finger joint locations.
g. All requirements of ANSI A190.1 are met.

3. Each inspected member shall be stamped by the special inspector with an identification mark.

PART 3 EXECUTION

3.01 ERECTION

A. Members shall be seat cut to bear, dapped, etc. as detailed on the drawings prior to erection.

B. Members shall be erected with suitable equipment and secured in place as detailed on the drawings.

C. Glued laminated members shall be aligned and braced until all secondary members or other framing is secured. Contractor shall verify all beam cambers in the field prior to erection.

3.02 CLEANING

A. All debris resulting from this portion of the work shall be removed from the site upon completion.

B. Protect work from damage by subsequent operations.

END OF SECTION

SECTION 06 2000
FINISH CARPENTRY

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Finish carpentry items.

B. Interior and exterior wood trim;

C. Exterior wood soffits.

D. Wood casings and moldings.

E. Hardware and attachment accessories.

1.02 RELATED SECTIONS

A. Section 01 6116 - Volatile Organic Compound (VOC) Content Restrictions.

B. Section 01 8113 - Sustainable Design Requirements.

C. Section 06 1000 - Rough Carpentry: Support framing, grounds, and concealed blocking.

D. Section 06 4100 - Architectural Wood Casework: Shop fabricated custom cabinet work.

E. Section 08 1416 - Flush Wood Doors.

F. Section 09 9123 - Interior Painting: Painting and finishing of finish carpentry items. Backpriming of finish carpentry.

G. Division 32 - Pertinent Sections specifying wood landscape headers and stakes, fences, gates, benches.

1.03 REFERENCE STANDARDS

A. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.

B. ASTM Standards: A153, A165, D 226

C. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.

D. AWI/AWMAC/WI (AWS) - Architectural Woodwork Standards.

E. AWMAC/WI (NAAWS) - North American Architectural Woodwork Standards, U.S. Version 3.0.

F. AWPA C2 - Lumber, Timber, Bridge Ties and Mine Ties -- Preservative Treatment by Pressure Processes; American Wood-Preservers' Association.

G. BHMA A156.9 - American National Standard for Cabinet Hardware.

H. California Code of Regulations, Title 24, Part 2, California Building Code (CBC), International Building Code.

I. California Code of Regulations, Title 24, Part 11 California Green Building Standards Code, “CAL-Green”.

J. PS 1 - Structural Plywood.

K. PS 20 - American Softwood Lumber Standard.

L. PS-51 for decorative plywood.

M. Redwood Inspection Service (RIS): "Standard Specifications for Grades of California Redwood Lumber" 2000 ed, www.calredwood.org.

N. West Coast Lumber Inspection Bureau (WCLIB): "Standard Grading and Dressing Rules No. 16".

1.04 SUBMITTALS

A. See Section 01 3300 - Submittals for submittal procedures.

B. Product Data:
1. Manufacturer's storage, handling and installation instructions
2. Provide instructions for attachment hardware and finish hardware.

C. CAL-GREEN Submittals:
1. Product Data – VOC Limits: For adhesives, sealants, fillers, primers and coatings, documentation including printed statement of VOC contents, comply with limits specified in related section.
2. Composite Wood Formaldehyde Limits: Provide certification that all products meet current CARB Airborne Toxic Control Measure (ATCM) for Composite Wood Formaldehyde Limits by Mandatory Compliance Dates as specified in related section.

D. Shop Drawings: Indicate materials, component profiles, fastening methods, jointing details, and accessories.
1. Scale of Drawings: 1-1/2 inch to 1 foot, minimum.
2. Provide the information required by AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS).

E. Mill grade certificate, if material cannot be marked on a concealed surface.

F. Shop Drawings: Indicate materials, component profiles, fastening methods, jointing details, accessories, and details of anchorage, to a minimum scale of 1-1/2 inch to 1 ft.

G. Samples of materials for making stain and transparent finish samples.
1. Following review, provide samples to other Sections for application of finishes.

H. Samples: Submit two samples of finish plywood, 8 inch x 10 inch in size illustrating wood grain and specified finish.

I. Samples: Submit two samples of each wood trim profile, 12 inch long.

1.05 QUALITY ASSURANCE

A. Perform work in accordance with Woodwork Institute Manual of Millwork, Custom grade.

B. Factory-mark each piece of lumber and plywood with type, grade, mill and grading agency identification; except omit marking from surfaces to receive transparent finish.

C. Fabricator Qualifications: Company specializing in fabricating the products specified in this section with minimum five years of documented experience.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Wood: Store indoors, in well ventilated area at maximum relative humidity of 60 percent and in accordance with WIC technical bulletin 419-R.

B. Protect from moisture damage.

1.07 PROJECT CONDITIONS

A. Sequence installation to ensure utility connections are achieved in an orderly and expeditious manner.

B. Coordinate the work with plumbing rough-in, electrical rough-in, installation of associated and adjacent components, and interior finishes.

PART 2 PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

A. VOC Limits for adhesives, sealants, fillers, primers and coatings . Comply with limits specified in related section.

B. Composite Wood products must meet current CARB Airborne Toxic Control Measure (ATCM) for Composite Wood Formaldehyde Limits by Mandatory Compliance Dates as specified in Section 01 6116.

2.02 FINISH CARPENTRY ITEMS

A. Quality Standard: Custom Grade, in accordance with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS), unless noted otherwise.

2.03 LUMBER MATERIALS

A. Exterior wood: Dry; with moisture content up to 15 percent, unless otherwise indicated.
   1. Exterior Trim and Fascias, opaque finish: Redwood Inspection Service Paragraph 107 - "Grade B". RIS Paragraph 109 "Select" for material thinner than 2 inch, and Paragraph 117 "Select" for 2 inch and thicker; S4S; smooth surfaced.

B. Interior wood: Dry; with moisture content between 6 and 12 percent, unless otherwise indicated. Finger joints not permitted. WI manual, Section 3 and Section 4; “Custom Grade”
   1. Softwoods:
      a. Opaque Finish: Clear; western softwood.
   2. Hardwoods: Transparent finish, plain sawn “Select White” maple.

C. Crash Rail at Trash Enclosure: Construction Heart Redwood.

2.04 FASTENINGS

A. Adhesive for Purposes Other Than Laminate Installation: Suitable for the purpose; not containing formaldehyde or other volatile organic compounds.

B. Rough Hardware and fasteners: Provide nails, screws, anchor bolts, machine bolts, expansion sleeves, lag screws, powder driven fasteners, joist hangers, straps, and other framing anchors of the size and type required to securely attach finish carpentry to substrates.
   1. Nails:
      a. Exterior Trim Exposed: Nichols-Homeshield, Independent Nail and Packing,
   2. Other Exterior Work: Hot-dip galvanized steel.
   3. Interior Work: Steel, typical unless otherwise indicated.
   4. Screws, Bolts, Washers:
      a. Exterior Work: Hot-dip galvanized steel, ASTM A153.
      b. Interior Work: Cadmium plated steel, ASTM A165.
   5. Framing Devices:
      a. Exterior Work: Hot-dip galvanized steel, ASTM A153.
      b. Interior Work: Plated, ASTM A165; or painted steel.

C. Concealed Joint Fasteners: Threaded steel.

2.05 ACCESSORIES

A. Construction Adhesive: Type recommended by fabricator to suit application.

B. Adhesive and Tape
1. Wood Adhesive: Essex Chemical "Webtex 588", Inmont "Presstite 220", 3M "Scotch-Grip 4314" or equal.

C. Building Paper: #15 imperforate asphalt saturated organic felt, ASTM D226, Type I.

D. Lumber for Shimming and Blocking: Softwood lumber of _____ species.

E. Aluminum Edge Trim: Extruded flat shape; smooth surface finish; self locking serrated tongue; of width to match component thickness; Selected finish. Sizes and profiles as indicated and as recommended by manufacturer to suit application. Fry Products or equal.

F. Safety Glass: ASTM C1048, fully tempered; clear; 1/8 inch thick, minimum.

G. Primer: as specified in pertinent sections of Division 09 for finish type indicated.

H. Wood Filler: Solvent base, VOC Compliant, tinted to match surface finish color. Duratite "Wood Dough", Boyle-Midway "Plastic Wood" or equal.

2.06 FABRICATION

A. Shop assemble work for delivery to site, permitting passage through building openings.

B. Mill and fabricate units and pieces as long as practical.

C. Finish and assemble at shop to greatest extent possible.

D. Finish to specified standards of Architectural Woodwork Standards (AWS) Manual.
1. Opaque finish, unless otherwise indicated.

E. When necessary to cut and fit on site, provide materials with ample allowance for cutting. Provide trim for scribing and site cutting.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify location of blocking, adequacy of backing and support framing.

B. Verify mechanical, electrical, and building items affecting work of this section are placed and ready to receive this work.

3.02 PREPARATION

A. Separate units and condition wood materials for a minimum of 72 hours. Allow wood to achieve prevailing humidity conditions in installation areas prior to installing.

B. Backprime lumber, including side and ends, before installation for:
1. Exposed exterior surfaces;
2. Where surface is exposed to interior moisture and high relative humidities.

3.03 INSTALLATION

A. Install custom fabrications in accordance with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS) requirements for grade indicated.

B. Trim and bases: Install with minimum number of joints possible. Use full-length pieces from maximum lengths of lumber available.
   1. Stagger joints in adjacent and related members.
   2. Cope at returns and miter at corners. Produce tight fitting joints with full surface contact throughout length of joint.
   3. Joints: End-to-end
      a. Wood: Scarf.
   4. Locate wood bases above subfloor by the thickness of finish flooring.

C. Set and secure materials and components in place, plumb and level.

D. Carefully scribe work abutting other components, with maximum gaps of 1/32 inch. Do not use additional overlay trim to conceal larger gaps.

E. Building paper: Install under exterior wood; without holes or tears.

F. Lap flashings to weather to the exterior.
   1. Lap horizontal edges 3-inches minimum and vertical edges 6-inches minimum
   2. Lap sheet metal flashings; double layer at corners by extending 6-inches around corner from each side.

G. Anchorage: Drill pilot holes for nails where necessary to preclude splitting or chipping of material .
   1. Anchor finish carpentry work to anchorage devices or blocking built-in or directly attached to substrates. Secure to grounds, stripping and blocking with countersunk, concealed fasteners.

H. Blind nail where possible and use fine finishing nails for exposed nailings, countersunk and filled flush with finished surface.

I. At exterior locations drive nails flush.

3.04 PREPARATION FOR SITE FINISHING

A. Set exposed fasteners. Apply wood filler in exposed fastener indentations. Sand work smooth. Prepare in accordance with level of finish specified in Section 09 9000.

B. Before installation, prime paint surfaces of items or assemblies to be in contact with cementitious materials.

3.05 TOLERANCES

A. Tolerances
   1. Install the work plumb, level, true and straight with no distortions. Conceal shims.
      a. 1/16-inch maximum offset in flush adjoining surfaces.
      b. 1/8-inch maximum offset in revealed adjoining surfaces.
   2. Scribe and cut work to fit adjoining work, and refinish cut surfaces or repair damaged finish at cuts.

B. Maximum Variation from True Position: 1/16 inch.

3.06 ADJUSTMENT AND FINISHING

A. Ease salient corners and edges and sand all exposed surfaces of smooth finish wood.

B. Repair damaged and defective finish carpentry work wherever possible to eliminate functional and visual defects. Chipped or split materials is considered a defect.

C. Replace where repair is not possible.

D. Adjust joinery for uniform appearance.

END OF SECTION 06 2000

SECTION 06 4100
ARCHITECTURAL WOOD CASEWORK

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Laminated Plastic Casework.

B. Cabinet Hardware.

C. Preparation for installing utilities.

1.02 RELATED SECTIONS

A. Section 01 6116 - Volatile Organic Compound (VOC) Content Restrictions.

B. Pertinent sections specifying wall framing, support framing, grounds, and concealed blocking.

C. Section 06 2000 - Finish Carpentry

D. Division 09: Pertinent sections specifying finishes adjacent to cabinets.

E. Section 11 3100 - Residential Appliances.

F. Pertinent sections specifying plumbing and/or mechanical equipment interfacing cabinets.

G. Pertinent sections specifying lighting and/or electrical equipment interfacing cabinets.

1.03 REFERENCE STANDARDS

A. AWMAC/WI (NAAWS) - North American Architectural Woodwork Standards, U.S. Version 2.0; 2014.

B. NEMA LD 3 - High-Pressure Decorative Laminates.

C. WI (CCP) - Certified Compliance Program (CCP).

D. WI (MCP) - Monitored Compliance Program (MCP).

E. California Code of Regulations, Title 24, Part 2, California Building Code (CBC), International Building Code.

F. California Code of Regulations, Title 24, Part 11 California Green Building Standards Code, “CAL-Green”.

G. Architectural Woodwork Standards (AWS) latest edition, published jointly by the Woodwork Institute, Architectural Woodwork Institute, and the Architectural Woodwork Manufacturer's Association of Canada.

1.04 SUBMITTALS

A. See Section 01 3300 - Submittals, for submittal procedures.

B. Shop Drawings: Indicate materials, component profiles, fastening methods, jointing details, and accessories, hardware location and schedule of finishes.
   1. Scale of Drawings: 1-1/2 inch to 1 foot, minimum.
   2. Provide the information required by AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS).
   3. Include certification program label indicating that drawings fully meet the requirements of the AWS Millwork Grade specified.

C. Product Data: Provide data for specified products, including hardware accessories. Demonstrate compliance with specified attributes.

D. CAL-GREEN Submittals:
   1. Product Data – VOC Limits: For adhesives sealants, fillers, primers and coatings, documentation including printed statement of VOC contents, comply with limits specified in related section..
   2. Composite Wood Formaldehyde Limits: Provide certification that all products meet current CARB Airborne Toxic Control Measure (ATCM) for Composite Wood. Formaldehyde Limits by Mandatory Compliance Dates as specified in related section.
   3. Product Data - Low/No-VOC Paints and Coatings. Provide certification that all primers and coatings meet VOC emission limits specified in related section. List manufacturer, brand, application, type (flat or non-flat), number of gallon, and the VOC emissions in grams/liter. Include MSDS and product data sheet indicating VOC limits for each product provided.

E. Samples:
   1. Full range of plastic laminates and edge tapes available from the specified group, of the specified manufacturer.
   2. Submit two samples of each hardware item to be provided, illustrating hardware finish .
   3. Three 12" x 12" finished samples of each veneer species and finish to be used and three 6" x 12" finished samples of each lumber lumber species and finish.

F. Closeout Submittals: AWS certificates of compliance indicating that installation fully meets requirements of AWS Millwork Grade specified.

1.05 QUALITY ASSURANCE

A. Fabricator Qualifications: Company specializing in fabricating the products specified in this section with minimum five years of documented experience.
   1. Company with at least one project in the past 5 years with value of woodwork within 20 percent of cost of woodwork for this Project.
   2. Accredited participant in the specified certification program prior to the commencement of fabrication and throughout the duration of the project.
   3. Single Source Responsibility: Provide and install this work from single fabricator.

B. Quality Certification:
   1. Provide labels or certificates indicating that the installed work complies with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS) requirements for grade or grades specified.
   2. Provide designated labels on shop drawings as required by certification program.
   3. Provide designated labels on installed products as required by certification program.
   4. Submit certifications upon completion of installation that verifies this work is in compliance with specified requirements.
   5. Replace, repair, or rework all work for which certification is refused.

C. Single Source Responsibility: A single manufacturer shall provide and install the work described in this Section.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Protect units from moisture damage.

B. Do not deliver woodwork, until the area of operation is enclosed, painting, wet work, grinding, overhead work and similar operations which could damage, soil or deteriorate woodwork are complete and the area is broom clean.

C. If woodwork is stored in other than installation areas, store only in areas meeting requirements specified for installation areas.

D. Do not install woodwork until required temperature and relative humidity are stable and will be maintained in installation areas.

1.07 FIELD CONDITIONS

A. During and after installation of custom cabinets, maintain temperature and humidity conditions in building spaces in the range recommended by the Architectural Woodwork Standards for the location of the project.

PART 2 PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

A. VOC Limits for adhesives, sealants, fillers, primers and coatings . Comply with limits specified in related section.

B. Composite Wood products must meet current CARB Airborne Toxic Control Measure (ATCM) for Composite Wood Formaldehyde Limits by Mandatory Compliance Dates as specified in related section.

2.02 MANUFACTURERS

A. Single Source Responsibility: Provide and install this work from single fabricator.

2.03 CABINETS

A. Quality Grade: Unless otherwise indicated provide products of quality specified by AWI//AWMAC/WI (AWS) for Grades as indicated. Refer to SCHEDULES article.
   1. Provide Custom Grade minimum.

B. Plastic Laminate Faced Cabinets:
   1. Exposed Interior Surfaces: Low Pressure Melamine in a pattern or color compatible with the exposed surfaces unless otherwise noted.
   2. Semi-Exposed Surfaces: White melamine.

C. Cabinets:
   1. Door and Drawer Front Edge Profiles: Square edge with thin applied band.
      a. Door and drawer fronts shall be 3/4 inch thick.
   2. Backs shall be full 3/4 inch thick.
   3. Casework Construction Type: Type A - Frameless.
   4. Interface Style for Cabinet and Door: Style 1 - Overlay; reveal overlay.
      a. Where doors are notched for hinges seal exposed edges of core with paint to match adjacent panel surface.
   5. Cabinet Design Series: As indicated on drawings.
      a. Fabricate cabinets with openings and mortises precut, to receive hardware, appliances, plumbing, fixtures, electrical work and similar items.
      b. Smooth edges of cutoffs and, where located in countertops and similar exposures, seal edges of cutouts with a water resistant coating.
   6. Adjustable Shelf Loading: 50 lbs. per sq. ft..
      a. Deflection: L/144.
      b. Shelves over 36 inch in length, fixed or adjustable, shall be 1 inch thick.
   7. Cabinet Doors and Drawer Fronts: Flush style.
   8. Drawer Side Construction: Multiple-dovetailed.

2.04 WOOD-BASED COMPONENTS

A. Wood fabricated from old growth timber is not permitted.

2.05 LUMBER MATERIALS

A. Wood Moisture Content: Comply with requirements of referenced quality standard for moisture content of lumber at time of fabrication and for relative humidity conditions in the installation areas.

2.06 PANEL MATERIALS

A. Particleboard: Not permitted. Do not use.

B. Acceptable Medium Density Fiberboard Manufacturers:
   1. Roseburg, Springfield, OR; tel: (800) 245-1115, web: www.roseburg.com .
   2. Substitutions: See Section 01 6000 - Product Requirements.

C. Medium Density Fiberboard (MDF) Panels: ANSI A208.2, Grade 155. No added formaldehyde. Medite II MDF as follows;
   1. Faces not required to be HPDL or wood veneer may be melamine, polyester or high-pressure laminate at fabricator's option. Color selected by Architect from full range of manufacturer's options, minimum of three choices.
   2. Composition: Lignocellulosic fibers and formaldehyde-free synthetic resin.
   3. Density: 44 to 49 lb/cu ft.
   4. Thickness: 1/4 to 1-1/4 inches, as indicated on drawings or as required by referenced standard for conditions indicated or necessary.
   5. Formaldehyde Content: Certified by Scientific Certification Systems to be made without use of phenol formaldehyde and to contain not more than 0.05 ppm formaldehyde.
   6. Force to Withdraw Screws at Panel Face: 225 pounds minimum, No.10 sheet metal screw.
   7. Force to Withdraw Screws at Panel Edge: 200 pounds minimum, No.10 sheet metal screw.
   8. Recycled Wood Content: Certified by Scientific Certification Systems for pre-consumer recycled wood fiber content

D. Medium Density Fiberboard (MDF) Panels - Moisture Resistant Types, Provide at Sinks and Interior High Moisture Areas: ANSI A208.2, Grade 155. No added formaldehyde, SierraPine Medex MDF as follows;
   1. Meet all requirements specified above for Medium Density Fiberboard (MDF) Panels and the following:
      a. Moisture-Resistant Panels: Withstanding the Accelerated Aging Tests specified in ASTM D 1037 without adverse effects.

2.07 LAMINATE MATERIALS

A. Manufacturers:
   1. Formica Corporation: www.formica.com/#sle.
   2. Wilsonart International, Inc: www.wilsonart.com.
   3. Substitutions: See Section 01 6000 - Product Requirements.

B. High Pressure Decorative Laminate (HPDL): NEMA LD 3, types as recommended for specific applications.

C. Provide specific types as indicated.

1. Horizontal Surfaces: HGS, 0.048 inch nominal thickness, through color, color as selected, finish as selected.
2. Vertical Surfaces: VGS, 0.028 inch nominal thickness, through color, _____ color, finish as indicated.
3. Post-Formed Horizontal Surfaces: HGP, 0.039 inch nominal thickness, through color, color as selected, finish as indicated.
4. Post-Formed Vertical Surfaces: VGP, 0.028 inch nominal thickness, through color, color as selected, finish as indicated.
5. Flame Retardant Surfaces: HGF, 0.048 inch nominal thickness, through color, color as selected, finish as indicated.
6. Cabinet Liner: CLS, 0.020 inch nominal thickness, through color, _____ color, finish as indicated.
7. Laminate Backer: BKL, 0.020 inch nominal thickness, undecorated; for application to concealed backside of panels faced with high pressure decorative laminate.

D. Colors, Patterns, and Finishes: As selected by Architect for manufacturer's full range of standard and premium colors and patterns, and as follows:
1. Allow for different patterns/colors of base cabinet, upper cabinet and countertops in each building.
2. Allow for different color scheme combination for each building.

2.08 COUNTERTOPS

A. General: Types specified in Section 12 3600. Provide in accordance with WI Manual Sections cited to match quality grade(s) for cabinets indicated in this Section.

2.09 ACCESSORIES

A. Adhesive: Type recommended by WI to suit application, urea formaldehyde-free.
1. Wood Glue: Waterproof types as recommended by WI standards for the particular application. VOC content of not more than 30 g/L when calculated according to 40 CFR 59, Subpart D (EPA method 24.
2. Adhesive for Bonding Plastic Laminate: Contact cement, for general use and for postforming. Use unpigmented product with through-color laminate.

B. Plastic Edge Banding: Extruded PVC, flat shaped; smooth finish; self locking serrated tongue; of width to match component thickness. 3 mm thick, minimum.
1. Color: As selected by Architect from manufacturer's full range.
a. Provide minimum of seventy-five color selections coordinated with plastic laminate selections, including patterns and woodgrains.

C. Glass Shelves and Cabinet Door Inserts: Tempered Float Glass, ASTM C 1048, Kind FT, Condition A, Type I, Class 1 (clear) or obscure type as indicated, Quality-Q3, with exposed edges seamed before tempering, 6 mm thick minimum and thicker as indicated on drawings, permanently marked with certification label of the Safety Glazing Certification Council or another certification agency or manufacturer acceptable to authorities having jurisdiction.

D. Fasteners: Size and type to suit application.

E. Bolts, Nuts, Washers, Lags, Pins, and Screws: Of size and type to suit application; galvanized or chrome-plated finish in concealed locations and stainless steel or chrome-plated finish in exposed locations.

F. Concealed Joint Fasteners: Threaded steel.

G. Grommets: plastic material for cut-outs, 2 inch diameter minimum, color as selected.

2.10 HARDWARE

A. General: Meet or exceed specified requirements of AWI/AWMAC/WI - Architectural Woodwork Standards (AWS) and BHMA Grade 1; US 26D finish or as selected by Architect from manufacturer's standards.

B. Shelf Support Clips: Plated steel, ANSI/BHMA A156.9, meet or exceed Grade 1 B04013, with support pin for drilled hole in cabinet standard and shelf, with pre-drilled hole for seismic fastener to shelf. Hettich Sekura #1, US Futaba 72511 52 068, or equal. Plastic clips will be rejected.

C. Workstation and Countertop Brackets: Type specified in Section 12 3600.

D. Door and Drawer Pulls: Provide at all doors and drawers, matte stainless steel, 6-5/16 inch hole spacing x 1-13/32 inch loop wire pull complying with CBC 11B-309..4; Mockett DP57D, www.mockett.com or equal .

E. Cabinet Locks: Provide at all cabinets and drawers except sink cabinets. Locks to be keyed cylinder, two keys per lock, master keyed, steel with chrome finish.

F. Catches: Magnetic.

G. Drawer Slides:
   1. Type: Extension types as indicated.
   2. Static Load Capacity: Heavy Duty grade and minimum capacity ratings as follows;
      a. File Drawers: Extra Heavy Duty grade 125 pounds.
      b. Lateral File Drawers: Extra Heavy Duty grade 150 pounds.
      c. Lateral File Drawers More Than 30" Wide: Extra Heavy Duty grade 200 pounds.
      d. Drawers in excess of 36 inches wide: Extra Heavy Duty grade 150 pounds.
      e. Pencil Drawers (less than 4 inches inside height): 50 pounds.
      f. All other drawers: 75 pounds.
   3. Mounting: Side mounted.
   4. Stops: Integral type.
   5. Features: Provide self closing/stay closed type.
   6. Manufacturers:
      a. Accuride International, Inc; Heavy-Duty Drawer Slides: www.accuride.com/#sle.
      b. Grass America Inc; Ball Bearing Slide System: www.grassusa.com/#sle.
      c. Hettich America, LP: www.hettich.com/#sle.
      d. Knape & Vogt Manufacturing Company: www.knapeandvogt.com/#sle.
      e. Substitutions: See Section 01 6000 - Product Requirements.

H. Hinges: Stainless steel, five knuckle ANSI / BHMA Grade 1, non-removable pins, attached with screws that are inaccessible when closed, capable of 270 degree swing. Finish as selected by Architect. European style concealed hinges will be rejected.
   1. Manufacturer: Rockford Process Control "No. 376" or equal.
   2. Substitutions: See Section 01 6000 - Product Requirements.

I. Latches: Finger-release type; Locate release not exceeding 40 inches above finish floor elevation, on either leaf of pair doors, to suit configurations shown.

J. Grommets and covers: 2 inch diameter, ABS plastic; color as selected.

K. File frames and followers: Pendaflex type at each drawer indicated as file drawer.

L. Other Hardware: per referenced standard.

2.11 FABRICATION

A. Assembly: Shop assemble cabinets for delivery to site in units easily handled and to permit passage through building openings.

B. Edging: Fit shelves, doors, and exposed edges with specified edging. Do not use more than one piece for any single length.
   1. Cap exposed plastic laminate countertop finish ends and edges with material of same finish and pattern. Cap semi-exposed ends and edges with materials permitted by the Referenced Standard. Plastic Tee banding is not acceptable.
   2. Plastic Laminate Faced Cabinet Edge Band: 3mm PVC at doors, drawer fronts, false fronts, and at all other edges requiring banding.
   3. Wood Faced Cabinet Edge Band: 3mm wood edge band at doors, drawer fronts and false fronts, all other edges per the AWS.

C. Fitting: When necessary to cut and fit on site, provide materials with ample allowance for cutting. Provide matching trim for scribing and site cutting.

D. Plastic Laminate: Apply plastic laminate finish in full uninterrupted sheets consistent with manufactured sizes. Fit corners and joints hairline; secure with concealed fasteners. Locate counter butt joints minimum 6 feet from sink cut-outs.

E. Provide cutouts for plumbing fixtures. Verify locations of cutouts from on-site dimensions. Seal cut edges.

2.12 FABRICATION - COUNTERTOPS

A. Fabricate countertops as specified in Section 12 3600 and to match quality grade standards specified in this section. In the event of conflict, the higher standard prevails.

2.13 SOURCE QUALITY CONTROL

A. Labels: Certification of compliance, affixed by WI Inspector at the place of fabrication prior to shipment.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify location of blocking, adequacy of backing and support framing.

B. Verify location and sizes of utility rough-in associated with work of this section.

3.02 INSTALLATION

A. Set and secure casework in place; rigid, plumb, and level, free of distortions. Shim as required; use concealed shims.

B. Use fixture attachments in concealed locations wherever possible for wall mounted components. Exposed fasteners at semi-exposed surfaces and exposed interior surfaces are acceptable when required to provide a seismic compliant installation.
   1. Exception: Exposed fastening permitted at access panels.

C. Use concealed joint fasteners to align and secure adjoining cabinet units.

D. Carefully scribe casework abutting other work, with maximum gaps of 1/32 inch. Do not use additional overlay trim for this purpose.

E. Secure cabinets to floors and walls using appropriate angles and anchorages.

F. Shelves: Install adjustable shelves evenly spaced, with specified hardware. Securely attach shelves to earthquake clips.

G. Countertops: Anchor securely to base units and other support systems and as specified in Section 12 3600.

H. Connection of sinks to plumbing systems as specified in pertinent related sections.

3.03 TOLERANCES.

A. Site Tolerances: 1/8 inch in 8 feet for plumb and level; adjoining surfaces flush, without offset.

B. Cabinet Tolerances: As specified in the referenced standard.

3.04 ADJUSTING

A. Adjust installed work.
   1. Adjust and lubricate moving or operating parts to function smoothly and correctly.
   2. Adjust hardware to center doors and drawers in openings and to provide smooth operation.

B. Touch-up shop-applied finishes to restore damaged or soiled areas.

C. Repair damaged and defective woodwork and eliminate defects functionally and visually. Where repair is not possible replace woodwork. Adjust joinery for uniform appearance.

3.05 FIELD QUALITY CONTROL

A. If Architect questions that installation quality may not conform to the specified AWS Quality Grade, Architect may order a final inspection by a WI Inspector.

3.06 CLEANING

A. Clean casework, counters, shelves, hardware, fittings, and fixtures.

3.07 PROTECTION OF FINISHED WORK

A. Do not permit finished casework to be exposed to continued construction activity.

B. Do not store materials or products on countertops. Do not stand or walk on countertops or use for construction access to building elements above floor level.

C. Protect countertops with durable panel materials secured in place using methods which will not damage surfaces or finishes. Do not remove until Owner acceptance following move-in.

3.08 SCHEDULES

A. All Locations:
   1. Quality: WI Custom Grade.
   2. Cabinet Construction: Plastic laminate faced.
   3. Countertops: Section 12 3600.

END OF SECTION 06 4100

SECTION 07 2100
BOARD AND BATT [BUILDING] INSULATION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Batt insulation and vapor retarder in interior and exterior wall, ceiling, roof, and floor construction.

B. Insulation for filling perimeter window and door shim spaces and crevices in exterior wall and roof.

1.02 RELATED REQUIREMENTS

A. Section 01 6116 - Volatile Organic Compound (VOC) Content Restrictions.

B. Section 07 8400 - Firestopping: Insulation as part of fire-rated through-penetration assemblies.

C. Division 23 - Mechanical, Duct and Pipe Insulation.

1.03 REFERENCE STANDARDS

A. ASTM C665 - Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing.

B. ASTM C1289 - Standard Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board.

C. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.

D. ASTM E96/E96M - Standard Test Methods for Water Vapor Transmission of Materials.

E. ASTM E136 - Standard Test Method for Behavior of Materials in a Vertical Tube Furnace At 750 Degrees C.

F. California Code of Regulations, Title 24, Part 2, California Building Code (CBC), International Building Code.

G. California Code of Regulations, Title 24, Part 11 California Green Building Standards Code, “CAL-Green”.

H. Manufacturer's recommendations.

1.04 SUBMITTALS

A. See Section 01 3300 - Submittals, for submittal procedures.

B. Product Data: Provide data on product characteristics, performance criteria, and product limitations.

C. CAL-GREEN Submittals:
   1. Product Data – VOC Limits: For adhesives sealants, fillers, primers and coatings, documentation including printed statement of VOC contents, comply with limits specified in related section.
   2. Certify compliance with California Referenced Standards Code as referenced in Article PERFORMANCE REQUIREMENTS.

D. Manufacturer's Installation Instructions: Include information on special environmental conditions required for installation and installation techniques.

E. Schedule of installation methods for each and every system and condition.

F. Samples of mechanical supports and fasteners.

1.05 FIELD CONDITIONS

A. Do not install insulation adhesives when temperature or weather conditions are detrimental to successful installation.

1.06 SEQUENCING

A. Sequence work to ensure fireproofing and firestop materials are in place before beginning work of this section.

1.07 DELIVERY, STORAGE AND HANDLING

A. Mark materials on face of package, with manufacturer's name, thickness, and insulation “R “ value.

PART 2 PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

A. VOC Limits for adhesives, sealants, fillers, primers and coatings . Comply with limits specified in related section.

B. Insulating Material Standards: All insulation materials must comply with the California Referenced Standards Code, California Code of Regulations, Title 24, Part 12 / Chapter 12-13 Standards for Insulating Material.
   1. Foam Board Insulation products shall be manufactured without HFC134a blowing agents.

C. Roof and wall insulation to provide a complete insulation envelope surrounding all conditioned spaces, as indicated elsewhere in the Contract Documents, and as listed below.

2.02 APPLICATIONS

A. Insulation in Wood Framed Exterior Walls: Batt insulation with integral vapor retarder.
   1. Wood Framed Wall Insulation: Minimum R-19 fiberglass batts with vapor retarder facing, fastened to wood studs, and greater thicknesses as required to fill framing cavity with insulation batt equal to full depth of framing member.

B. Insulation in Interior Framed Walls: Unfaced Batt Insulation with no vapor retarder to full depth of framing member, at all wall locations.

2.03 FOAM BOARD INSULATION MATERIALS

A. Polyisocyanurate (ISO) Board Insulation: Rigid cellular foam, complying with ASTM C1289.
   1. Classifications:
      a. Type II:
         1) Class 1 - Faced with glass fiber reinforced cellulosic felt facers on both major surfaces of core foam.
         2) Compressive Strength: Classes 1-2-3, Grade 3 - 25 psi (172 kPa), minimum.
         3) Thermal Resistance, R-value: At 1-1/2 inch thick; Class 1, Grades 1-2-3 - 8.4 (1.48) at 75 degrees F.
   2. Flame Spread Index (FSI): Class A - 0 to 25, when tested in accordance with ASTM E84.
   3. Smoke Developed Index (SDI): 450 or less, when tested in accordance with ASTM E84.
   4. Water Vapor Permeance: 1.2 perm, maximum, at 1 inch thickness, and when tested in accordance with ASTM E96/E96M, desiccant method.
   5. Board Size: 48 inch by 96 inch.

6. Board Thickness: As shown on Drawings. If not shown, provide 2.0 inch.
7. Manufacturers:
   a. Atlas Roofing Corporation: www.atlasroofing.com/#sle.
   b. DuPont de Nemours, Inc: www.building.dupont.com/#sle.
   c. GAF: www.gaf.com/#sle.
   d. Rmax Inc: www.rmax.com/#sle.
   e. Substitutions: See Section 01 6000 - Product Requirements.

2.04 BATT INSULATION MATERIALS

A. Glass Fiber Batt Insulation: ASTM C 665; flexible preformed glass fiber batt; friction fit, sized to fit between framing elements, conforming to the following:
   1. Flame Spread Index: 25 or less, when tested in accordance with ASTM E84.
   2. Smoke Developed Index: 450 or less, when tested in accordance with ASTM E84.
   3. Combustibility: Non-combustible, when tested in accordance with ASTM E136, except for facing, if any.
   4. Formaldehyde Content: Zero.
   5. Thermal Resistance: R value as indicated.
   6. Facing: FSK (Foil-Scrim Kraft), one side. Exception: Paper facing may be provided in locations where the insulation is in "substantial contact" with the wall finish as described in exceptions noted in CBC 719.2.1.
   7. Maximum 0.50 perm rating, ASTM E 96.
   8. Manufacturers:
      a. Johns Manville International, Inc: www.jm.com.
      b. CertainTeed Corporation: www.certainteed.com.
      c. Owens Corning Corp: www.owenscorning.com.
      d. Substitutions: See Section 01 6000 - Product Requirements.

B. Acoustic Batt (Sound Retardant) Insulation:
   1. Same as Batt Insulation, unfaced.

2.05 OTHER INSULATION

A. Foamed-in-place Plastic Insulation: Polyurethane Foam Sealant, Flame Spread 20 / Smoke Developed 20, when tested in accordance with ASTM E 84.
   1. Manufacturers:
      a. Dow Chemical Co.; Great Stuff: www.itsgreatstuff.dow.com. UL Listed R 13655.
      b. Substitutions: See Section 01 6000 - Product Requirements.

2.06 ACCESSORIES

A. Attachment clips as recommended by the manufacturer in writing.

B. Tape: Bright aluminum self-adhering type, mesh reinforced, 2 inch wide.

C. Insulation Fasteners: Impaling clip of unfinished steel with washer retainer and clips, to be adhered to surface to receive insulation, length to suit insulation thickness and substrate, capable of securely and rigidly fastening insulation in place.

D. Nails or Staples: Steel wire; electroplated or galvanized; type and size to suit application.

E. Adhesive: Type recommended by insulation manufacturer for application.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that substrate, adjacent materials, and insulation materials are dry and that substrates are ready to receive insulation.

B. Verify that all framing inspections are complete and that required corrections have been made before installing insulation.

3.02 INSTALLATION - GENERAL

A. Install insulation in accordance with manufacturer's instructions.

B. Install in walls, roof and ceiling spaces without gaps or voids. Do not compress insulation.

C. Trim insulation neatly to fit spaces. Fit insulation tight in spaces and tight to exterior side of mechanical and electrical services within the plane of insulation.

D. Small gaps and voids which are not otherwise insulatable:
   1. Either sprayed foam type plastic insulation or mineral wool, as recommended by the Contractor and approved by the Architect.
   2. Provide bond breaking material between foam and adjacent materials whereever possible.

E. Install with factory applied vapor retarder membrane facing warm side of building spaces.

3.03 BATT INSTALLATION

A. Install insulation and vapor retarder in accordance with manufacturer's instructions.

B. Install in exterior wall, roof, and ceiling spaces without gaps or voids. Do not compress insulation.

C. Trim insulation neatly to fit spaces. Insulate miscellaneous gaps and voids.

D. Fit insulation tightly in cavities and tightly to exterior side of mechanical and electrical services within the plane of the insulation.

E. Install with factory applied vapor retarder membrane facing warm side of building spaces. Lap ends and side flanges of membrane over framing members.

F. Secure vapor barrier facing to framing along edges and at ends of batt at all applications. At horizontal applications additionally provide guy wire or netting to support insulation without sags.

G. Batts: Attach by either method.
   1. Install as a single length between structural members or fold vapor barriers together and staple or tape at intermediate end joints.
   2. Staple or nail facing flanges in place at maximum 6 inches on center.

H. Tape seal butt ends, lapped flanges, and tears or cuts in membrane.

I. At wood framing, place vapor retarder on warm side of insulation by stapling at 6 inches on center. Lap and seal sheet retarder joints over member face.

J. At metal framing, place vapor retarder on warm side of insulation; lap and seal sheet retarder joints over member face.

K. Tape seal tears or cuts in vapor retarder.

L. Extend vapor retarder tightly to full perimeter of adjacent window and door frames and other items interrupting the plane of the membrane. Tape seal in place.

M. Acoustic Insulation: Place tightly within spaces, around cut openings, behind and around electrical and mechanical items within partitions, and tight to items passing through partitions.

3.04 PROTECTION

A. Repair holes or tears with adhesive tape immediately before application of finish.

B. Do not permit installed insulation to become wet or damaged prior to its concealment.

END OF SECTION 07 2100

SECTION 07 2216
ROOF INSULATION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Roof insulation and installation.
   1. HCFC FREE "Green" Polyiso Rigid board type roof insulation(s) for thermal protection as part of roofing assemblies.

1.02 RELATED SECTIONS

A. Section 06 1100 - Rough Carpentry.

B. Section 07 2100 - Thermal Insulation.

C. Section 07 4113 – Metal Roof Panels

E. Section 07 6200 - Sheet Metal Flashing and Trim

F. Sections specifying work related to or penetrating the roof.

1.03 REFERENCES

A. ASTM A-167 Specification for Stainless and Heat-Resisting Chromium Nickel Steel Plate, Sheet and Strip

B. ASTM A- 653 Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc - Iron Alloy-Coated (Galvanized) by the Hot-Dip Process

C. ASTM B-29 Pig Lead

D. ASTM B-32 Solder Metal

E. ASTM C-165 Test Method for Measuring Compressive Properties of Thermal Insulation

F. ASTM C-208 Specifications for Cellulosic Fiber Insulating Board

G. ASTM C-209 Test Method for Cellulosic Fiber Insulating Board

H. ASTM C-272 Test Method for Water Absorption of Core Materials for Structural Sandwich Constructions

I. ASTM C 518 - Standard Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus.

J. ASTM C-728 Specification for Perlite Thermal Insulation Board

K. ASTM D-5 Test Method for Penetration of Bituminous Materials

L. ASTM D-36 Test Method for Softening Point of Bitumen (Ring and Ball Apparatus)

M. ASTM D-92 Test Method for Flash and Fire Pints by Cleveland Open Cup

N. ASTM D-312 Specification for Asphalt Used in Roofing

O. ASTM D-5147 Sampling and Testing Modified Bituminous Sheet Material

P. ASTM E 84 - Standard Test Method for Surface Burning Characteristics of Building Materials.

Q. ASTM E 96 - Standard Test Methods for Water Vapor Transmission of Materials.

R. ASTM E 2114 - Standard Terminology for Sustainability Relative to the Performance of Buildings

S. ASTM 2129 - Standard Practice for Data Collection for Sustainability Assessment of Building Product

T. FM Factory Mutual System, Norwood, Massachusetts

U. NRCA National Roofing Contractors Association, Chicago, IL

V. SMACNA Sheet Metal and Air Conditioning Contractors National Association

W. UL Underwriter's Laboratories, Inc., Northbrook, Illinois

X. FS HH-I-1972 Insulation Board, Polyisocyanurate

Y. WH Warnock Hersey International, Inc. Middleton, WI

1.04 DEFINITIONS

A. HCFC FREE "Green" Polyiso Roof Board Insulation is defined as environmentally friendly, with Zero Global Warming, Zero Ozone Depletion (ODP) as in compliance with the US EPA requirements of January 1, 2003 requirement to eliminate production of HCFC 141b.

B. LTTR (Long Term Thermal Resistance) is defined as using techniques from ASTM C1303, CAN/ULC S770 predicting a foam's R-Value that has been shown to be equivalent to the average performance of a permeably faced foam insulation product over 15 years. In Canada this method is used as the Design R-Value. This applies to ALL foam insulation products with blowing agents other than air, such as Polyiso, "Green" Polyiso, extruded polystyrene and polyurethane. The new method is based on consensus standards in the US and Canada. PIMA has reported this method as providing a better understanding of the thermal performance of foam.

1.05 SUBMITTALS

A. See Section 01 3300 - Submittals, for submittal procedures.

B. Product Data: Manufacturer's specifications and installation instructions for each product specified.

C. Provide approval letters from insulation manufacturer for use of their insulation within this particular roofing system type.

D. Provide a sample of each insulation type.

E. Shop Drawings:

F. Indicate complete installation details of tapered insulation system, including identification of each insulation block, sequence of installation, layout, drain locations, roof slopes, thicknesses, crickets and saddles.

G. Include: Outline of roof, location of drains and scuppers, complete board layout of tapered insulation components, thickness and the average "R" value for the completed insulation system.

H. Certifications: Submit all of the following;
   1. Roof manufacturer's certification that insulation fasteners furnished are acceptable to roof manufacturer.
   2. Roof manufacturer's certification that insulation furnished is acceptable to roofing manufacturer as a component of roofing system and is eligible for roof manufacturer's system warranty.
   3. Insulation fastener pattern.

4. System Manufacturer's or insulation manufacturer's certification that HCFC FREE "Green" Polyiso materials meet Zero ODP (Ozone Depletion Potential) and Zero GWP (Global Warming Potential) specification requirements.

1.06 DESIGN REQUIREMENTS

A. No ponding of water on roof, all runoff flows to drain.

B. All roof insulation overlaid with perlite board. No roofing installed over exposed insulation.

1.07 PERFORMANCE REQUIREMENTS

A. General: Fire Classification, ASTM E-108; Section specifies a roof system with an external fire rating. The descriptions given below are general descriptions. The insulation, recovery board, and all other components shall be included as required by the membrane manufacturer to provide a Factory Mutual Class 1A fire resistance rating or Listed by Underwriter's Laboratories or Warnock Hersey for external fire tests of ASTM - E - 108 Class A.

B. Provide continuity of thermal barrier at building enclosure elements.

C. Flame spread less than 25 when tested in accordance with ASTM E84.

D. Smoke density less than 50 when tested in accordance with ASTM E84.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials in manufacturer's original, unopened packaging, with identifying tags or labels intact and legible.

B. Coordinate scheduling for timely deliveries and prompt installation of materials.

C. Store insulation and support system in a dry, protected area out of direct sunlight. If storage area is outdoors, store material off the ground and protected by a suitable waterproof cover.

D. Remove insulation which is warped, broken or exposed from moisture from the site.

1.09 ENVIRONMENTAL REQUIREMENTS

A. Handle and install insulation system only under conditions and temperatures recommended by the manufacturer.

B. Coordinate insulation placement to assure that material can be covered promptly with roof. Do not leave insulation exposed overnight or to inclement weather.

1.10 WARRANTY

A. Provide warranty coordinated with the requirements of other sections specifying roof products.

PART 2 PRODUCTS

2.01 MANUFACTURER

A. Acceptable Manufacturers:
   1. Hunter Panels, www.hunterpanel.com
   2. Atlas Insulation, www.atlasrwi.com

B. Substitutions: See Section 01 6000 - Product Requirements.

2.02 MATERIALS

A. Polyisocyanurate board or tapered Roof Insulation: Provide thicknesses of insulation as indicated, or as. Provide combination of types and thicknesses to provide a complete system.

1. Surface Burning Characteristics: Provide assembly with composite flame spread rating of 25 or less and smoke developed of 50 or less, as determined in accordance with ASTM E 84.
2. Closed cell polyisocyanurate foam.
   a. R-Value: as indicated on drawings.
3. Insulation board shall meet the following requirements:
   a. UL, WH or FM listed under Roofing Systems
   b. Federal Specification HH-I-1972, Class 1
   c. Dimensional Stability ASTM D2126 2% max.
   d. Compressive Strength ASTM D1621 25 psi min.
   e. Vapor Permeability ASTM E-96 1 perm max.
   f. Foam Core Density ASTM D1622 2.0 pcf min.
   g. Water Absorption ASTM C209 <1 %
   h. Flame Spread ASTM E 84, 25 max.
   i. R-Factor 5.7 per inch thickness ASTM C 518 (Design Value)
   j. Tapered insulation slope: ¼" per 12".
   k. Tapered cricket slope: 2x primary roof slope.

B. Related Materials:
   1. Fiber Cant and Tapered Edge Strips: Performed rigid insulation units of sizes/shapes indicated or as required to achieve configurations shown, of perlite or organic fiberboard:

C. Fasteners:
   1. Corrosion resistant screw fastener as recommended by roof membrane manufacturer.
   2. Factory Mutual Tested and Approved with 3 in. coated disc for 1-90 rating, length required to penetrate deck one inch.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that roof framing system is complete and ready to receive insulation system. Do not proceed with installation until unsatisfactory conditions have been corrected.
   1. Verify that work which penetrates roof deck has been completed.
   2. Verify that wood nailers are properly and securely installed.
   3. Examine surfaces for defects, rough spots, ridges, depressions, foreign material, moisture, and unevenness.
   4. Do not proceed until defects are corrected.
   5. Do not apply insulation until substrate is sufficiently dry, 12 percent moisture maximum, and ready to receive insulation and adhesive.
   6. Broom clean substrate immediately prior to application.
   7. Use additional insulation to fill depressions and low spots that would otherwise cause ponding water.

3.02 INSTALLATION

A. General: Install roof insulation in strict accordance with manufacturer's instructions and approved shop drawings.

B. Structural Metal Roof insulation:
   1. Install Z-furring over vapor retarder and loose lay base layer of insulation between furring. Tack second layer in place and mechanically attach cover board with screws and plates to z-furring per roof system manufacturer's recommendation.
   2. Place boards in a method to maximize contact bedding. Notch out undersides of insulation where insulation directly covers structural fasteners which are attached to the roof deck.

3. Filler pieces of insulation require at least two fasteners per piece if size of insulation is less than four square feet.
4. Minimum penetration into deck shall be as recommended by the fastener manufacturer, and one inch (1") minimum where not specified by the manufacturer
5. Mechanically attach insulation through cover board to top of Z-furring.

C. Asphalt Roof insulation attachment with Mechanical Fasteners:
1. Prime and adhere SA membrane to deck as soon as plywood is inspected.
2. Approved insulation board shall be fully attached to the deck with an approved mechanical fastening system. Attachment shall be per roofing system manufacturer's wind uplift calculation.
2. Place boards in a method to maximize contact bedding. Notch out undersides of insulation where insulation directly covers structural fasteners which are attached to the roof deck. Make notch equal to the length, width and depth of steel strap.
3. Filler pieces of insulation require at least two fasteners per piece if size of insulation is less than four square feet.
4. Provide spacing pattern of fasteners manufacturer's recommendations to meet wind uplift requirements. Placement of any fastener from edge of insulation board shall be a minimum of three inches, and a maximum of six inches.
5. Minimum penetration into deck shall be as recommended by the fastener manufacturer, and one inch (1") minimum for wood decks where not specified by the manufacturer
6. Subsequent layers of insulation will be set in hot asphalt that has been cooled to below 400 degrees to avoid off gassing of the insulation. Stagger the joints of subsequent layers of polyisocyanurate and protection board over the initial layer.

3.03 CLEANING AND PROTECTION

A. Remove debris and cartons from roof deck. Protect finished work to ensure that insulation remains clean and dry, ready to receive roofing membrane.

END OF SECTION

SECTION 07 2500
WEATHER BARRIERS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Fluid-Applied Weather-Resistive Barrier: Both Air and Vapor-Permeable Water-Resistive Barrier on wall sheathing under exterior cladding.
   1. Accessories: Materials that form a system to stop passage of air through exterior walls, joints between exterior walls and roof, joints around frames of openings in exterior walls, and utility penetrations.

1.02 RELATED REQUIREMENTS

A. Pertinent Sections specifying Volatile Organic Compound (VOC) Content Restrictions.

B. Section 03 3000 - Cast-in-Place Concrete.

C. Section 07 2100 - Board and Batt (Building) Insulation: Vapor retarder installed in conjunction with batt insulation.

D. Section 07 2600 - Under-Slab Vapor Retarders: Plastic Sheet Vapor Retarders under concrete slabs on grade.

E. Section 07 6200 - Sheet Metal Flashing and Trim: Metal flashings installed in conjunction with weather barriers.

F. Section 07 9200 - Joint Sealants: Sealing building expansion and construction joints.

1.03 DEFINITIONS

A. Weather Barrier: Assemblies that form either water-resistive barriers and air barriers.

B. Air Barrier: Air tight barrier made of material that is relatively air impermeable but water vapor permeable, both to the degree specified, with sealed seams and with sealed joints to adjacent surfaces.

C. Water-Resistive Barrier: Water-shedding barrier made of material that is moisture resistant, to the degree specified, intended to be installed to shed water without sealed seams.

1.04 REFERENCE STANDARDS

A. ASTM D1970/D1970M - Standard Specification for Self-Adhering Polymer Modified Bituminous Sheet Materials Used as Steep Roofing Underlayment for Ice Dam Protection.

B. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.

C. Manufacturer's recommendations and specifications.

D. ASTM E96/E96M - Standard Test Methods for Water Vapor Transmission of Materials.

E. ASTM E2178 - Standard Test Method for Air Permeance of Building Materials.

F. ICC-ES AC38 - Acceptance Criteria for Water-Resistive Barriers; ICC Evaluation Service, Inc.

G. ICC-ES AC148 - Acceptance Criteria for Flexible Flashing Materials; ICC Evaluation Service, Inc.

H. ICC-ES AC212 - Acceptance Criteria for Water-Resistive Coatings Used as Water-Resistive Barriers over Exterior Sheathing; ICC Evaluation Service, Inc.

I. NFPA 285 - Standard Fire Test Method for Evaluation of Fire Propagation Characteristics of Exterior Non-Load-Bearing Wall Assemblies Containing Combustible Components.

J. California Code of Regulations, Title 24, Part 2, California Building Code (CBC), International Building Code, with California Amendments.

K. California Code of Regulations, Title 24, Part 11 California Green Building Standards Code, "CAL-Green".

1.05 SUBMITTALS

A. See Section 01 13300 - Submittals, for submittal procedures.

B. Product Data: Provide data on material characteristics, performance criteria, and limitations.

C. CAL-GREEN VOC Submittals: For adhesives sealants, fillers, coatings and primers, documentation including printed statement of VOC contents, comply with limits specified in related section.

D. Shop Drawings: For air-barrier and weather-resistive barrier assemblies; provide drawings of special joint conditions.
   1. Show locations and extent of air barrier and weather-resistive barrier. Include details for substrate joints and cracks, counterflashing strips, penetrations, inside and outside corners, terminations, and tie-ins with adjoining construction.
   2. Include details of interfaces with other materials that form part of air barrier and weather-resistive barrier including related cladding, sealants and flashings.
   3. Provide project-specific details customized to this project's conditions. Manufacturer's standard details alone are not acceptable.

E. Manufacturer's Installation Instructions: Indicate preparation, installation methods, and storage and handling criteria.

F. Qualification Data: For Installer, Include list of ABAA-certified installers and supervisors employed by the Installer, who work on Project.

1.06 QUALITY ASSURANCE

A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.

B. Preinstallation Conference: Conduct conference at Project site after approval of complete submittal to comply with requirements in Division 1 Section "Project Management and Coordination." Review requirements for air barrier, including surface preparation specified under other Sections, substrate condition and pretreatment, temporary weather protection, forecasted weather conditions, special details and sheet flashings, installation procedures, testing and inspection procedures, and protection and repairs.
   1. Review air-barrier requirements and installation, special details, mockups, air-leakage and bond testing, air-barrier protection, and work scheduling that covers air barriers.

1.07 MOCK-UP

A. Mockups: Build mockups to set quality standards for materials and execution and for preconstruction testing.
   1. Indicate portion of wall represented by mockup on Drawings or draw mockup as separate element.
   2. Build integrated mockups of exterior wall assembly 150 sq. ft. (14 sq. m), incorporating backup wall construction, external cladding, window, storefront, door frame and sill,

insulation, ties and other penetrations, and flashing to demonstrate surface preparation, crack and joint treatment, application of air barriers, and sealing of gaps, terminations, and penetrations of air-barrier assembly.

a. Coordinate construction of mockups to permit inspection by Owner's testing agency of air barrier before external insulation and cladding are installed.
b. Include junction with roofing membrane, building corner condition, and foundation wall intersection.
c. If Architect determines mockups do not comply with requirements, reconstruct mockups and apply air barrier until mockups are approved.
d. Mock ups may be coordinated with mock ups required by other exterior material Sections, providing all provisions of this Section are met.

3. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.

1.08 FIELD CONDITIONS

A. Maintain temperature and humidity recommended by the materials manufacturers before, during and after installation.

PART 2 PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

A. VOC Limits for adhesives sealants, fillers and primers. Comply with limits specified in Section 01 6116.

B. General: The air barrier assembly shall be capable of performing as a continuous vapor-permeable air barrier and as a liquid-water drainage plane flashed to discharge to the exterior incidental condensation or water penetration. Air-barrier assemblies shall be capable of accommodating substrate movement and of sealing substrate expansion and control joints, construction material changes, penetrations, tie-ins to adjacent waterproofing, and transitions at perimeter conditions without deterioration and air leakage exceeding specified limits.

C. Air-Barrier Assembly Air Leakage: Less than 0.0008 cfm/sq. ft. of surface area at 1.57 lbf/sq. ft. (0.004 L/s x sq. m of surface area at 75 Pa), when tested according to ASTM E 2357.

D. Products shall be included in a valid NFPA 285 Test with foam plastic insulation products specified in Section 07 2100 and products in the related sections specifying exterior cladding.

E. Building Envelope shall be constructed with a continuous air barrier to control air leakage into, or out of the conditioned space. An air barrier shall also be provided for interior partitions between conditioned space and space designed to maintain temperature or humidity levels which differ from those in the conditioned space by more than 50% of the difference between the conditioned space and design ambient conditions. The air barrier shall have the following characteristics:

1. Continuous, with all joints made airtight.
2. Capable of withstanding positive and negative combined design wind, fan and stack pressures on the envelope without damage or displacement, and shall transfer the load to the structure. It shall not displace adjacent materials under full load.
3. Durable or maintainable.
4. The air barrier shall be joined in an airtight and flexible manner to the air barrier material of adjacent systems, allowing for the relative movement of systems due to thermal and moisture variations and creep. Connection shall be made between:
   a. Foundation and walls.
   b. Walls and windows or doors.

c. Different wall construction and cladding assemblies.
d. Wall and roof.
e. Wall and roof over unconditioned space.
f. Walls, floor and roof across construction, control and expansion joints.
g. Walls, floors and roof to utility, pipe and duct penetrations.

5. All penetrations of the air barrier and paths of air infiltration/exfiltration shall be made airtight.

2.02 BACKING PAPERS UNDER EXTERIOR CLADDING

A. Backing Papers: Provide on exterior walls under exterior cladding. Types specified in related sections specifying exterior cladding.
1. Use building paper unless otherwise indicated.
2. Under Portland cement stucco, use two separate layers of building paper.

B. Building Paper: Asphalt-saturated Kraft building paper complying with requirements of ICC-ES AC38 Grade D.
1. Water Resistance, ASTM D779: > 60 minutes.
2. Water Vapor Transmission, ASTM E96, 11 perms (MVT).
3. Manufacturers:
a. Fortifiber Building Systems Group; Super JumboTex 60 min., ICC ESR-1027: www.fortifiber.com.
b. Substitutions: See Section 01 6000 - Product Requirements.

C. Sealants, Tapes, Fasteners and Accessories for Sealing Backing Papers and Sealing Backing Papers to Adjacent Substrates: As specified or as recommended by weather barrier manufacturer.

2.03 AIR AND WEATHER BARRIER MATERIALS (BOTH WATER VAPOR PERMEABLE AND WATER-RESISTIVE)

A. Fluid-Applied Air Barrier Coating: Fluid-applied, vapor permeable, elastomeric waterproofing membrane that creates a solid barrier against air infiltration and exfiltration, permits transfusion of water vapor that may condense in the wall structure, but is impermeable to liquid water.
1. Material:Silyl-Terminated Polyurethane or 100% Silicone.
2. Included in a valid NFPA 285 Test with foam plastic insulation products specified in Section 07 2100 and products in the related sections specifying exterior cladding.
3. Adhesion to Paper and Glass Mat Faced Sheathing: Sufficient to ensure failure due to delamination of sheathing.
4. Dry Film Thickness (DFT): 10 mil, 0.010 inch, minimum.
5. Air Permeance: Less than 0.0008 cfm/sq. ft. of surface area at 1.57 lbf/sq. ft. (0.004 L/s x sq. m of surface area at 75 Pa), when tested according to ASTM E 2357.
6. Air Permeance: 0.004 cfm/sq ft, maximum, when tested in accordance with ASTM E2178.
7. Water Vapor Permeance: 10 perms, minimum, when tested in accordance with ASTM E96/E96M Procedure B (Water Method) at 73.4 degrees F.
8. Ultraviolet (UV) and Weathering Resistance: Approved in writing by manufacturer for up to six months of weather exposure after application.
9. Surface Burning Characteristics: Flame spread index of 25 or less, smoke developed index of 450 or less, when tested in accordance with ASTM E84.
10. Nail Sealability: Pass, when tested in accordance with ASTM D1970/D1970M.
11. VOC Content: 100 g per L or less.
12. Sealants, Tapes and Accessories: As recommended by coating manufacturer.

13. Manufacturers:
    a. Momentive Performance Materials, Inc/GE Construction Sealants; GE Elemax 2600 AWB: www.siliconeforbuilding.com/#sle.
    b. PROSOCO, Inc; R-GUARD Cat 5: www.prosoco.com/r-guard/#sle.
14. Substitutions: See Section 01 6000 - Product Requirements.

B. Air Barrier Accessories:
1. General: Accessory materials recommended by air-barrier manufacturer to produce a complete air-barrier assembly and compatible with primary air-barrier material. Provide accessory materials by the same manufacturer as the primary air-barrier.
2. Liquid Flashing Membrane: Air-barrier manufacturer's standard cold fluid-applied elastomeric liquid for details and terminations, trowel grade.
    a. Prosoco FastFlash.
    b. Description: Single-component, Silyl-Terminated Poly-Ether (STPE) gun-grade waterproofing, adhesive and detailing compound.
    c. Properties:
        1) Hardness, Shore A: 35–45
        2) Tensile Strength: >150 psi
        3) Elongation at Break: >350%
        4) Water Vapor Transmission, ASTM E96: 21 perms.
3. Crack and Joint Filler: PROSOCO R-GUARD® Joint & Seam Filler.
    a. High modulus, gun-grade, crack and joint filler, adhesive and detailing compound, single-component, 99% solids, fiber-reinforced, Silyl-Terminated-Poly-Ether (STPE) formulation.
    b. Use to fill openings and create transitions where flexible reinforcement is required to bridge gaps and provide continuous support of fluid-applied flashing membranes, waterproofing or air barrier components.
    c. Properties:
        1) ASTM E84; FS 15, SD 5, ICC Class A.
        2) VOC: 30 g/l maximum.
        3) Water Vapor Transmission: 19 perms at 20 mils.
    d. Peel Strength: >25 pli.
4. Air and Weather Barrier Sealant for Openings: R-GUARD AirDam®.
    a. Description: Single-component, Silyl-Terminated Poly-Ether (STPE) gun-grade waterproofing sealant ASTM C719 Class 25.
    b. Properties:
        1) Hardness, Shore A: 15–25
        2) Tensile Strength: 85 psi
        3) Elongation at Break: 1000%
        4) Peel Strength: 25 pli
5. Silicone Transition Sealant Sheet: R-GUARD SureSpan EX manufactured by PROSOCO; www.prosoco.com.
    a. Description: Extruded, elastomeric, pre-cured sealant that is bonded to substrates with liquid-applied flashing membrane (R-GUARD FastFlash). Provide at movement joints and as recommended by manufacturer.
    b. Properties:
    c. Form: Cured silicone rubber, odorless.
        1) Hardness, Shore A: 50-65.
        2) Tensile Strength: 700 psi.
        3) Tear Strength: 200 lb/in.
        4) Elongation at Break: 400%.

5) Tear Propagation: Pass.
6) Joint Movement Capability: 200% elongation; 75% compression.
7) Operational Temperature Range: -60 to 300 degrees F.
8) UV Resistance: Unaffected.
9) Ozone Resistance: Unaffected.
10) Radiation Resistance: Unaffected.

6. Self-Adhering Flashing Membrane: Grace Ultra™ Butyl Sheet Underlayment, High Temperature Type, manufactured by GCP Applied Technologies; tel: (866) 333-3726; web: https://gcpat.com.
   a. Description: Sheet material composed of 100% butyl rubber adhesive backed by a layer of high density cross laminated polyethylene film.
   b. Physical and Performance Properties:
      1) Thickness: 30 mils (0.76 mm).
      2) Roll Width: 36 inches (914 mm).
      3) Tensile Strength, Membrane: 250 psi (1720 kN/m2) per ASTM D 412 (Die C Modified).
      4) Elongation, Membrane: 250% per ASTM D 412 (Die C Modified).
      5) Low Temperature Flexibility: Unaffected at -20 deg F (-29 deg C) ASTM D 1970.
      6) Adhesion to Plywood: 3.0 lbs/in. width (525 N/m) per ASTM D 903.
      7) Permeance (Maximum): 0.05 Perms (2.9 ng/m2s Pa) per ASTM E 96.
      8) Material Weight Installed (Maximum): 0.22 lb/ft2 (1.1 kg/m2) per ASTM D 461.

2.04 DRAINAGE PLANE

A. Manufacturer:
   1. DuPont, E. I. DuPont Nemours and Company; www.drainvent.tyvek.com.
      a. Drainage Plane Product: DuPont ™ Tyvek® DrainVent ™ Rainscreen.
      b. Included in NFPA 285 Assembly Report for Dow Dupont XARMOR specified in Section 07 2114.
   2. Substitutions: Not permitted.

B. Rainscreen Drainage Plane System: Plastic three-dimensional honeycomb-textured drainage mat with attached heavy-duty filter fabric..
   1. Roll Size: 4' x 50' (1.2m x 15.2m) roll, 200 sq. ft. coverage per roll
   2. Thickness (Gap Size): 6.8mm/0.27".
   3. UV exposure rating: 90-day maximum.
   4. Permeability: >100 perms based on ASTM E96 (method B)
   5. Fire Rating, ASTM E84: Class “A”.
   6. Drainage Efficiency, ASTM E2273: >90%. Meet James Hardie requirements for use in fiber cement cladding assemblies.
   7. Intertek Code Compliance Research Report CCRR-0295, meet ICC-ES AC356 – Acceptance Criteria for Moisture Drainage Systems Used with Exterior Cement Plaster or Adhered Masonry Veneer Walls.
   8. Filter Fabric:
      a. Polyester, laminated to outside of core mesh.
   9. Mold and mildew resistant.
   10. 10-year limited product warranty

2.05 SEALANTS

A. Single-Component, Nonsag, Neutral-Curing Silicone Joint Sealant: ASTM C 920, Type S, Grade NS, Class 100/50, for Use NT, complying with requirements of related Section 07 9005.

Type as recommended by wall finish manufacturer for conditions indicated, and as required to maintain single-source warranty continuity.

1. Color: As selected by Architect from manufacturer's standards.

2.06 ACCESSORIES

A. Thinners and Cleaners: As recommended by material manufacturer, meeting VOC requirements specified.

B. Primers, Cleaners, Tapes and Other Materials: As manufactured or as recommended by primary manufacturer, appropriate to application, and compatible with adjacent materials, meeting VOC requirements specified.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that surfaces and conditions are ready to accept the work of this section.

3.02 PREPARATION

A. Remove projections, protruding fasteners, and loose or foreign matter that might interfere with proper installation.

B. Clean and prime substrate surfaces to receive sealants and fluid-applied membranes and self-adhered flashings in accordance with manufacturer's instructions.

C. Do not install materials during rain or snowfall.

D. Concrete must be cured a minimum of fourteen (14) days. Perform adhesion test before membrane application.

E. Exterior sheathing panels: Ensure that the boards are sufficiently stabilized with corners and edges fastened with appropriate screws in accordance with exterior sheathing manufacturers written instructions.

F. Masonry Substrates: Apply weather barrier over concrete block and brick with smooth and flush mortar joints. Fill all voids and holes, particularly in the mortar joints, with a lean mortar mix, non-shrinking grout or parge coat.

3.03 INSTALLATION

A. Install materials in accordance with manufacturer's instructions.

B. Backing Papers: Install continuous barrier over surfaces indicated, with sheets lapped to shed water but with seams not sealed.

C. Air Barriers: Install continuous air-and water-tight barrier over surfaces indicated, with sealed perimeters, penetrations and with sealed joints to adjacent surfaces.

D. Apply liquids, sealants and adhesives within recommended application temperature ranges. Consult manufacturer if temperature is out of this range.

E. Building Paper and Flashings for surfaces receiving Plaster Cladding or strip or panel siding:
   1. Cover surfaces of sheathed framed wall assembly with 2 layers of building paper, without holes, tears, or gaps. Apply building paper using single separate layer method. Secure end laps at supports.
   2. Attach to framed construction with fasteners extending through sheathing into framing. Space fasteners at 12 to 18 inches on center along each framing member supporting sheathing.

3. Sequence work to ensure installation of papers continuously behind applied accessories.
4. Lap horizontal edges 4-inches minimum, shingle fashion to weather.
5. Lap vertical edges 6-inches minimum and seal with tape.
6. Install water-resistive barrier over jamb flashings.
7. Install air barrier and vapor retarder UNDER jamb flashings.
8. Install head flashings under weather barrier.
9. At openings to be filled with frames having nailing flanges, wrap excess sheet into opening; at head, seal sheet over flange and flashing.
10. Double bottom layer at corners, extending 6-inches around corner from each side.
11. Lap sheet metal and flexible flashings. Lap felt flashing strips at door frames and windows; lap over head and jamb strips and under sill strip.
12. Coordinate installation with related section to ensure that no part of metal lath specified in related sections extends under paper or flashing. Weather all laps to exterior.

F. Flexible Flashing: Install in at opening flashings, at locations indicated and underlying horizontal and sloped areas of plaster cladding, in inset wall opening sills and similar locations; in accordance with the manufacturer's recommendations and as follows;
   1. Substrate Preparation:
      a. Smooth, clean, dry and free of voids, spalled areas, loose substrate, loose nails, sharp protrusions or other matter that will hinder the adhesion or regularity of installation.
      b. Clean loose dust or dirt by wiping with a clean dry cloth or brush. Prime substrate with compatible primer in conditions recommended by flashing manufacturer.
   2. Flashing Application:
      a. Coordinate installation with other paper and metal flashings, interleave as required to weather all laps to drain, directing water to exterior.
      b. Coordinate installation with window and insert opening frames.
      c. Peel release paper from roll to expose adhesive surface and position flashing to center over joint location before application. Ensure flashing is centered over joint opening. Avoid fishmouths.
      d. Press flashing firmly into place and hand-roll with resilient roller. Ensure full, continuous and intimate contact with the substrate. Cut out wrinkles or other affected areas and replace with smooth flat membrane.
      e. Flashing shall be continuously supported by the substrate without spanning or bridging joints, gaps or voids in excess of 1/4 inch. Minimum End Laps 2 inch.
   3. Leave flexible flashing in condition to receive installation of metal lath at locations to receive plaster cladding.
   4. Preformed Resilient Corners: Provide at all lower corner openings of windows unless metal sill pan flashings are shown on the drawings.

3.04 FLUID-APPLIED WEATHER BARRIER MEMBRANE INSTALLATION

A. Application Instructions
   1. Roller-apply fluid-applied membrane coating to exterior wall assembly using vertical strokes with a slight diagonal slant. Ensure there are no pinholes, voids or gaps in the membrane.
   2. Seal masonry ties and properly prepared penetrations as work progresses.

B. Allow product to cure and dry.

C. Inspect membrane before covering. Repair all deep gouges, punctures or damaged areas with R-GUARD FastFlash® or R-GUARD Joint & Seam Filler. If the surface of the primary air barrier or liquid flashing membrane is damaged during construction, remove all loose surface contaminants before selective re-coating with additional FastFlash®, Joint & Seam Filler or Cat

5®. Overlap repairs, penetration treatments, transitions, rigid flashing and other air barrier components to ensure positive drainage and continuity of the air and water-resistive barrier.

D. Coverage: Apply product at minimum 12 wet mils and as required by manufacturer to produce results as tested.

E. Through-Wall Flashing Installation.
   1. Install through-wall flashing membrane where applicable and as indicated on Drawings.
   2. Seal all small protrusions (pipes, etc.) through waterproofing membrane by pre-stripping with manufacturer's recommended product and mastic.

F. Window and Door Openings.
   1. Install air/vapor membrane at window and door openings in accordance with manufacturer's instructions.
   2. Install air/vapor barrier membrane to create a continuous seal at window and door openings.

3.05 FIELD QUALITY CONTROL

A. See Section 01 4000 - Quality Requirements, for additional requirements.

B. Do not cover installed weather barriers until required inspections have been completed.

C. Obtain approval of installation procedures by the weather barrier manufacturer based on a mock-up installed in place, prior to proceeding with remainder of installation.

D. Take digital photographs of each portion of the installation prior to covering up.

E. Inspections: Weather barrier materials and installation are subject to inspection for compliance with requirements. Inspections may include the following:
   1. Continuity of weather barrier system has been achieved throughout the building envelope with no gaps or holes.
   2. Continuous structural support of weather barrier system has been provided.
   3. Masonry and concrete surfaces are smooth, clean and free of cavities, protrusions, and mortar droppings.
   4. Site conditions for application temperature and dryness of substrates have been maintained.
   5. Maximum exposure time of materials to UV deterioration has not been exceeded.
   6. Surfaces have been primed, if applicable.
   7. Laps in transition membrane have complied with minimum requirements and have been shingled in the correct direction (or mastic has been applied on exposed edges), with no fish-mouths.
   8. Termination sealant has been applied on cut edges.
   9. Transition membrane has been firmly adhered to substrate.
   10. Compatible materials have been used.
   11. Transitions at changes in direction and structural support at gaps have been provided.
   12. Connections between assemblies (membrane and sealants) have complied with requirements for cleanliness, preparation and priming of surfaces, structural support, integrity, and continuity of seal.
   13. All penetrations have been sealed.

F. Remove and replace deficient weather barrier components and re-inspect as specified above.

3.06 CLEANING AND PROTECTION

A. Remove masking materials after installation. Remove all stains on materials that would be exposed in the completed work using procedures as recommended by manufacturer.

B. Weather Barrier Membrane is not suitable for permanent exposure and must be protected from the effects of sunlight until covered by final cladding.

C. Schedule work to ensure that the weather barrier wall membrane system is covered as soon as possible after installation. Protect weather barrier wall membrane system from damage during subsequent operations. If the weather barrier wall membrane system cannot be covered within 30 days after installation, apply temporary UV protection such as dark plastic sheet or tarpaulins.
   1. Remove and replace weather barrier exposed for more than 150 days.

D. Protect installed weather barriers from damage due to harmful weather exposures, physical abuse, and other causes.

E. Repair damaged weather barrier as recommended by manufacturer.

F. Damage includes: Rips, tears, mechanical damage, mud, marks, chemical and mortar spills.

G. Do not leave paper- or felt-based barriers exposed to weather for longer than one week.

END OF SECTION 07 2500

SECTION 07 2600
UNDER-SLAB VAPOR RETARDERS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Vapor Retarders: Materials installed under slabs-on-grade to make assemblies water vapor resistant and air tight.

1.02 RELATED REQUIREMENTS

A. Pertinent Sections specifying Volatile Organic Compound (VOC) Content Restrictions.

B. Pertinent Division 03 sections specifying Cast-in-Place Concrete.

1.03 DEFINITIONS

A. Vapor Retarder: Air tight barrier made of material that is relatively water vapor impermeable, to the degree specified, with sealed seams and with sealed joints to adjacent surfaces.
   1. Water Vapor Permeance: For purposes of conversion, 57.2 ng/(Pa s sq m) = 1 perm.

1.04 REFERENCE STANDARDS

A. ASTM E 154 - Standard Test Methods for Water Vapor Retarders Used in Contact with Earth Under Concrete Slabs, on Walls, or as Ground Cover

B. Manufacturer's recommendations and specifications.

C. ASTM D 1709 - Standard Test Methods for Impact Resistance of Plastic Film by the Free-Falling Dart Method

D. ASTM E96/E96M - Standard Test Methods for Water Vapor Transmission of Materials.

E. ASTM E1643 Selection, Design, Installation, and Inspection of Water Vapor Retarders Used in Contact with Earth or Granular Fill Under Concrete Slabs.

F. ASTM E1745 - Standard Specification for Plastic Water Vapor Retarders Used in Contact with Soil or Granular Fill under Concrete Slabs.

G. California Code of Regulations, Title 24, Part 2, California Building Code (CBC), International Building Code, with California Amendments.

H. California Code of Regulations, Title 24, Part 11 California Green Building Standards Code, “CAL-Green”.

1.05 SUBMITTALS

A. See Section 01 3300 - Submittals, for submittal procedures.

B. Product Data: Provide data on material characteristics, performance criteria, and limitations.

C. CAL-GREEN VOC Submittals: For adhesives sealants, fillers, coatings and primers, documentation including printed statement of VOC contents, comply with limits specified in related section.

D. Below Grade Vapor Retarder Test Data: Submit independent third party test data for all listed performance values to show compliance with this specification. All test data for review shall be as published and released for publication by the authors without restriction of distribution.
   1. Summary of test results as described in ASTM E 1745.

a. Certify that all mandatory ASTM E1745 testing has been performed on a single production roll per ASTM E1745 Section 8.1. Test reports must specifically state that sampling and testing of materials are in strict accordance with the requirements of the standard.
2. Manufacturer's samples and literature.
3. Manufacturer's installation instructions for placement, seaming and penetration repair instructions.

E. Shop Drawings: For under-slab vapor retarder assemblies; provide drawings of special joint conditions.
1. Show locations and extent of membrane. Include details for substrate joints and cracks, counterflashing strips, penetrations, inside and outside corners, terminations, and tie-ins with adjoining construction.
2. Provide project-specific details customized to this project's conditions. Manufacturer's standard details alone are not acceptable.

F. Manufacturer's Installation Instructions: Indicate preparation, installation methods, and storage and handling criteria.

1.06 FIELD CONDITIONS

A. Maintain temperature and humidity recommended by the materials manufacturers before, during and after installation.

PART 2 PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

A. VOC Limits for adhesives sealants, fillers and primers. Comply with limits specified in Section 01 6116.

2.02 VAPOR RETARDER MATERIALS

A. Under-Slab Vapor Retarder/Barrier Sheet: 15 mil, single ply extruded polyolefin, ASTM E 1745, performance classification A, B, and C;
1. Water vapor permeance, ASTM E 154 or E 96 procedure B: 0.009 perm maximum.
2. Tensile strength ASTM D 882 or ASTM E154, sec. 9; 45 lb/in.
3. 0.01 or less perm vapor performance per ASTM E 154 Section 8, 11, 12 and 13; 0.0054 WVTR water vapor permeance per ASTM F 1249;
4. Minimum puncture resistance, ASTM D 1709, Method B: 2200 grams.
5. Products:
a. Epro Waterproofing Systems; ECOSHIELD-E15, 15-mil thick Sheet Membrane Vapor Retarder: www.eproserv.com.
b. Stego Industries, LLC, San Diego, CA; Stego Wrap Vapor Barrier, 15 mils: www.stegoindustries.com.
c. W.R Meadows, PERMINATOR, 15-mil thick, www.meadows.com.
d. REEF Industries, Inc., Griffolyn® Reinforced Vapor Protection, VAPORGUARD®, www.reefindustries.com.
e. Substitutions: See Section 01 6000 - Product Requirements.

B. Adhesives, sealants and plastic cement: Types recommended by manufacturer to suit application and for compliance with referenced standards.

C. Sealing Tape: Two-sided tape; 4 inch wide black seaming tape with release liner, perm rating not less than vapor retarder, complying with ASTM E 1643 - Standard Practice for Installation of Water Vapor Retarders Used in Contact with Earth or Granular Fill under Concrete Slabs; types recommended by manufacturer to suit application.

D. Detail Tape and/or patch membrane for Concrete Adhesion:
   1. Type recommended by manufacturer tape and/or membrane detail strip and/or membrane to mechanically lock vapor retarder to concrete.
   2. Permeance: Comply with ASTM F1249.
   3. Peel Adhesion: Comply with PSTC 101
   4. Tensile Strength: Comply with ASTM E 154, Sec. 9
   5. Puncture Resistance: Comply with ASTM D 1709
   6. Product: Stego; Crete Claw Tape; www.stego.com.

E. Vapor Retarder Stakes:
   1. Product: Vaporstake, LLC; Polyvinyl Black VaporStake™: www.vaporstake.com.
      a. Solid Plastic construction: ASTM E1643-11 (sec. 8.4 & 8.6) and ACI 302.2R-06
      b. Use with Vapor Retarders: ASTM E 1745-09
      c. Recycled content: 100%
      d. Size: Length for application and diameter recommended by manufacturer for application.

2.03 SEALANTS

A. Single-Component, Nonsag, Neutral-Curing Silicone Joint Sealant: ASTM C 920, Type S, Grade NS, Class 100/50, for Use NT, complying with requirements of related Section 07 9005. Type as recommended by wall finish manufacturer for conditions indicated, and as required to maintain single-source warranty continuity.
   1. Color: As selected by Architect from manufacturer's standards.

2.04 ACCESSORIES

A. Sealants, Tapes, and Accessories for Sealing Vapor Retarder and Sealing Vapor Retarder to Adjacent Substrates: As specified or as recommended by manufacturer.

B. Vapor Retarder Tape: Coated polyester film with acrylic adhesive backing; pressure sensitive.

C. Thinners and Cleaners: As recommended by material manufacturer, meeting VOC requirements specified.

D. Primers, Cleaners, and Other Sealant Materials: As recommended by sealant manufacturer, appropriate to application, and compatible with adjacent materials, meeting VOC requirements specified.

E. Attachment Battens: Stainless steel bars, with anchors of same material.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that surfaces and conditions are ready to accept the work of this section.

3.02 PREPARATION

A. Remove projections, protruding fasteners, and loose or foreign matter that might interfere with proper installation.

B. Clean and prime substrate surfaces to receive sealants and fluid-applied membranes and self-adhered flashings in accordance with manufacturer's instructions.

3.03 INSTALLATION- VAPOR RETARDER UNDER CONCRETE SLAB-ON-GRADE

A. Install materials in accordance with manufacturer's instructions and ASTM E 1643-98.

1. Unroll Vapor Retarder membrane with the longest dimension parallel with the direction of the concrete pour.
2. Extend vapor barrier over footings and grade beams to a distance acceptable to the structural engineer or stop at impediments such as dowels and waterstops.
3. Seal vapor barrier to footing/grade beam with double sided tape, termination bar, or both.
4. Lay-out sheets to minimize quantity of joints.
   a. Lap edge 6 -inches minimum and end joints 12 -inches minimum and continuously seal with joint tape.
5. Apply tape to a clean and dry vapor retarder membrane.
6. Terminate vapor retarder membrane per manufacturer's recommendations along perimeter; at footers, vertical walls, and against penetrations.
   a. Seal perimeter with continuous mastic bead along foundation walls.
   b. Seal barrier joints with tape.

B. No penetration of the Vapor Retarder membrane is allowed except for reinforcing steel and permanent utilities.
   1. Seal all penetrations (including pipes) with field-assembled boots per manufacturer's instructions.
   2. Where forms are used, provide Vapor Stakes to hold forms in place.
      a. Penetrate vapor Retarder with stake.
      b. Treat stake as pipe penetration.
      c. Leave stake permanently in concrete.
      d. Using a power saw, cut the stake off above the seal, but below the concrete finished surface not higher than elevation of horizontal reinforcing.
      e. The lower portion of the vapor stake remains in place, permanently plugging the penetration.

C. Refer to related section "Cast-in-Place Concrete" for installation coordination requirements.

D. Repair damaged areas by cutting patches of Vapor Barrier/Retarder, overlapping damaged area 6 -inches and taping all four sides with tape.
   1. Do not use concrete adhesion tape to repair penetrations.

E. Where differential settlement is possible, adhere the vapor retarder at building perimeter and in a grid pattern every 4 -feet on-center with integrally bonded detail tape for concrete adhesion.

3.04 PROTECTION

A. Protect under-slab vapor retarder sheets from puncture during installation. Patch punctures before proceeding with subsequent construction.
   1. Screed-pins and similar implements that can/will puncture the under-slab vapor barrier are prohibited.

B. Install runway planks in construction traffic lanes until slabs are poured.

3.05 FIELD QUALITY CONTROL

A. See Section 01 4000 - Quality Requirements, for additional requirements.

B. Under-Slab Vapor Retarder Membrane: Conduct a visual inspection, in the presence of the Architect/Engineer, of the entire Retarder installation the day before placing concrete. Make all necessary corrections prior to placing concrete.

C. Take digital photographs of each portion of the installation prior to covering up.

D. Inspections: Materials and installation are subject to inspection for compliance with requirements. Inspections may include the following:
   1. Continuity of membrane has been achieved throughout the building slab-on-grade with no gaps or holes.
   2. Continuous structural support of membrane has been provided.
   3. Site conditions for application temperature and dryness of substrates have been maintained.
   4. Maximum exposure time of materials to UV deterioration has not been exceeded.
   5. Surfaces have been primed, if applicable.
   6. Laps in membrane have complied with minimum requirements and have been shingled in the correct direction (or mastic has been applied on exposed edges), with no fish-mouths.
   7. Termination sealant has been applied on cut edges.
   8. Transition membrane has been firmly adhered to substrate.
   9. Compatible materials have been used.
   10. Transitions at changes in direction and structural support at gaps have been provided.
   11. Connections between assemblies (membrane and sealants) have complied with requirements for cleanliness, preparation and priming of surfaces, structural support, integrity, and continuity of seal.
   12. All penetrations have been sealed.

3.06 PROTECTION

A. Do not leave materials exposed to weather longer than recommended by manufacturer.

END OF SECTION 07 2600

SECTION 07 2633

WATER VAPOR EMISSION CONTROL COATING

PART 1 GENERAL

1.01 SUMMARY

A. Epoxy type, environmentally safe, 100 percent solids, water vapor emission and alkalinity control coating. A Moisture Mitigation and Alkalinity Control System as defined in ASTM F3010.

B. Cementitious leveling underlayment applied over moisture mitigation coating as required by specific flooring adhesive to be used at each finish flooring condition.
   1. Coordinate all flooring manufacturers adhesive requirements for submitted flooring materials in each area to determine requirements for flooring adhesive underlayments.

1.02 RELATED REQUIREMENTS

A. Section 01 4000 - Quality Control for product manfacturer's independent laboratory qualifications.

B. Section 01 6116 - VOC Restrictions.

C. Division 03 section specifying Cast-in-Place Concrete for concrete slab substrate.

D. Division 09 Section specifying concrete floor surface preparation.

E. Division 09 Section specifying floor moisture and pH testing.

F. Division 09 Floor Covering Sections, for installation requirements and to verify compatibility with the floor covering manufacturer’s adhesives.

1.03 REFERENCED STANDARDS

A. California Code of Regulations, Title 24, Part 2, California Building Code (CBC), International Building Code, with California Amendments.

B. California Code of Regulations, Title 24, Part 11 California Green Building Standards Code, “CAL-Green”.

C. American Concrete Institute:
   1. ACI 318 – Building Code Requirements for Structural Concrete.

D. ASTM International:
   1. ASTM C109 - Standard Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2-in. Cube Specimens).
   2. ASTM D1308 – Standard Test Method for Effort of Household Chemicals on Clear and Pigmented Organic Finishes.
   3. ASTM D1653-03(2008) Standard Test Methods for Water Vapor Transmission of Organic Coating Films
   4. ASTM D7234-12 – Standard Test Method for Pull-Off Adhesion Strength of Coatings on Concrete Using Portable Pull-Off Adhesion Testers
   5. ASTM E96 – Standard Test Methods for Water Vapor Transmission of Materials.
   6. ASTM E1155 Standard Test Method for Determining FF Floor Flatness and Fl Floor Levelness Numbers
   7. ASTM F2170-09 Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using in situ Probes.
   8. ASTM F3010 - 13 Two-Component Resin Based Membrane-Forming Moisture Mitigation Systems for Use Under Resilient Floor Coverings.

E. International Concrete Repair Institute (ICRI) Guideline No. 03732- Selecting and Specifying Concrete; Surface Preparation for Sealers, Coatings and Polymer Overlays.

F. EPA Method 24 VOC Content Testing.

1.04 DEFINITIONS

A. Water Vapor Emission Control Coating (Moisture Mitigation Control System): A sequence of products applied on a concrete floor to isolate moisture and high pH in the concrete from adhesive and finish floor covering.

B. Water Vapor Emission Control Barrier: Coating applied on concrete floor that acts as the primary barrier to moisture movement.

C. Underlayment: Trowelable or pourable cementititous patching/leveling compounds to which the finish floor covering is adhered. Underlayment is installed on top of the Water Vapor Emission Control Barrier.

1.05 SUBMITTALS

A. General: Submit in accordance with Section 01 3300.

B. Provide complete submittals at the same time as submittals for work in related sections to permit review of complete and integrated systems and assemblies.

C. Product Data: For each type of product indicated, demonstrate compliance with specified attributes.
1. Include detailed installation requirements, spread rates, joint and crack treatment and final barrier surfaces for floor coverings.
2. ASTM Reports: Certified laboratory reports for specified ASTM performance.
3. Extended Warranty Certificate: Manufacturers standard 15 year warranty for manufacturing defects and on site material performance. Warranty shall not list ACI-318 compliance exclusions.
4. Pail Labels: Collect and submit each original pail label of Water Vapor Emission Control Coating installed. Copies are not acceptable. If pail labels are not removable, provide pails.

D. Quality Control Post-Testing: Tensile pull-off testing results per ASTM D7234 performed by Owner's Testing Agency prior to floor covering installation.

E. CAL-GREEN Submittals: Product Data – VOC Limits: For adhesives sealants, fillers, primers and coatings, documentation including printed statement of VOC contents, comply with limits specified in related section.

F. Shop Drawings: Floor Plans, indicating areas of installation, sequencing, and total area of installation in square feet.

G. Manufacturer Certification: Provide letterhead documentation of complete review of concrete mix designs, admixtures, sub-slab vapor retarder installation and curing methods with written acceptance prior to installation.

H. Installer Proof of Qualification: Factory licensed, approved or certified applicator certificate signed by the manufacturer.

1.06 QUALITY ASSURANCE

A. Manufacturer Qualifications: Manufacturer shall have not less than five years experience in manufacturing floor moisture mitigation systems. The products shall be specifically

formulated and marketed to reduce concrete floor moisture vapor interaction with resilient floor coverings and for pH control.

B. Installer Qualifications: Installer shall have not less than five years experience installing the selected fluid based coating systems, shall be trained by the manufacturer, experienced in surface preparation and application of the material and shall be subject to inspection and control by the manufacturer.

C. Pre-installation Testing:
   1. Document floor and building conditions are within acceptable limits of temperature, relative humidity, and concrete condition before proceeding with product application.
   2. File a pre-installation checklist with the manufacturer and receive written confirmation of approval to proceed to support manufacturer's 10-year warranty.

D. Product Performance:
   1. Manufacturer shall provide independent laboratory test reports documenting the following:
      a. Water vapor transmission by ASTM E96 (water method) or ASTM D1653 indicating a maximum 0.1 perms net for coating on concrete.
      b. Warrant no loss in moisture-resistance properties for a period of ten years of exposure to continuous water contact and pH greater than 10 after final cure.

E. Mock-Up: Provide a mock-up for evaluation of surface preparation techniques and moisture mitigation system application workmanship.
   1. Mockup area of at least 200 sq ft in location approved by Architect / Owner.
   2. Do not proceed with work until mockup workmanship and underlayment surface appearance are approved by manufacturer's representative and Owner's representative.
   3. Mockup bond tests: Owner's Testing Agency will perform tensile bond tests in triplicate on mockup, no sooner than 72 hours after installation is completed, according to ASTM D7234 through entire Water Vapor Emission Control Coating into concrete substrate. Comply with the following:
      a. No cohesive failure of leveling underlayment with at least 200 psi, or tensile failure in concrete substrate with no inter-layer or intra-layer failure of Water Vapor Emission Control Coating.
      b. If failure occurs, determine cause and method(s) to avoid further unacceptable work. Remove and re-apply mock-up area as required to produce acceptable work. Do not proceed with installation of Water Vapor Emission Control Coating until bond test results meet requirements above and are acceptable to Water Vapor Emission Control Coating manufacturer.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Deliver products to the job site in their original unopened containers, clearly labeled with the manufacturer's name and brand designation.

B. Store products in an approved ventilated dry area; protect from dampness, freezing, and direct sun light. Do not store in areas with temperatures in excess of manufacturer's written instructions.

C. Handle product in a manner that will prevent breakage or leakage of containers and damage to products.

D. Use products before manufacturer's expiration dates.

1.08 PROJECT CONDITIONS

A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits required by moisture mitigation system manufacturer. Do not install products under environmental conditions outside manufacturer's limits.

B. Do not apply Water Vapor Emission Control Coating to unprotected surfaces or when moisture is present on the surface of the concrete.

C. Do not apply Water Vapor Emission Control Coating when air or floor temperature is lower than 50 degrees F (10 degrees C) or expected to fall below this temperature within 24 hours from time of application.

D. Install Water Vapor Emission Control Coating only when concrete floor surface temperature is a least 5 degrees Fahrenheit above the dewpoint temperature of the air over the floor. Maintain and document coated floor surface temperature at least 5 degrees Fahrenheit above air dewpoint temperature for at least 24 hours after application.

E. Provide continuous ventilation and air movement at all times during application and curing process of the moisture mitigation system.

F. Protect work to prevent damage that will affect performance and the finished underlayment surface.

1.09 WARRANTY

A. Extended Warranty: Warranty shall provide, at Owner's option, repair or replacement of the Water Vapor Emission Control Coating and flooring damaged due to failure of the Water Vapor Emission Control Coating during the warranty period. Warranty definition of damage shall include at least the following:
   1. Distress of flooring caused by moisture including but not limited to
      a. Adhesive deterioration resulting in loss of flooring bond to the floor;
      b. Formation of bubbles, mole trails, lumps, bumps, seam separation, or other significant displacement that interferes with the intended use of the flooring;
   2. Distress of the Water Vapor Emission Control Coating including but not limited to
      a. Deformation of patching/leveling compounds installed under the Water Vapor Emission Control Coating;
      b. Adhesive or cohesive failure of Water Vapor Emission Control Coating components;
      c. Distress of underlayment above the Water Vapor Emission Control Coating such as delamination, disbanding, expansion, chemical reaction, or other deformation or displacement that interferes with the intended use of the flooring.

B. Water Vapor Emission Control Coating Warranty coverage shall commence on the date of completion of flooring installation.

C. Warranty shall include the replacement of Water Vapor Emission Control Coating, flooring system, patching compounds, installation accessories flooring materials and labor costs.
   1. Warranty shall not exclude or become void due to non-conformance to ACI-318 parameters, dew-point, concrete salts, admixtures, resin and silicate surface treatments or cohesive substrate failure in the concrete surface due to normal concrete movement. Installation of Water Vapor Emission Control Coating indicates acceptance of site conditions.

PART 2 PRODUCTS

2.01 SYSTEM DESCRIPTION

A. Comply with product requirements of ASTM F3010: Non-corrosive, low viscosity, high gloss, microbial resistant, moisture-alkaline resistant coating to suppress, control and mechanically restrict water emission and pH level of concrete substrates for compliance with subsequent floor coverings or coating materials.

B. Coating product must contain 100% epoxy resin solids. Products based on silicate chemistry, potassium, sodium, lithium, and similar formulations, water-based acrylics, or resin formulations containing or mixed with water, are not acceptable and will be rejected.

C. Barrier Coating Requirements: It is the intent of this section and the drawings to require a complete barrier system. Any items not specifically noted but necessary for a complete barrier system shall be provided under this section.
   1. Coating shall be compatible with all types of floor covering products, no system failures due to improper installations and contain no water/alkaline soluble compounds.
   2. Coating shall have a sufficient density to reduce water vapor transmission, avoid water vapor damage to other adhered systems and resistant to most commonly encountered acids/solvents in case of topical exposure (spills).
   3. Coating shall be resistant to mold, mildew and biological growth when applied to prepared substrates

2.02 PERFORMANCE REQUIREMENTS

A. Moisture and Alkalinity: Barrier shall remain tolerant to alkalinity of 14 pH per ASTM D1308 and to 100% relative humidity per ASTM F2170.

B. Water Vapor Transmission:
   1. Manufacturer shall provide independent laboratory test reports documenting the following:
      a. Water vapor transmission by ASTM E96 (water method) or ASTM D1653 indicating a maximum 0.1 perms net for coating on concrete.
      b. Warrant no loss in moisture-resistance properties for a period of fifteen years of exposure to continuous water contact and pH greater than 8 after final cure.

2.03 WATER VAPOR EMISSION CONTROL COATING

A. Source Limitations: Provide materials approved by one Water Vapor Emission Control Coating manufacturer including moisture-resistant concrete patching and leveling compounds for use under Water Vapor Emission Control Coating, primers, coatings, sand, and underlayment leveling/patching compounds.

B. Basis of Design: VAP I 2000 Zero VOC family of products by Koster Waterproofing Systems. Subject to compliance with requirements specified in this section, provide one of the following products:
   1. VAP I 2000 Zero VOC family of products by Koster Waterproofing Systems, www.kosterusa.com.
      a. VAP I 2000 Zero VOC, twelve hour cure time to final flooring.
      b. VAP I 2000 FS (Fast Set); four hour cure time to final flooring.
      c. VAP I 2000 UFS (Ultra Fast Set); two hour cure time to final flooring.
   2. A C Tech ® 2170 FC ZERO System: by Allied Construction Technologies, Inc. www.actamerican.net, www.combimix.com..
   3. VaporTight SG3 by Aquafin, www.aquafin.net.
   4. MC ™ RAPID by Ardex, www.ardexamericas.com.

5. Substitutions: See Section 01 6000.

C. Single Coat System: 2-component, VOC Compliant, 100% solids epoxy formulated as a vapor barrier against high moisture and alkalinity in concrete substrates. Apply at manufacturer's recommended rate, minimum average 15-mils (0.015-in.), to provide maximum 0.1 net perms (grains/hr/sq ft/in. Hg) water vapor transmission.
   1. Floor preparation in compliance with coating manufacturers written requirements and meeting warranty criteria.
   2. Manufacturer's approved bonding agent/primer
   3. Moisture Mitigation System Control Coating: Apply a single coat at manufacturer's recommended and tested coverage rate, minimum average to provide maximum 0.1 net perms (grains/hr/sq ft/per 1-inch Hg) water vapor transmission.
   4. Cementitious Leveling Underlayment: Manufacturer's approved.

D. Water Vapor Emission Control Coating: Epoxy resins and other chemical compounds; 100 % solids, specifically formulated chemicals and resins to provide the following properties. Coating product must contain 100% epoxy resin solids.
   1. Solid Content: 100%.
   2. VOC, mixed: 0 g/L.
   3. Flash Point: 200° F.
   4. Perm Rating, ASTM E96: Not to exceed 0.1 grains/ sq.ft. /hour in Hg.
   5. ASTM E 96, Water Vapor Transmission (wet methods) Performance shall be documented by an independent testing laboratory at a minimum 97% for water vapor transmission reduction compared to untreated concrete.
   6. ASTM D 1308; Insensitivity to alkaline environment up to, and including, pH 14 in a 14 day bath test.
   7. Certify acceptance and exposure to continuous topical water exposure after final cure.
   8. System must be able to perform as required with ASTM F2170 RH Probe readings of 100%.

E. Expansion Joint Treatment: By Coating manufacturer or approved by coating manufacturer and type recommended to suit site conditions.
   1. Basis of Design for KOSTER system: KOSTER Joint Sealant FS-H.

F. Non-Moving Crack Treatment: By Coating manufacturer or approved by coating manufacturer and type recommended to suit conditions indicated.
   1. Basis of Design for KOSTER system: KOSTER TA mixed with KOSTER VAP I 2000.

G. Self-Leveling Primer: By Coating manufacturer or approved by coating manufacturer and type recommended to suit site conditions.
   1. Basis of Design for KOSTER system: KOSTER VAP I® 06 Primer.
   2. Application: Applied over Moisture Mitigation System Coating Control System coating prior to installation of Underlayment.

H. Patching / Leveling Compounds: Formulated primarily of calcium aluminate or portland hydraulic cements, minimum compressive strength 3,000 psi at 28 days when tested in accordance with ASTM C109. Patching / Leveling compounds that rely primarily on gypsum for their cementing properties shall not be used.
   1. By Coating manufacturer or approved by coating manufacturer and type recommended to suit site conditions.
   2. Basis of Design for KOSTER system: KOSTER SL, Cementitious Underlayment.

I. Surface treatment for concrete contaminated with Soluble Silicates: By Coating manufacturer or approved by coating manufacturer and type recommended to suit conditions indicated.
   1. Basis of Design for KOSTER system: KOSTER IB.

2. Application: Apply to contaminated concrete prior to Moisture Mitigation System Coating Control System Sealer application.

PART 3 EXECUTION

3.01 EXAMINATION

A. Site Verification: Verify substrate conditions are acceptable for a warranted system.

B. Verify new concrete floors have cured minimum 28 days.

C. Verify concrete cleaned by shot blasting or other mechanical abrasion as specified in related section to an ICRI CSP-3 to CSP-4 profile and is not excessively rough for sealing at specified moisture mitigation coating application rates.
1. Verify removal of dirt, oils, films, and other materials detrimental to sealer application.

D. Examine substrates, with Installer present, for compliance with requirements for surface contamination, damage, and other conditions affecting performance of the Work.

E. Examine substrate to determine repairs required to restore substrate surface to be within tolerances required for floor finishes specified in other sections, prior to completing Work of this section.

F. Examine substrate to verify surfaces prepared in accordance with this section will be suitable for application of finishes specified in other sections.

G. Prepare written report, endorsed by Installer, listing conditions detrimental to performance with recommendations for methods and materials required to correct conditions before proceeding with work of this section.

H. Proceed with surface preparation only after unsatisfactory conditions have been corrected.
1. Proceeding with surface preparations indicates acceptance and of surfaces and conditions of substrate.

I. Verify items which penetrate concrete substrate to receive coating are securely installed and coating installation will not affect proper installation and warranty requirements.

J. Surfaces shall be free of water, rain, snow and frost.

3.02 PREINSTALLATION TESTING

A. Moisture and pH Testing: As specified in related Section 09 0512.

B. Verify relative humidity testing in accordance with ASTM F2170 and alkalinity-pH testing is completed using methods specified and acceptable results obtained.

3.03 PREPARATION

A. Surface Preparation: As specified in related Section 09 0511.

B. Protection: Mask and protect walls, equipment from adjacent work and finishes during installation process.

C. Concrete Fiber Reinforcement, if present after shot blasting, shall be burned off, scraped and vacuumed, leaving no fibers protruding from the concrete surface.

D. Cleaning: Broom-sweep and vacuum slab surfaces to remove contaminants.

E. Do not acid etch surface. Do not apply water to surface.

F. Joints and Cracks: Fill cracks, construction joints, sawcut control joints, and surface irregularities with crack repair compound.

1. Route cracks with 4 to 6-inch diameter x 0.060-inch diamond abrasive wheel to not more than 1-1/8 to 1-1/4-inch depth. Clean by vacuum to remove dust and residue.
2. Mix and apply crack repair compound according to manufacturer's instructions using gravity feed.
3. Fill cracks to within 1/8-inch. of surface, add sand and apply additional crack repair compound to saturate sand and slightly overfill crack.
4. Scrape or lightly grind flush after curing to provide a level surface for Water Vapor Emission Control Coating.
5. Fill cracks completely to stabilize against concrete movement and to provide moisture barrier.

3.04 INSTALLATION

A. Apply Water Vapor Emission Control Coating where relative humidity and alkalinity tests do not meet flooring manufacturers requirements for floor finishes:

B. Apply Water Vapor Emission Control Coating based on relative humidity and alkalinity test results in strict compliance with the manufacturer's written instructions.

C. Water Vapor Emission Control Coating System Application:
1. Coverage rates are dependent on the surface texture and porosity of the substrate.
2. Apply sufficient coating to achieve the manufacturer's recommended minimum film thickness using manufacturer's recommended squeegee or roller. Periodically check application rate and wet film thickness. Follow manufacturer's recommended curing times.
3. Two-coat system: Apply sand broadcast to rejection into second coat according to manufacturer's written instructions. After curing, remove excess sand by sweeping and vacuuming.

D. Cementitious Underlayment System:
1. Self-Leveling Cementitious Underlayment:
   a. One-coat Water Vapor Emission Control Coating without sand broadcast, apply primer to coating. Do not exceed manufacturer's recommended application rate and film thickness. Thicker primer can lead to cracking of underlayment. Allow manufacturer's specified cure time. Do not exceed manufacturer's specified open time. Mix and pour the underlayment product on the floor and disperse with the approved spreader, followed by smoothing the material with the approved smoother. Wear cleated shoes to avoid leaving marks.
   b. Do not exceed maximum application thickness specified by underlayment manufacturer. Provide a smooth, uninterrupted, level finish without bumps, clumps, depressions, or other defects that would reflect through flooring.
   c. Floor finish shall be flat to within 1/8-inch. in 10 ft, and as measured by ASTM E1155. Provide Ff of 50 and Fl of 30.
2. Inspect and Repair defects:
   a. Inspect hardened underlayment for flatness.
   b. Lightly sand flat any bumps in the underlayment. Unhydrated or partially hydrated clumps of underlayment cement shall be removed by carefully chiseling and patching with compatible trowel-applied patching compound recommended by underlayment manufacturer. Do not penetrate the moisture mitigation coating.
   c. Fill low spots with compatible trowel-applied patching compound recommended by underlayment manufacturer. Sand smooth to remove trowel marks.

E. Allow surfaces to cure and re-apply additional coats as required to form a uniform control layer.

3.05 FIELD QUALITY CONTROL

A. Manufacturer and installer to guarantee installed Water Vapor Emission Control Coating is compatible with all specified floor coverings.

B. Post-Installation Testing: Owner's Testing Agency to perform the following testing:
   1. Tensile bond tests: Perform tensile bond tests in triplicate, at the same rate as Relative Humidity testing specified in related section, no sooner than 72 hours after installation is completed, according to ASTM D7234 through entire Water Vapor Emission Control Coating into concrete substrate. Comply with the following:
      a. No cohesive failure of leveling underlayment with at least 200 psi, or tensile failure in concrete substrate with no inter-layer or intra-layer failure of Water Vapor Emission Control Coating.
   2. Repair failed test locations at no cost to Owner and re-test to demonstrate compliance.

3.06 PROTECTION

A. Protect each coat from damage due to traffic, topical water and contaminants during required cure period until acceptance by related floor covering section.

END OF SECTION 07 2633

SECTION 07 4113
METAL ROOF PANELS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Vapor barrier, z-furring, insulation, cover board, underlayment and metal roofing system of preformed panels.

B. Fastening system.

C. Factory finishing.

D. Accessories and miscellaneous components: Flashings, fasteners, and accessories as required for weatherproof installation.

1.02 RELATED REQUIREMENTS

A. Pertinent Sections specifying Volatile Organic Compound (VOC) Content Restrictions.

B. Section 06 1000 - Rough Carpentry: Roof sheathing.

C. Section 07 2216 – Roof Insulation.

1.03 REFERENCE STANDARDS

A. ASTM A792/A792M - Standard Specification for Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the Hot-Dip Process.

B. ASTM D1970/D1970M - Standard Specification for Self-Adhering Polymer Modified Bituminous Sheet Materials Used as Steep Roofing Underlayment for Ice Dam Protection.

C. ASTM E96/E96M - Standard Test Methods for Water Vapor Transmission of Materials.

D. ASTM E1646 - Standard Test Method for Water Penetration of Exterior Metal Roof Panel Systems by Uniform Static Air Pressure Difference.

E. ASTM E1680 - Standard Test Method for Rate of Air Leakage Through Exterior Metal Roof Panel Systems.

F. California Code of Regulations, Title 24, Part 2, California Building Code (CBC), International Building Code

G. California Code of Regulations, Title 24, Part 11 California Green Building Standards Code, “CAL-Green”.

H. Sheet Metal and Air Conditioning Contractors National Association: "Architectural Sheet Metal Manual".

I. ASTM E108 – Standard Test Methods Fire Tests of Roof Coverings.

J. ASTM E1592 Standard Test Method for Structural Performance of Sheet Metal Roof and Siding Systems by Uniform Static Air Pressure Difference.

K. American Society of Civil Engineers (ASCE):

1. ASCE 7 Minimum Design Loads for Buildings and Other Structures.

1.04 SUBMITTALS

A. General: Submit in accordance with Section 01 3300.

B. Product Data: For each type of product indicated, demonstrate compliance with specified attributes. Manufacturer's data sheets on each product to be used, including:
   1. Summary of test results, indicating compliance with specified requirements.
   2. Storage and handling requirements and recommendations.
   3. Installation methods.
   4. Specimen warranty.

C. CAL-GREEN Submittals: Product Data.
   1. VOC Limits: For adhesives sealants, fillers, primers and coatings, documentation including printed statement of VOC contents, comply with limits specified in related section.
   2. Product Test Reports: For roof materials, indicating that roof materials comply with Solar Reflectance Index requirement and demonstrate Cool Roof Rating Council (CRRC) listing.

D. Shop Drawings: Include layouts of roof panels, details of edge and penetration conditions, spacing and type of connections, flashings, underlayments, details of trim, gutter, ridge, curved panel and flashing conditions, fastening and anchorage methods, weatherproofing techniques, terminations, and flashing of each type of penetrations, and special conditions.
   1. Show work to be field-fabricated or field-assembled.
   2. Not used.
   3. Indicate metal thickness and finishes, panel lengths, joining details, anchorage details, flashings and special fabrication provisions for termination and penetrations; purlin and girt locations, thermal expansion provisions and special supports.
   4. Include roof plan showing clip spacing at ridge, eave and field.
   5. Indicate relationships with adjacent and interfacing work. Demonstrate continuity of air barriers with related wall assemblies and roof underlayment.
   6. Shop drawings must be completed by the metal roof panel manufacturer's engineering department.
   7. All changes recommended by Contractor must be approved by the manufacturer in writing prior to submittal.

E. Selection Samples: For each roofing system specified, submit color chips representing manufacturer's full range of available colors and patterns.

F. Verification Samples: For each roofing system specified, submit samples of minimum size 12 inches square, representing actual roofing metal, thickness, profile, color, and texture.
   1. Include typical panel joint in sample.
   2. Include typical fastening detail.

G. Fire rating certifications per ASTM E-108 per CBC, Chapter 15, 1505.

H. Warranty: Submit specified manufacturer's warranty and ensure that forms have been completed in Owner's name and are registered with manufacturer.

1.05 SCHEDULING AND SEQUENCING

A. Include in construction schedule:
   1. When field measurement for factory production will be taken.
   2. Order and delivery time.
   3. Installation period.

B. Determine that work of other trades will not hamper or conflict with necessary fabrication and storage requirements for preformed metal roofing system.

C. Schedule field measurements far enough in advance, to permit fabrication of panels to required lengths without delay to the construction schedule.

D. Sequence installation to avoid other activities over metal roofing.

E. Do not cover underside of metal roofed areas until water intrusion test has been performed.

1.06 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in the manufacture of roofing systems similar to those required for this project.
   1. Not less than 5 years of documented experience.

B. Installer Qualifications: Company specializing in the type of work specified, with not less than five (5) years of documented experience; trained and authorized by roofing system manufacturer with written certification from manufacturer.
   1. Maintain a full-time supervisor/foreman with minimum of five (5) years experience with the installation of system similar to that specified on the job-site at all times during installation of new roof system.
   2. Upon Owner request, fabricator/installer shall submit work experience and evidence of adequate financial responsibility. The owner's representative reserves the right to inspect fabrication facilities in determining qualifications.

C. Manufacturer's Testing Agency Qualifications: Qualified according to ASTM E 699 for testing indicated.

D. Manufacturer inspections:

   1. Manufacturer shall provide inspections a minimum of three times per week as well as a punch list and final inspection.

   2. Roofing system manufacturer shall provide inspection reports a minimum of every week to the owner’s representative verifying work is per the shop drawings.

   3. Inspector shall be a full time employee of the roofing system manufacturer.

E. Product Options: Information on Drawings and in Specifications establishes requirements for systems' aesthetic effects and performance characteristics. Aesthetic effects are indicated by dimensions, arrangements, alignment, and profiles of components and assemblies as they relate to sightlines, to one another, and to adjoining construction. Performance characteristics are indicated by criteria subject to verification by one or more methods including preconstruction testing, field testing, and in-service performance.
   1. Do not revise intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If revisions are proposed, submit comprehensive explanatory data to Architect for review.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Provide strippable plastic protection on prefinished roofing panels for removal after installation.

B. Store roofing panels on project site as recommended by manufacturer to prevent damage to panels prior to installation.

C. Order materials based on field measurements, not on construction drawings.

D. Deliver, store, protect and handle products to site under provisions of Section 01 6000 - Product Requirements.

E. Coordinate delivery schedule with installation schedule. Do not deliver materials of this section to project site until suitable facilities for storage and protection are available.

F. Protect materials from damage during transit and at project site. Store under cover, off ground, sloped to provide positive drainage, protected from wind, foreign material contamination, mechanical damage, cement, lime or other corrosive substances. Do not expose materials with strippable protective film to direct sunlight or extreme heat.
   1. Store preformed and prefinished material to prevent twisting, bending, or abrasion, and to provide ventilation. Slope metal sheets to ensure drainage.
   2. Provide protective interleaving between contact areas of exposed surfaces to prevent abrasion during shipment, storage, and handling.
   3. Prevent contact with materials which may cause discoloration or staining

G. Inspect materials upon delivery. Reject and remove physically damaged or marred material from project site.

H. Do not allow storage of other materials or allow staging of other work on installed metal panel roof system.
   1. Do not overload roof with stored materials.
   2. Do not support roof mounted equipment directly on roofing system.

1.08 DESIGN AND PERFORMANCE CRITERIA

A. Thermal Expansion and Contraction.

1. Completed metal roofing and flashing system shall be capable of withstanding expansion and contraction of components caused by changes in temperature without buckling, producing excess stress on structure, anchors or fasteners, or reducing performance ability.

2. The design temperature differential shall be not less than 200 ºF.

B. Uniform Wind Uplift Load Capacity.

1. Installed roof system shall withstand negative (uplift) design wind loading pressures complying with the following criteria.

a. Design Code: ASCE 7, Method 2 for Components and Cladding.

b. Panel Safety Factor: 1.650 after any load reduction or material stress increase.

c. Importance Class III Building with an Importance Factor of 1.00.

d. Wind Speed: as calculated.

e. Exposure Category: C.

2. Capacity shall be determined using pleated airbag method in accordance with ASTM E 1592, testing of sheet metal roof panels. Allowable safe working loads shall be determined by dividing the ultimate test load by the safety factor specified above.

C. Uniform Positive Load Capacity:

1. The installed roof system shall be capable of resisting the following positive uniform roof loads: Roof Live Load of 20 psf.

2. Installed roof system shall carry positive uniform design loads with a maximum system deflection of L/180 as measured at the rib (web) of the panel.

D. Underwriters' Laboratories, Inc., (UL) fire resistance P ratings for roof assemblies: If applicable, panel system shall be approved for use in an appropriate Construction Assembly, as defined by UL 263.

E. Class A fire rating per ASTM E108..

F. ASTM E283: Static pressure air infiltration (doors, windows, curtain walls):

1. Pressure Leakage Rate:

a. 15.0 PSF 0.015 cfm/sq.ft.

H. ASTM E331: Static pressure water infiltration (doors, windows, curtain walls):

1. Pressure Result:

a. 5 Gal/Hr per S.F. and Static No Leakage, Pressure of 20.0 Psf. for 15 minutes

I. ASTM E1680: Static pressure air infiltration (roof panels):

1. Pressure Leakage Rate:

a. 20.0 PSF 0.0027 cfm/sq.ft.

J. ASTM E1646: Static pressure water infiltration (roof panels):

1. Pressure Result:

a. 5 Gal/Hr per S.F. and Static No Leakage Pressure of 20.0 Psf. for 15 minutes

K. Capacities for gauge, span, or loading other than those tested may be determined by interpolation of test results within the range of test data. Extrapolation for conditions outside the test range is not acceptable.

1.09 **WARRANTY**

A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.

B. Finish Warranty: Provide manufacturer’s special warranty covering failure of factory-applied exterior finish on metal roof panels and agreeing to repair or replace panels that show evidence of finish degradation, including significant fading, chalking, cracking, or peeling within specified warranty period of 20 year period from date of Substantial Completion.

C. Waterproofing Warranty: Provide manufacturer’s warranty for watertight of roofing system, including agreement to repair or replace roofing that fails to keep out water within specified warranty period of 30 years from date of Substantial Completion.

1. Warranty must cover specified wind speed.

2. Warranty must cover all flashing and trim.

3. Provide single source warranty for metal roof, low slope roof and all sheet metal attached to metal roof.

PART 2 PRODUCTS

2.01 DESIGN REQUIREMENTS

A. Roof Panel System: Provide roof system with performance as specified when installed, designed in accordance with applicable codes.
   1. Make watertight.
   2. Make free from warp, wave and buckle.

B. Provide structural performance appropriate to substrate over which roof system is installed.

C. Design and size components to withstand loads caused by wind pressures as specified in applicable code.

D. Capacities for gauge, span or loading other than those tested may be determined by interpolation of test results within the range of test data. Extrapolation for conditions outside test range are not acceptable.

E. Drainage: Provide positive drainage to exterior for moisture entering building enclosure or condensation occurring within exterior building envelope.

2.02 MANUFACTURERS

A. Design is based on R-Mer Span, manufactured by Garland Co., Inc. or approved equal.

   1. UES (IAPMO) Evaluation Report (ER) 662.

B. Obtain all components of roof system from a single manufacturer including roll good materials if required to comply with metal roof manufacturer warranty. Secondary products required which cannot be supplied by the specified metal roof manufacturer must be those recommended and approved in writing by the specified metal roof manufacturer.

C. Substitutions: See Section 01 6000 - Product Requirements.
   1. Requests for substitution of proposed alternate systems must meet or exceed all performance requirements listed in Performance Criteria, Warranty and Quality Assurance Articles.
   2. Submit complete product, engineering and test data for each proposed substitution.

2.03 ARCHITECTURAL METAL ROOF PANELS

A. Metal Roofing: Provide complete engineered system complying with specified requirements and capable of remaining watertight while withstanding anticipated movement of substrate and thermally induced movement of roofing system.

B. Metal Panels: Factory-formed panels with factory-applied finish.
   1. Aluminum Panels:
      a. Aluminum alloy conforming to ASTM B209.
      b. Thickness: Minimum 0.040".
   2. Profile: Standing seam, with minimum 2 3/8 inch minimum seam height; concealed fastener system for field seaming with special tool.
      a. Symmetrical profile permitting removal of individual panels without removing adjacent panels.
   3. Texture: Smooth, with intermediate ribs for added stiffness.
   4. Length: Full length of roof slope, without lapped horizontal joints.
   5. Width: Maximum panel coverage of 18 inches.

2.04 ATTACHMENT SYSTEM

A. Concealed System: Provide manufacturer's standard stainless steel or galvanized steel concealed anchor clips designed for specific roofing system and engineered to meet performance requirements, including anticipated thermal movement.
   1. Concealed Z-furring: galvanized, 16 gauge, 40,000 psi yield.
   2. Concealed Anchor Clips: stainless steel, 16 gauge, 40,000 psi yield ONE (1) piece clip with projecting legs.
      a. Clip design: Isolate sealant in panel cap from contact with clip to limit sealant damage during expansion and contraction.
      b. Configured to maintain minimum clearance of 3/8 inch between panel and substrate for ventilation to reduce condensation and reduce contact of panel fastener head to panel.

B. Fasteners: As recommended by manufacturer for project conditions and panel type, concealed wherever possible.
   1. Concealed fasteners: Corrosion resistant steel screws designed to meet structural loading requirements. The normal minimum screw size shall be #14.
   2. Exposed fasteners: Corrosion resistant steel screws (cadmium or zinc coatings are not acceptable), stainless steel with neoprene sealing washer, or 3/16 inch diameter waterproof rivets with color matched finish.

2.05 PANEL FINISH

A. Fluoropolymer Coating System: Manufacturer’s standard multi-coat thermocured coating system, including minimum 70 percent fluoropolymer color topcoat with minimum total dry film thickness of 0.9 mil; color and gloss to match sample.

B. Concealed Surface Finish: Baked-on polyester coating with 0.20-0.30 mil DFT.

C. Color selected by Architect from the Manufacturer's standard color range.

2.06 ACCESSORIES AND MISCELLANEOUS ITEMS

A. Miscellaneous Sheet Metal Items: Provide flashings, gutters, downspouts, trim, moldings, closure strips, preformed crickets, caps, and equipment curbs of the same material, thickness, and finish as used for the roofing panels. Items completely concealed after installation may optionally be made of stainless steel.

B. Rib and Ridge Closures: Provide prefabricated, close-fitting components of steel with corrosion resistant finish, closed-cell synthetic rubber, neoprene, or PVC, or combination steel and closed-cell foam.

C. Sealants: As specified in Section 07 9005, except concealed seam sealant.
   1. Exposed sealant must cure to rubber-like consistency.
   2. Concealed sealant must be non-hardening, butyl type.
   3. Seam Sealant: Non-skinning, non-drying type recommended and factory-applied by roof panel manufacturer.
   4. Exposed sealant colors as selected by Architect, compatible with roof finish color.

D. Vapor barrier and underlayment:

   1. Primer: Intelliwrap SA Primer from www.IMETCO.com.

   2. Self-adhering rubber-modified asphalt sheet complying with ASTM D1970/D1970M; 50 mil total thickness; with strippable release film and woven polypropylene sheet top surface.
      a. Viking UDL.

E. Sealant: Tuff Stuff by The Garland Company.

F. Wire bulb strainers: stainless steel.

G. Gutter screens: powder coated aluminum.

1. www.greengutterscreens.com or approved equal.

H. Provide all miscellaneous accessories for complete installation.

2.07 FABRICATION

A. Form metal work true to required shape, accurate in size and radius, square and free from distortion or defects, with clear, sharp, straight, and uniform bends and rises. Hem exposed edges of flashings. Fabricate to predetermined exact lengths wherever possible. Cut panels to precise lengths indicated from field measurements.

B. Machine roll roof and flashing elements required to be curved or radiused. Do not field bend or "walk-down". Provide true curves, segmented fabrication not allowed.

C. Panels: Fabricate panels and accessory items at factory to the greatest extent possible, using manufacturer's standard processes as required to achieve specified appearance and performance requirements.

D. Joints: Factory-install captive gaskets, sealants, or separator strips at panel joints to provide watertight seals, eliminate metal-to-metal contact, and minimize noise from panel movements.

E. Accessories: Factory-fabricate trim and flashing components in longest practical lengths.
1. Provide mitered corners, joined using closed end pop rivets and joint sealant.

F. Roof-related Flashings: Provide as specified in related sections, as required by roofing material manufacturers and referenced standards. Coordinate work of this section with related sections. Provide complete systems without conflict or omission.
1. Fabricate roofing and related sheet metal work in accord with approved shop drawings and applicable standards.

PART 3 EXECUTION

3.01 EXAMINATION

A. Do not begin installation of preformed metal roof panels until substrates have been properly prepared.
1. Determine if work of other trades which penetrates the roof or is to be made watertight by the roof is in place and approved prior to installation of roofing.
2. Verify pipes, sleeves, or vents through roof are solidly set, reglets are in place, and nailing strips located.
a. Locate penetrations in the center of roofing panel.
3. Verify roofing termination, base flashings and gutter flanges are in place, sealed, and secure.
4. Notify Architect in writing if substrates are not suitable for application of panel system.
5. Do not proceed with installation until substrates are acceptable.

B. Structural surfaces: Smooth, even, sound, surface dry 19 percent maximum, clean and free of depressions, waves, or projections before material is applied.
1. Examine the alignment and placement of the building structure and substrate. Correct any objectionable warp, waves or buckles in the substrate before proceeding with installation of the preformed metal roofing. The installed roof panels will follow the contour of the structure and may appear irregular if not corrected.

C. Apply no materials during wet weather or on wet surface.

3.02 INTERFACE WITH OTHER WORK

A. Coordinate with roof accessories, miscellaneous sheet metal accessories, piping vents and other items specified in related sections penetrating metal roofing work. Avoid conflict or omission in waterproofing systems and provide watertight installation.

3.03 PREPARATION

A. Verify field dimensions prior to ordering materials.
   1. Establish straight side and crosswise benchmarks.
   2. Check rectangular roofs for squareness and straightness. Gable ends may not be straight; set a true line for the gable clips and flashing with stringline.
   3. Measure the roof lengthwise to confirm panel lengths, overhangs, coverage of flashings at eaves and ridges and verify clearances for thermal movement.

B. Broom clean wood sheathing prior to installation of roofing system.

C. Coordinate roofing work with provisions for roof drainage, flashing, trim, penetrations, and other adjoining work to assure that the completed roof will be free of leaks.

D. Coordinate installation of waterproof membrane over roof sheathing with 06 1000.

E. Remove protective film from surface of roof panels immediately prior to installation. Strip film carefully, to avoid damage to prefinished surfaces.

F. Separate dissimilar metals by applying a bituminous coating, self-adhering rubberized asphalt sheet, or other permanent method approved by roof panel manufacturer.

G. Where metal will be in contact with wood or other absorbent material subject to wetting, seal joints with sealing compound and apply one coat of heavy-bodied bituminous paint.

3.04 INSTALLATION

A. Overall: Install roofing system in accordance with approved manufacturer's shop drawings and panel manufacturer's instructions and recommendations, as applicable to specific project conditions. Anchor all components of roofing system securely in place while allowing for thermal and structural movement.
   1. Install vapor barrier, z-furring, insulation, gyp. board and underlayment.

   2. Install roofing system with concealed clips and fasteners, except as otherwise recommended by manufacturer for specific circumstances. Where exposed fasteners are unavoidable, use fasteners prefinished to match panels.

   3. Minimize field cutting of panels. Where field cutting is absolutely required, use methods that will not distort panel profiles. Use of torches for field cutting is absolutely prohibited.

B. Accessories: Install all components required for a complete roofing assembly, including flashings, gutters, downspouts, trim, moldings, closure strips, preformed crickets, caps, equipment curbs, rib closures, ridge closures, and similar roof accessory items.
   1. Install surface mounted reglets true to lines and levels. Seal top of reglets with sealant.

C. Flashings: Coordinate to provide weathertight conditions at roof terminations. Fabricate and install in accordance with standards of SMACNA Manual.
   1. Install flashings as shown on Drawings and approved shop drawings.
   2. Secure flashings in place using concealed fasteners.
   3. Cleat and seam all joints.

4. Apply plastic cement compound between metal flashings and felt flashings.
5. Fit flashings tight in place. Make corners square, surfaces true and straight in planes, and lines accurate to profiles and radius indicated or required.
6. Seal metal joints watertight with two parallel beads of sealant, do not permit sealant to migrate to exposed surfaces.
7. Install flashings to allow thermal movement.

D. Install underlayment on roof deck before installing preformed metal roof panels. Secure by methods acceptable to roof panel manufacturer, minimizing use of metal fasteners. Apply from eaves to ridge in shingle fashion, overlapping horizontal joints a minimum of 4 inches and side and end laps a minimum of 6 inches. Offset seams in successive layers of underlayment.
1. Cover entire surface under panels; holes or tears not permitted.
2. Install underlayment(s) in order to achieve a Class A Fire Rated Assembly per CBC.
3. Lap sheet metal flashings. All laps shall weather to exterior.
4. Double layer at changes in plane by extending 6 inches around corner from each side.
5. Install a 3'-0" wide additional layer of self-adhering underlayment at flashing and panel terminations (ridges, eaves, rakes, and roof penetrations).
6. Install one layer of peal and stick at hips and panel head.

E. Roof Panels: Install panels in strict accordance with manufacturer’s instructions, minimizing transverse joints except at junction with penetrations. Install panels plumb, level, and true to line.
1. Form watertight standing seams incorporating concealed clips, using an automatic mechanical seaming device approved by the panel manufacturer.
2. Fully interlock panels with adjacent panels; apply sealants as recommended by panel manufacturer to achieve watertight installation.
3. Provide sealant tape or other approved continuous joint sealer at lapped panel joints.
4. Install sealant or sealant tape, as recommended by panel manufacturer, at end laps and side joints.
5. Cut panels only at approved locations, and only where necessary to make openings for penetrations and field adjustments. Cut using a power saw with metal cutting blade.
    a. Back paint concealed metal surfaces with protective backing paint to a minimum dry film thickness of 0.45 mil.
6. Isolate dissimilar metals and masonry or concrete from metals with bituminous coating. Provide gasketed stainless steel fasteners between dissimilar metals.
7. Provide for temperature expansion/contraction movement of panels at roof penetrations and roof mounted equipment in accordance with panel manufacturer's product data and design calculations.

F. Anchorage shall allow for temperature expansion/contraction movement without stress or elongation of panels, clips, or anchors. Attach clips to structural substrate using fasteners of size, length and spacing as determined by manufacturer's design analysis to resist imposed loads.
1. Provide fastener head size beneath roof panel as recommended by panel manufacturer.
2. Limit exposed fasteners to extent indicated on shop drawings.

G. Do not allow shavings, metal dust, or chips to fall on panels.
1. Capture all drilling debris with a rag or cloth placed on the panels at the drilling operation.

H. Provide installed roof that is true to line and plane, free of dents, and physical defects with a minimum of oil canning.

3.05 CONSTRUCTION TOLERANCES

A. Maximum Alignment Variation: 1/4 inch in 20 feet, 3/8" in 40'-0" or more.

3.06 FIELD QUALITY CONTROL

A. Testing:
   1. Re-test until roof is shown to be watertight.

B. Manufacturer Field Services: Provide daily site inspection for a minimum of one (1) hour during active roofing operations by an experienced, full time employee of the roofing manufacturer. Submit written reports weekly.

3.07 CLEANING

A. Clean exposed sheet metal work at completion of installation. Remove grease and oil films, excess joint sealer, handling marks, and debris from installation, leaving the work clean and unmarked, free from dents, creases, waves, scratch marks, or other damage to the finish.

B. Touch up minor abrasions and exposed fasteners with matching paint provided by panel manufacturer. Remove and replace panels that cannot be satisfactorily touched up.
   1. No exposed sealant or visible raw metal.

C. Sweep and remove chips, shavings, and dust from roof on a daily basis during installation period. Leave installed work clean, free from grease, finger marks and stains.

D. Upon completion of installation, remove scraps and debris from project site.

3.08 PROTECTION

A. Do not permit storage of materials or roof traffic on installed roof panels. Provide temporary walkways or planks as necessary to avoid damage to completed work. Protect roofing until completion of project.

B. Touch-up, repair, or replace damaged roof panels or accessories before date of Substantial Completion.

END OF SECTION

SECTION 07 4213.23

METAL COMPOSITE MATERIAL WALL PANELS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Exterior cladding consisting of formed metal composite material (MCM) sheet, secondary supports, and anchors to structure, attached to solid backup.

B. Matching flashing and trim.

1.02 RELATED REQUIREMENTS

A. Pertinent Sections specifying Volatile Organic Compound (VOC) Content Restrictions.

B. Section 01 8113 - Sustainable Design Requirements.

C. Section 07 2500 - Weather Barriers: Weather barrier behind wall panel system.

D. Section 07 6200 - Sheet Metal Flashing and Trim: Metal flashing components integrated with this wall system.

E. Section 07 9200 - Joint Sealants: Sealing joints between siding and adjacent construction and fixtures.

1.03 REFERENCE STANDARDS

A. AAMA 2605 - Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels.

B. ASTM A276/A276M - Standard Specification for Stainless Steel Bars and Shapes.

C. ASTM A480/A480M - Standard Specification for General Requirements for Flat-Rolled Stainless and Heat-Resisting Steel Plate, Sheet, and Strip.

D. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar.

E. ASTM B209 / B209M - Standard Specification for Aluminum-Alloy Sheet and Plate.

F. ASTM C920 - Standard Specification for Elastomeric Joint Sealants.

G. ASTM D1781 - Standard Test Method for Climbing Drum Peel for Adhesives.

H. ASTM D1929 - Standard Test Method for Determining Ignition Temperature of Plastics.

I. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.

J. California Code of Regulations, Title 24, Part 2, California Building Code (CBC), International Building Code with California amendments.

K. California Code of Regulations, Title 24, Part 11, California Green Building Standards Code, “CAL-Green”.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Pre-Installation Meeting: Convene one week before starting work of this section to verify project requirements, co-ordinate with installers of other work, establish condition and completeness of building substrate, and review manufacturers' installation instructions and warranty requirements.
   1. Require attendance by the installer and relevant sub-contractors.

2. Review procedures for protection of work and other construction.

1.05 SUBMITTALS

A. See Section 01 3300 - Submittal Requirements, for submittal procedures.

B. Provide complete submittals at the same time as submittals for work in related sections to permit review of complete and integrated systems and assemblies.

C. For each type of product indicated, demonstrate compliance with specified attributes.

D. Product Data - MCM Sheets: Manufacturer's data sheets on each product to be used, including thickness, physical characteristics, and finish, and:
1. Finish manufacturer's data sheet showing physical and performance characteristics.
2. Storage and handling requirements and recommendations.
3. Fabrication instructions and recommendations.
4. Specimen warranty for finish, as specified herein.

E. CAL-GREEN Submittals: Product Data – VOC Limits: For adhesives sealants, fillers, primers and coatings, documentation including printed statement of VOC contents, comply with limits specified in related section.

F. Shop Drawings: Show layout and elevations, dimensions and thickness of panels, connections, details and dimensioned location of joints, sealants and gaskets, method of anchorage, number of anchors, supports, reinforcement, trim, flashings, and accessories.
1. Indicate panel numbering system.
2. Differentiate between shop and field fabrication.
3. Indicate substrates and adjacent work with which the wall system must be coordinated.
4. Include large-scale details of anchorages and connecting elements.
5. Include large-scale details or schematic, exploded or isometric diagrams to fully explain flashing at a scale of not less than 1-1/2 inches per 12 inches.

G. Selection Samples: For each finish product specified, submit at least three sample color chips representing manufacturer's standard range of available colors and patterns.

H. Verification Samples: For each finish product specified, submit at least three samples, minimum size 12 inch square, and representing actual product in color and texture.

I. Certificate: Certify that the work results of this section meet or exceed specified requirements.

J. Manufacturer's Qualification Statement.

K. Installer's Qualification Statement.

L. Maintenance Data: Care of finishes and warranty requirements.

M. Executed Warranty: Submit warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

1.06 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing wall panel systems specified in this section.
1. With not less than 10 years of documented experience.
2. Approved by MCM sheet manufacturer.
3. Submit contact names and phone numbers for at least three references connected with successful past projects.

B. Installer Qualifications: Company specializing in performing work of the type specified in this section.
   1. With minimum 10 of documented experience.
   2. Approved by wall panel system manufacturer.
   3. Submit contact names and phone numbers for at least three references connected with successful past projects.

C. Mock-Up: Provide a mock-up for evaluation of fabrication workmanship.
   1. Locate where directed.
   2. Provide panels finished as specified.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Deliver products in manufacturer's original, unopened, undamaged containers with identification labels intact.
   1. Protect finishes by applying heavy duty removable plastic film during production.
   2. Package for protection against transportation damage.
   3. Provide markings to identify components consistently with drawings.
   4. Exercise care in unloading, storing and installing panels to prevent bending, warping, twisting and surface damage.

B. Store products protected from exposure to harmful weather conditions and at temperature conditions recommended by manufacturer.
   1. Store in well ventilated space out of direct sunlight.
   2. Protect from moisture and condensation with tarpaulins or other suitable weather tight covering installed to provide ventilation.
   3. Store at a slope to ensure positive drainage of any accumulated water.
   4. Do not store in any enclosed space where ambient temperature can exceed 120 degrees F.
   5. Avoid contact with any other materials that might cause staining, denting, or other surface damage.

1.08 WARRANTY

A. MCM Sheet Manufacturer’s Finish Warranty: Provide manufacturer's written warranty stating that the finish will perform as follows for minimum of 20 years:
   1. Chalking: No more than that represented by a No.8 rating based on ASTM D4214.
   2. Color Retention: No fading or color change in excess of 5 Hunter color difference units, calculated in accordance with ASTM D2244.
   3. Gloss Retention: Minimum of 30 percent gloss retention, when tested in accordance with ASTM D523.

PART 2 PRODUCTS

2.01 VOC REQUIREMENTS

A. VOC Limits for adhesives, sealants, fillers, primers and coatings . Comply with limits specified in related section.

2.02 MANUFACTURERS

A. Metal Composite Material (MCM) Sheet Manufacturers:
   1. ALPOLIC Materials; ALPOLIC/fr (Fire Retardant core): www.alpolic-americas.com/#sle. ICC-ES Evaluation Report ESR-2653, expiration 9/2024.
   5. Substitutions: See Section 01 6000 - Product Requirements.

2.03 PANELS

A. Brake Metal Panels: ALPOLIC® Brake Metal formed of metal composite material sheet by routing back edges of sheet, removing corners, and folding edges.
   1. Maintain maximum panel bow of 0.8 percent of panel dimension in width and length; provide stiffeners of sufficient size and strength to maintain panel flatness without showing local stresses or read-through on panel face.
   2. Metallic Finished Panels: Maintain consistent grain of MCM sheet; specifically, do not rotate sheet purely to avoid waste.
   3. Fabricate as indicated on drawings and as recommended by MCM sheet manufacturer.
      a. Make panel lines, breaks, curves and angles sharp and true.
      b. Keep plane surfaces free from warp or buckle.
      c. Keep panel surfaces free of scratches or marks caused during fabrication.
   4. Provide joint details providing a watertight and structurally sound wall panel system that allows no uncontrolled water penetration on inside face of panel system.

2.04 MATERIALS

A. Metal Composite Material (MCM) Sheet: Two sheets of aluminum sandwiching a core of extruded thermoplastic material; no foamed insulation material content.
   1. Overall Sheet Thickness: 0.118 inch, minimum.
   2. Face Sheet Thickness: 0.019 inches, minimum.
   3. Alloy: Manufacturer's standard, selected for best appearance and finish durability.
   4. Bond and Peel Strength: No adhesive failure of the bond between the core and the skin nor cohesive failure of the core itself below 22.4 inch-pound/inch with no degradation in bond performance, when tested in accordance with ASTM D1781, simulating resistance to panel delamination, after 8 hours of submersion in boiling water and after 21 days of immersion in water at 70 degrees F.
   5. Surface Burning Characteristics: Flame spread index of 25, maximum; smoke developed index of 450, maximum; when tested in accordance with ASTM E84.
   6. Flammability: Self-ignition temperature of 650 degrees F or greater, when tested in accordance with ASTM D1929.

2.05 FINISHES

A. Fluoropolymer Coil Coating System: Polyvinylidene fluoride (PVDF) multi-coat superior performing organic coatings system complying with AAMA 2605, including at least 70 percent PVDF resin, with at least 80 percent of coil coated aluminum surfaces having minimum total dry film thickness (DFT) of 0.9 mils, 0.0009 inch.
   1. Manufacturers:
      a. Lumiflon® FEVE fluoropolymer resin in Valflon® finishes by Sherwin-Williams.
      b. Substitutions: See Section 01 6000 - Product Requirements.

B. Color(s) and Gloss(es) as selected by Architect from:
   1. Custom colors, to match Architect's sample or as otherwise selected by Architect.

2.06 ACCESSORIES

A. Flashing: Sheet aluminum; 0.040 inch thick, minimum; finish and color to match MCM sheet; refer to Section 07 6200 for additional requirements.

B. Anchors, Clips and Accessories: Use one of the following:
   1. Stainless steel complying with ASTM A276/A276M, ASTM A480/A480M, or ASTM A666.

C. Fasteners:

1. Screws: Self-drilling or self-tapping Type 410 stainless steel hex washer head, with EPDM or PVC washer under heads of fasteners bearing on weather side of metal wall panels.
2. Bolts: Stainless steel.
3. Fasteners for Flashing and Trim: Blind fasteners of high-strength aluminum or stainless steel.

D. Joint Sealer: Provide color to match wall panels silicone sealant of type approved by MCM sheet manufacturer, and in compliance with ASTM C920.
   1. Refer to Section 07 9200 for additional requirements.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine dimensions, tolerances, and interfaces with other work.
   1. Verify that weather barrier system is properly installed, refer to Section 07 2500 for requirements.

B. Examine substrate on-site to determine that conditions are acceptable for product installation in accordance with manufacturers written instructions.

C. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

D. Notify Architect in writing of conditions detrimental to proper and timely completion of work, and do not proceed with erection until unsatisfactory conditions have been corrected.

3.02 PREPARATION

A. Protect adjacent work areas and finish surfaces from damage during installation.

3.03 INSTALLATION

A. Do not install products that are defective, including warped, bowed, dented, and broken members, and members with damaged finishes.

B. Comply with instructions and recommendations of MCM sheet manufacturer and wall system manufacturer, as well as with approved shop drawings.

C. Install wall system securely allowing for necessary thermal and structural movement; comply with wall system manufacturer's instructions for installation of concealed fasteners.

D. Install panels and flashing with matching directional finish orientation, avoid rotation that will resul t in visible variations between pieces.

E. Do not handle or tool products during erection in manner that damages finish, decreases strength, or results in visual imperfection or failure in performance. Return component parts that require alteration to shop for refabrication, if possible, or for replacement with new parts.

F. Do not form panels in field unless required by wall system manufacturer and approved by the Architect; comply with MCM sheet manufacturer's instructions and recommendations for field forming.

G. Separate dissimilar metals; use gasket fasteners, isolation shims, or isolation tape where needed to eliminate possibility of electrolytic action between metals.

H. Where joints are designed for field applied sealant, seal joints completely with specified sealant.

I. Install flashings as indicated on shop drawings. At flashing butt joints, provide a lap strap under flashing and seal lapped surfaces with a full bed of non-hardening sealant.

J. Install square, plumb, straight, and true, accurately fitted, with tight joints and intersections maintaining the following installation tolerances:
   1. Variation From Plane or Location: 1/2 inch in 30 feet of length and up to 3/4 inch in 300 feet, maximum.
   2. Deviation of Vertical Member From True Line: 0.1 inch in 25 feet run, maximum.
   3. Deviation of Horizontal Member From True Line: 0.1 inch in 25 feet run, maximum.
   4. Offset From True Alignment Between Two Adjacent Members Abutting End To End, In Line: 0.03 inch, maximum.

K. Replace damaged products.
   1. Exception: Field repairs of minor damage to finishes are permitted only when approved in writing by Architect, panel manufacturer, and fabricator.
   2. Field Repairs to Finishes: Using materials and methods sufficient that repairs are not discernible when viewed at distance of 5 feet under all typical light conditions experienced at the project. Before proceeding with field repairs, obtain Architect's written approval of a test patch repair on a scrap panel not part of the final installation.

3.04 FIELD QUALITY CONTROL

A. Wall System Manufacturer's Field Services: Provide field services consisting of product use recommendations and periodic site visits for inspection of product installation in accordance with instructions.

B. Site Visits: Schedule two site visits during execution of installation.

3.05 CLEANING

A. Ensure weep holes and drainage channels are unobstructed and free of dirt and sealants.

B. Remove protective film after installation of joint sealers, after cleaning of adjacent materials, and immediately prior to completion of work.

C. Remove temporary coverings and protection of adjacent work areas.

D. Clean installed products in accordance with manufacturer's instructions.

3.06 PROTECTION

A. Protect installed panel system from damage until Date of Substantial Completion.

END OF SECTION 07 4213.23

SECTION 07 6200
SHEET METAL FLASHING AND TRIM

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Fabricated sheet metal items, including flashings, counterflashings, gutters, downspouts, scuppers, and other items indicated in Schedule and as follows:
   1. Edge strip and flashing.
   2. Counterflashings for roof accessories, roof mounted equipment, vent stacks and similar items.
   3. Reglets and accessories.
   4. Plaster stops, terminations and miscellaneous custom shapes not otherwise provided by related section specifying plaster cladding.
   5. Attic and soffit vents of perforated sheet metal.

B. Sealants for joints within sheet metal fabrications.

C. Tape Sealant for sheet metal and flashing applications.

1.02 RELATED REQUIREMENTS

A. Section 06 1000 - Rough Carpentry: Wood curbs and nailers.

B. Section 07 0150.91 - Roofing Repair.

C. Section 07 7200 - Roof Accessories: Manufactured metal roof curbs.

D. Section 07 9200 - Joint Sealants: Sealing non-lap joints between sheet metal fabrications and adjacent construction.

1.03 REFERENCE STANDARDS

A. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

B. ASTM A792 Steel Sheet, Aluminum-Zinc Alloy-Coated, by the Hot-Dip Process

C. ASTM B32 - Standard Specification for Solder Metal.

D. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.

E. ASTM B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate [Metric].

F. ASTM B486 Paste Solder

G. ASTM C920 - Standard Specification for Elastomeric Joint Sealants.

H. ASTM D226/D226M - Standard Specification for Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing.

I. ASTM D2178/D2178M - Standard Specification for Asphalt Glass Felt Used in Roofing and Waterproofing.

J. ASTM D4586/D4586M - Standard Specification for Asphalt Roof Cement, Asbestos-Free.

K. California Code of Regulations, Title 24, Part 2, California Building Code (CBC), International Building Code

L. California Code of Regulations, Title 24, Part 11 California Green Building Standards Code, "CAL-Green".

M. FS QQ-L-201 Specification for Lead Sheet

N. SMACNA (ASMM) - Architectural Sheet Metal Manual.

O. WH Warnock Hersey International, Inc. Middleton, WI.

P. FM Loss Prevention Data Sheet.

Q. NRCA National Roofing Contractors Association - Roofing Manual.

R. Manufacturer's recommendations and specifications.

1.04 SUBMITTALS

A. See Section 01 3300 - Submittals, for submittal procedures.

B. Shop Drawings: Indicate material profile, jointing pattern, jointing details, fastening methods, flashings, terminations, and installation details.
   1. Indicate type, gauge and finish of metal.

C. Product data: Provide manufacturer's specification data sheets for each product. Demonstrate compliance with specified attributes:
   1. Submit color chart for prefinished materials.
   2. Metal material characteristics and installation recommendations.

D. CAL-GREEN Submittals: Product Data – VOC Limits: For adhesives sealants, fillers, primers and coatings, documentation including printed statement of VOC contents, comply with limits specified in related section.

E. Certification:
   1. Submit certification that metal and fastening system furnished is Tested and Approved by Factory Mutual for 1-90 Wind Up-Lift Requirements.

F. Provide approval letters from metal manufacturer for use of their metal within this particular roofing system type.

G. Proof of fabricator and installer qualifications.

1.05 QUALITY ASSURANCE

A. Perform work in accordance with SMACNA Architectural Sheet Metal Manual requirements , except as otherwise indicated.
   1. Factory Mutual Approval Standard 4435.

B. Contractor's Warranty: The Contractor shall provide the Owner with a notarized written warranty assuring that all sheet metal work including caulking and fasteners to be water-tight and secure for a period of five years from the date of final acceptance of the building. Warranty shall include all materials and workmanship required to repair any leaks that develop, and make good any damage to other work or equipment caused by such leaks or the repairs thereof.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials in manufacturer's original, unopened containers or packages with labels intact and legible.

B. Stack material to prevent twisting, bending, and abrasion, and to provide ventilation. Slope metal sheets to ensure drainage.

C. Prevent contact with materials that could cause discoloration or staining.

PART 2 PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

A. VOC Limits for adhesives, sealants, fillers, primers and coatings . Comply with limits specified in related section.

2.02 SHEET MATERIALS

A. Galvanized Steel: ASTM A 653/A 653M, with G90/Z275 zinc coating; minimum 0.02 inch thick base metal, minimum thickness 24 gauge and greater as required by referenced standards for specific applications indicated.

B. Aluminum: ASTM B 209 (ASTM B 209M), 3105 alloy, H14 temper;.040 inch thick; anodized finish of color as selected unless noted otherwise.

2.03 UTILITY WALL PENETRATION FLASHINGS

A. Prefabricated Facility Services Utility Penetration Flashings, sizes and profiles required to suit conditions.

B. Manufacturer: Quickflash Weatherproofing Products, Inc., 4129 Wagon Trail Avenue, Las Vegas, Nevada 89118. Phone (702) 614-6100. Fax (702) 614-4090. Website www.quickflashproducts.com.

C. Plumbing Flashing Panels:
1. Panel: Combination of high-density polyethylene (HDPE) and low-density polyethylene (LDPE).
   a. HDPE, Specific Gravity, ASTM D 1505: 0.953 g/cm3.
   b. HDPE, Tensile Strength at Yield, ASTM D 638: 3,100 psi.
   c. LDPE, Specific Gravity, ASTM D 792: 0.917 g/cm3.
   d. LDPE, Tensile Strength at Yield, ASTM D 638: 1,300 psi.
2. Weatherproof Seal: Thermoplastic elastomer.
   a. Hardness, ASTM D 2240, Shore A, 10 Seconds: 46.
   b. Specific Gravity, ASTM D 792: 1.05 g/cm3.
   c. Tensile Strength, ASTM D 412: 490 psi.

D. Electrical Flashing Panels:
1. Material: Thermoplastic elastomer.
   a. Hardness, ASTM D 2240, Shore A, 10 Seconds: 93.
   b. Specific Gravity, ASTM D 792: 1.05 g/cm3.
   c. Tensile Strength, ASTM D 412: 1,300 psi.

2.04 FABRICATION - GENERAL

A. Fabricate in accordance with referenced standards. Form sections true to shape, accurate in size, square, and free from distortion or defects. Form pieces as recommended by SMACNA standard for conditions required.
1. Provide reinforcements and supports as required for secure anchorage.
2. Make joints rigid. Seams mechanically strong and soldered or sealed to make watertight
3. Fabricate corners in one piece with legs extending 30-inches each way to field joint. Lap, rivet, and solder or seal corner seams watertight.

4. Turn up "end dam" flanges at ends of opening sill flashing pieces, lap with wall flashing and membranes to shed water.
5. Fabricate cleats of same material as sheet, minimum 3/4 inches wide, interlockable with sheet.
6. Hem exposed edges on underside 1/2 inch; miter and seam corners.
7. Solvent clean all sheet metal. Coat surfaces to be in contact with roofing or otherwise concealed with specified asphaltic paint; 0.015-inch minimum uniform thickness.

B. Fabricate cleats of same material as sheet, 1 gauge heavier, minimum 2 inches wide, interlocking with sheet.

C. Form pieces in longest possible lengths.

D. Machine-roll flashing elements and joinery required to be curved or radiused. Do not field bend or "walk-down". Provide true curves and joinery utilizing "Pittsburgh lock" construction, minimizing joints. Segmented fabrication is not acceptable unless specifically noted and dimensioned on drawings.

E. Hem exposed edges on underside 1/2 inch; miter and seam corners.

F. Form material with flat lock seams, except where otherwise indicated; at moving joints, use sealed lapped, bayonet-type or interlocking hooked seams.

G. Fabricate corners from one piece with minimum 18 inch long legs; seam for rigidity, seal with sealant.

H. Fabricate vertical faces with bottom edge formed outward 1/4 inch and hemmed to form drip.

2.05 ROOF-RELATED SHEET METAL AND FLASHINGS

A. Roof-Related Sheet Metal and Flashings: As indicated, as specified in related sections, as required by roofing material manufacturers and referenced standards. Coordinate work of this section with related sections. Provide complete systems without conflict or omission.

2.06 GUTTER AND DOWNSPOUT FABRICATION

A. Gutters: Profile as indicated. 20 gauge minimum.
1. Expansion joints: Lap type; closed ends with cap over flanged tops of gutter ends.

B. Gutters and Downspouts: Size indicated.

C. Accessories: Profiled to suit gutters and downspouts.
1. End caps, rain diverters, gutter straps support brackets, joint fasteners: Sized to suit gutters, of matching thickness.
2. Anchorage Devices: In accordance with SMACNA (ASMM) requirements.
3. Gutter Supports: Straps. Fabricate from material of double thickness of gutter fabrication, minimum.
4. Downspout Supports: Straps. Fabricate from material of double thickness of gutter fabrication, minimum
5. Gutter Outlet Strainers: Stainless steel; Woven wire mesh type, #10 gauge, No.4 mesh minimum.

D. Seal prefinished metal joints. Solder other joints.

2.07 ACCESSORIES

A. Reinforcement Metals:
1. Typical: Stainless steel or extruded aluminum.
2. For copper work: Copper or Stainless Steel.

B. Fasteners:
   1. Corrosion resistant screw fastener as recommended by metal manufacturer. Finish exposed fasteners same as flashing metal.
   2. Fastening shall conform to Factory Mutual 1-90 requirements or as stated on section details, whichever is more stringent.
   3. Screws, bolts, washers, drive-ins.
      a. For aluminum work: Stainless steel, aluminum, or zinc-aluminum alloy.
      b. For galvanized steel work: Galvanized steel or cadmium plated steel.
      c. For stainless steel work or dissimilar metals: Stainless steel.
      d. For zinc alloy work: Steel, hot dip galvanized per ASTM A153, or stainless steel or aluminum.
      e. For copper work: copper.

C. Underlayment: Organic roofing felt, Type II ("No. 30").

D. Primer: Galvanized iron type.
   1. Product: Rust-Oleum 7400 System, Modified Alkyd Zinc Primer, <340 g/l VOC: www.rustoleum.com.
   2. Substitutions: Section 01 6000.

E. Sealant to be Concealed in Completed Work: Non-curing butyl sealant.

F. Sealant to be Exposed in Completed Work: 1; elastomeric sealant, 100 percent silicone with minimum movement capability of plus/minus 25 percent and recommended by manufacturer for substrates to be sealed; clear.

G. Self-Adhering Flashing Membrane: Grace Ultra™ Butyl Sheet Underlayment, High Temperature Type, manufactured by GCP Applied Technologies; tel: (866) 333-3726; web: www.gcpat.com.
   1. Description: Sheet material composed of 100% butyl rubber adhesive backed by a layer of high density cross laminated polyethylene film.
   2. Physical and Performance Properties:
      a. Thickness: 30 mils (0.76 mm).
      b. Roll Width: 36 inches (914 mm).
      c. Tensile Strength, Membrane: 250 psi (1720 kN/m2) per ASTM D 412 (Die C Modified).
      d. Elongation, Membrane: 250% per ASTM D 412 (Die C Modified).
      e. Low Temperature Flexibility: Unaffected at -20 deg F (-29 deg C) ASTM D 1970.
      f. Adhesion to Plywood: 3.0 lbs/in. width (525 N/m) per ASTM D 903.
      g. Permeance (Maximum): 0.05 Perms (2.9 ng/m2s Pa) per ASTM E 96.
      h. Material Weight Installed (Maximum): 0.22 lb/ft2 (1.1 kg/m2) per ASTM D 461.

H. Sealer Tape: Medium Density Closed Cell EPDM or rubber blend tape single-coated with acrylic adhesive, for use in sheet metal and flashing applications.
   1. Width and Thickness: As required for snug fit under low compression to exclude moisture.
   2. Tensile Strength, ASTM D 412: 65 PSI.
   3. Pres-On; P9100, www.pres-on.com.
   4. 3M
   5. Argent; www.argent-international.
   6. Substitutions: See Section 01 6000 - Product Requirements.

I. Plastic Cement: 1, Type I.

J. Flux: FS O-F-506.

K. Solder: ASTM B 32; Alloy Grade 50A.

PART 3 EXECUTION

3.01 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.

C. Beginning of installation means acceptance of existing conditions.

D. Field measure site conditions prior to fabricating work.

3.02 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.

3.03 INSTALLATION

A. Except as otherwise indicated, comply with manufacturer's installation instructions and recommendations and with SMACNA Architectural Sheet Metal Manual.
   1. Anchor units of work securely in place by methods indicated, providing for thermal expansion of units; conceal fasteners where possible, and set units true to line and level in locations indicated.
   2. Install work with laps, joints, and seams that will be permanently watertight and weatherproof.

B. Install work watertight, without waves, warps, buckles, fastening stress, or distortion, allowing for expansion and contraction. Conform to referenced standards. Make metal joints watertight.

C. Fastening of metal to walls and wood blocking shall comply with SMACNA Architectural Sheet Metal Manual, Factory Mutual 1-90 wind uplift specifications and/or manufacturer's recommendations whichever is of the highest standard.

D. Underlayment: Where sheet metal installation occurs on cementitious or wood substrates, install roofing felt covered with slip sheet direct to substrate, do not allow sheet metal installation directly to concrete or wood.

E. Coordinate sheet metal installation with roofing underlayment and air barrier and water-resistive barriers specified in related sections.

F. All accessories or other items essential to the completeness of sheet metal installation and water tight envelope of the building, whether specifically indicated or not, shall be provided.

G. Flashing: Joints at 10-foot maximum spacing and at 2-1/2-feet from corners. Butt joints with 3/16-inch space centered over matching 8-inch long backing plate with sealer tape in laps.

H. Flanged flashings and roof accessories: Set on continuous sealer tape. Nail flanges through sealer tape and at 3-inch maximum spacing.

I. Isolate metal from dissimilar metal with 2 coats of specified asphaltic paint, sealer tape or other approved coating, specifically made to stop electrolytic action. Use only stainless steel fasteners to connect isolated dissimilar metals.

J. Joints, fastenings, reinforcements and supports: Sized and located as required to preclude distortion or displacement due to thermal expansion and contraction. Conceal fastenings wherever possible.

K. Secure flashings in place using concealed fasteners, and use exposed fasteners only where permitted..

L. Flexible Flashing Installation: Install at closure flanges, under metal copings, caps and platforms; fully adhered, freeof voids, blisters and buckling.
1. Prime substrates as recommended by flexible flashing manufacturer, allow to dry.
2. Install flexible flashings in maximum feasible lengths to minimize lap joints.
3. Peel release paper from roll to expose rubberized asphalt and position flashing to center over joint location before applying. Move along opening or joint, being careful to put flashing as evenly as possible over the opening. Avoid fishmouths.
4. Press flashing firmly into place and roll using resilient roller with heavy hand pressure . Ensure continuous and intimate contact with substrate.
5. If wrinkles develop, carefully cut out affected area and replace as outlined above.
6. Minimize exposure time to that period recommended by the manufacturer.

M. Apply plastic cement compound between metal flashings and felt flashings.

N. Fit flashings tight in place; make corners square, surfaces true and straight in planes, and lines accurate to profiles.

O. Seal prefinished metal joints watertight.

P. Solder other metal joints for full metal surface contact. After soldering, wash metal clean with neutralizing solution and rinse with water.

Q. Secure gutters and downspouts in place with concealed fasteners.
1. Gutter support straps: Nail or screw into solid framing or blocking, 16 d minimum. Provide straps at 32 inches on center minimum, align with roof framing members where occurs.
2. Gutters: Flash and seal gutters to downspouts and accessories.
3. Leaf guards inside gutter at each downspout or rainwater leader opening.

R. Slope gutters 1/4 inch per 10 feet, minimum.

3.04 OPENING FLASHING

A. Flash all wall openings as follows.
1. Install opening flashings after completion of air barriers.
2. Install opening flashings (pre-molded corners and flexible flashings) in accordance with flexible flashing manufacturer's recommendations.
3. Install premolded corner flashings at opening sill corners with nails or screws over layer of flexible flashing extended over face of sheathing and sill opening.
4. Install flexible flashing across face of wall under opening, install additional layer as sill pan with ends turned up 3 inches, coordinate with weather-resistive barrier and jamb flashings to form water-shedding laps. Direct all water flow to exterior of building.
5. Install flexible flashing at head and jamb under weather resistive barrier along opening header, coordinate to lap over sill pan described above, install flexible flashing across

head of opening, extended past jamb flashings by 3 inches and secure with nails or screws to wall, fold weather resistive barrier down over head flashing and seal with tape.

6. Flanged Fixtures (Window, Door, Louver, etc.): Set flanges of Head and Jamb in beads of sealant. Do not flash over bottom nailing flange. Do not seal bottom flange.

3.05 UTILITY WALL PENETRATION FLASHING INSTALLATION

A. Select prefabricated facility services utility penetration flashing sizes and profiles required to suit conditions.

B. Install in accordance with manufacturer's recommendations, properly lapped with weather resistive barrier and related flashing and finishes to shed water to the building exterior.

3.06 FIELD QUALITY CONTROL

A. See Section 01 4000 - Quality Requirements, for field inspection requirements.

B. Inspection will involve surveillance of work during installation to ascertain compliance with specified requirements.

C. Tolerances
   1. Exposed surfaces: Free of dents, scratches, abrasions, or other visible defects; clean, ready for painting.
   2. Set flashings and sheet metal to straight, true lines with exposed faces aligned in plane as indicated.

3.07 SHOP FABRICATED SHEET METAL

A. Installer shall be responsible for determining if the sheet metal systems are in general conformance with roof manufacturer's recommendations.

B. Metal work shall be shop fabricated to configurations and forms in accordance with recognized sheet metal practices.

C. Install sheet metal to comply with Architectural Sheet Metal manual, Sheet Metal and Air Conditioning Contractor's National Associations, Inc.
   1. Hem exposed edges.
   2. Angle bottom edges of exposed vertical surfaces to form drip.
   3. Lap all corners with adjoining pieces, fasten and set in sealant.

D. Form Joints for continuous strip flashings with a 1/4 inch opening between sections. Cover opening with a cover plate or back with an internal drainage plate formed to the profile of flashing piece. Embed cover plate in mastic, fastened through the opening between the sections and loose locked to the drip edges.

3.08 MANUFACTURED SHEET METAL SYSTEMS

3.09 REPAIR AND RESTORATION

A. Water Test Existing Gutters:
   1. Plug existing downspouts, fill existing gutters with water by hose.
   2. Allow filled gutters to rest for a period of 24 hours and observe for leaks.
   3. Mark all leaking locations for repair as specified below.
   4. For purposes of bidding, assume minimum one leak per thirty lineal feet of existing gutter.

B. Prepare Existing Substrate(s): Scarify metal surfaces. Remove unbonded materials, sealants, and rust.

C. Seal Leaks and Joints: Set 4 inch wide sheet metal cover plate, of same material and gauge as existing gutter, over inside of joint. Set cover plate in 4 beads of urethane sealant, two beads on each side of joint.

3.10 SCHEDULE

A. Abbreviations:
   1. SSM = Preformed Metal Roofing, type(s) specified in related section(s). Roof related sheet metal shall be type provided by roof manufacturer with finish matching roof.

B. 24 ga. Galvanized Steel:
   1. Continuous Cleats/Hook Strips
   2. Securement Clips
   3. Siding stops and miscellaneous shapes as indicated.
   4. Stucco/Plaster Stops and miscellaneous shapes as indicated.
   5. Stucco/Plaster Termination Screeds, custom or specially formed types.

C. 24 ga. Galvalume Steel, Kynar 500 Coated, Color as selected:
   1. SSM, AS Counterflashings
   2. SSM, AS Ridge, Rake, Eave, Jamb, Curb, etc. Flashings
   3. SSM, BUR, PVC AS, RT Gutters and Gutter Expansion Joints
   4. SSM, BUR, PVC, AS, RT Downspout/Rainwater leader Inlets
   5. SSM, AS, RT Edge Metal (rake and eave trim, all other miscellaneous roofing related metal).

D. Stainless Steel:
   1. Flashing in contact with aluminum items.
   2. Inlet sleeves at rainwater leaders to prevent contact with gutters of dissimilar metals.
   3. Sill pans at door and window openings.

E. Schedule 40 Steel Pipe:
   1. Rainwater leaders, types specified in Section 05 5000.

F. Types not otherwise scheduled: As recommended by referenced standards for application or condition indicated.

END OF SECTION 07 6200

SECTION 07 8400
FIRESTOPPING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Firestopping systems.

B. Firestopping of all joints and penetrations in fire resistance rated and smoke resistant assemblies, whether indicated on drawings or not, and other openings indicated.

1.02 RELATED SECTIONS

A. Section 01 6116 - Volatile Organic Compound (VOC) Content Restrictions.

B. Section 01 7000 - Execution and Closeout Requirements: Cutting and patching.

C. Section 09 2116 - Gypsum Board Assemblies: Gypsum wallboard fireproofing.

D. Pertinent sections of other Divisions specifying work penetrating rated assemblies which require firestopping.

1.03 REFERENCE STANDARDS

A. ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials.

B. ASTM E814 - Standard Test Method for Fire Tests of Through-Penetration Fire Stops.

C. ASTM E1966 - Standard Test Method for Fire Resistive Joint Systems.

D. ASTM E2174 - Standard Practice for On-Site Inspection of Installed Firestops.

E. ASTM E2393 - Standard Practice for On-Site Inspection of Installed Fire Resistive Joint Systems and Perimeter Fire Barriers.

F. ASTM E2307 - Standard Test Method for Determining Fire Resistance of Perimeter Fire Barriers Using Intermediate-Scale, Multi-story Test Apparatus.

G. ASTM E2837 - Standard Test Method for Determining the Fire Resistance of Continuity Head-of-Wall Joint Systems Installed Between Rated Wall Assemblies and Nonrated Horizontal Assemblies.

H. ASTM G21 - Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi.

I. ITS (DIR) - Directory of Listed Products.

J. FM 4991 - Approval Standard for Firestop Contractors.

K. FM (AG) - FM Approval Guide.

L. ASTM C 518

M. Manufacturer's recommendations for installation.

N. SCAQMD 1168 - South Coast Air Quality Management District Rule No.1168.

O. UL 2079 - Standard for Tests for Fire Resistance of Building Joint Systems.

P. UL (DIR) - Online Certifications Directory.

Q. UL (FRD) - Fire Resistance Directory.

1.04 SUBMITTALS

A. See Section 01 3300 - Submittals, for submittal procedures.

B. Schedule of Firestopping: List each type of penetration, fire rating of the penetrated assembly, firestopping test or design number, and certification that material is classified or listed for the type and size of void to be firestopped.

C. Product Data: Provide data on product characteristics.

D. Sustainable Design Submittal: Submit VOC content documentation for all non-preformed materials.

E. Sketches indicating proposed methods of installation where not detailed on the Drawings.

F. Manufacturer's Installation Instructions: Indicate preparation and installation instructions.

G. Proof of applicator qualifications.

H. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

I. Certificate from authority having jurisdiction indicating approval of materials used.

J. Installer Qualification: Submit qualification statements for installing mechanics.

1.05 QUALITY ASSURANCE

A. Fire Testing: Provide firestopping assemblies of designs that provide the scheduled fire ratings when tested in accordance with methods indicated.
   1. Listing in UL (FRD), FM (AG), or ITS (DIR) will be considered as constituting an acceptable test report.
   2. Valid evaluation report published by ICC Evaluation Service, Inc. (ICC-ES) at www.icc-es.org will be considered as constituting an acceptable test report.
   3. Submission of actual test reports is required for assemblies for which none of the above substantiation exists.

B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

C. Deliver materials in the original packages bearing the manufacturer's label showing classification or listing.

D. Installer Qualifications: Company specializing in performing the work of this section with minimum three years experience and approved by the manufacturer.
   1. Trained by manufacturer.
   2. Approved by Factory Mutual Research Corporation under FM 4991, or meeting any two of the following requirements:
   3. Verification of minimum three years documented experience installing work of this type.
   4. Verification of at least five satisfactorily completed projects of comparable size and type.
   5. Licensed by local authorities having jurisdiction (AHJ).

1.06 FIELD CONDITIONS

A. Comply with firestopping manufacturer's recommendations for temperature and conditions during and after installation; maintain minimum temperature before, during, and for three days after installation of materials.

B. Provide ventilation in areas where solvent-cured materials are being installed.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Firestopping Manufacturers:
   1. 3M Fire Protection Products: www.3m.com/firestop.
   2. A/D Fire Protection Systems Inc: www.adfire.com.
   3. Hilti, Inc: www.us.hilti.com/#sle.
   4. Substitutions: See Section 01 6000 - Product Requirements.

2.02 MATERIALS

A. Volatile Organic Compound (VOC) Content: Provide products having VOC content lower than that required by SCAQMD 1168.

B. Mold and Mildew Resistance: Provide firestoppping materials with mold and mildew resistance rating of zero(0) in accordance with ASTM G21.

C. Primers, Sleeves, Forms, Insulation, Packing, Stuffing, and Accessories: Provide type of materials as required for tested firestopping assembly.

D. Fire Ratings: Refer to drawings for required systems and ratings.

2.03 FIRESTOPPING ASSEMBLY REQUIREMENTS

A. Perimeter Fire Containment Firestopping: Use system that has been tested according to ASTM E2307 to have fire resistance F Rating equal to required fire rating of floor assembly.
   1. Movement: Provide systems that have been tested to show movement capability as indicated.
   2. Temperature Rise: Provide systems that have been tested to show T Rating as indicated.
   3. Air Leakage: Provide systems that have been tested to show L Rating as indicated.
   4. Where floor assembly is not required to have a fire rating, provide systems that have been tested to show L Rating as indicated.

B. Head-of-Wall Joint System Firestopping at Joints Between Fire-Rated Wall Assemblies and Non-Rated Horizontal Assemblies: Use system that has been tested according to ASTM E2837 to have fire resistance F Rating equal to required fire rating of floor or wall, whichever is greater.
   1. Movement: Provide systems that have been tested to show movement capability as indicated.

C. Floor-to-Floor, Wall-to-Wall, and Wall-to-Floor Joints, Except Perimeter, Where Both Are Fire-Rated: Use system that has been tested according to ASTM E1966 or UL 2079 to have fire resistance F Rating equal to required fire rating of the assembly in which the joint occurs.
   1. Movement: Provide systems that have been tested to show movement capability as indicated.
   2. Air Leakage: Provide systems that have been tested to show L Rating as indicated.
   3. Watertightness: Provide systems that have been tested to show W Rating as indicated.
   4. Listing by FM (AG), ITS (DIR), UL (DIR), or UL (FRD) in their certification directories will be considered evidence of successful testing.

D. Through Penetration Firestopping: Use system that has been tested according to ASTM E814 to have fire resistance F Rating equal to required fire rating of penetrated assembly.
   1. Temperature Rise: Provide systems that have been tested to show T Rating as indicated.
   2. Air Leakage: Provide systems that have been tested to show L Rating as indicated.
   3. Watertightness: Provide systems that have been tested to show W Rating as indicated.

4. Listing by FM (AG), ITS (DIR), UL (DIR), or UL (FRD) in their certification directories will be considered evidence of successful testing.

2.04 FIRESTOPPING SYSTEMS

A. Firestopping:
1. As required by the proprietary U.L. or Warnock Hersey classification noted on the Drawings.
2. If not specified by the classification, listed materials as specified in this section.
3. Fire Ratings: See drawings for required systems and ratings.

B. Firestopping Between Edge of Floor and Curtain Wall: Mineral Fiber Safing Insulation, Owens-Corning Thermafiber Safing FF formaldehyde-free Mineral Wool insulation, ASTM C665 Type I & III, NFPA 220 Non-combustible, ASTM E84 FS = 0, SD = 0. Pass Perimeter Fire Containment Test ASTM E2307, 4.0 PCF density minimum.

C. Firestopping Between Parapet Wall and Roof Structure: Mineral Fiber Safing Insulation, Owens-Corning Thermafiber Safing FF formaldehyde-free Mineral Wool insulation, ASTM C665 Type I & III, NFPA 220 Non-combustible, ASTM E84 FS = 0, SD = 0. Pass Perimeter Fire Containment Test ASTM E2307, 4.0 PCF density minimum.

2.05 MATERIALS

A. All materials Underwriters Laboratories Inc. (UL) or Warnock Hersey classified or listed as required to meet the appropriate firestop application.

B. High-melt-point mineral wool or ceramic fiber, unfaced; Master Products "FireMaster Bulk".
1. ASTM E84: Flame Spread 0; Smoke Development 0; Fuel Contributed 0.
2. Non-combustible in accordance with ASTM E136.

C. Gypsum board firestopping: ASTM C 36, Type X.

D. Sealant, Fire-Retardant: 3M "Fire Dam 150", Dow Corning "Firestop" 2000", Hilti, Inc. "FS One", or approved equal for required fire rating. Color as selected by Architect from manufacturer's standards.

E. Calcium silicate board: Promadeck as manufactured by Promat Fire Protection division of Eternit, Blandon, PA.; thickness as noted on the Drawings or as required by the tested assembly.

F. Primers, Sleeves, Forms, Insulation, Packing, Stuffing, and Accessories: Type required for tested assembly design.

G. Installation Accessories: Clips, collars, fasteners, temporary stops or dams, and other devices required to position and retain materials in place.

H. Marking and Identification Tape: Pre-printed self-adhesive vinyl signage identifying fire and smoke assemblies, complying with CBC 703.7, designed to adhere to gypsum board surfaces. M&I Tape; Wege & Company, San Jose CA, www.wege.us.com.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify openings are ready to receive the work of this section.

3.02 PREPARATION

A. Clean substrate surfaces of dirt, dust, grease, oil, loose material, or other materials that could adversely affect bond of firestopping material.

B. Remove incompatible materials that could adversely affect bond.

C. Install backing or damming materials to arrest liquid material leakage.

3.03 INSTALLATION

A. Install materials in manner described in fire test report and in accordance with manufacturer's instructions, achieving installation of required rating, completely closing openings.

B. Do not cover installed firestopping until inspected by authorities having jurisdiction.

C. Install labeling required by code.
1. Self-adhesive vinyl tape with identification of assembly as required by CBC 703.7.

3.04 FIELD QUALITY CONTROL

A. Independent Testing Agency: Inspection agency employed and paid by Owner, will examine penetration firestopping in accordance with ASTM E2174, and ASTM E2393.

B. Repair or replace penetration firestopping and joints at locations where inspection results indicate firestopping or joints do not meet specified requirements.

3.05 CLEANING

A. Clean adjacent surfaces of firestopping materials.

3.06 PROTECTION

A. Protect adjacent surfaces from damage by material installation.

END OF SECTION 07 8400

SECTION 07 9200
JOINT SEALANTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Nonsag gunnable joint sealants.

B. Self-leveling pourable joint sealants.

C. Joint backings and accessories.

1.02 RELATED REQUIREMENTS

A. Section 01 6116 - Volatile Organic Compound (VOC) Content Restrictions: Additional requirements for sealants and primers.

B. Pertinent Sections specifying sealants or referencing this Section for sealant products and execution requirements.

1.03 REFERENCE STANDARDS

A. ASTM C661 - Standard Test Method for Indentation Hardness of Elastomeric-Type Sealants by Means of a Durometer.

B. ASTM C794 - Standard Test Method for Adhesion-In-Peel of Elastomeric Joint Sealants.

C. ASTM C834 - Standard Specification for Latex Sealants.

D. ASTM C919 - Standard Practice for Use of Sealants in Acoustical Applications.

E. ASTM C920 - Standard Specification for Elastomeric Joint Sealants.

F. ASTM C1087 - Standard Test Method for Determining Compatibility of Liquid-Applied Sealants with Accessories Used in Structural Glazing Systems.

G. ASTM C1193 - Standard Guide for Use of Joint Sealants.

H. ASTM C1248 - Standard Test Method for Staining of Porous Substrate by Joint Sealants.

I. ASTM C1311 - Standard Specification for Solvent Release Sealants.

J. ASTM C1330 - Standard Specification for Cylindrical Sealant Backing for Use with Cold Liquid-Applied Sealants.

K. ASTM C1521 - Standard Practice for Evaluating Adhesion of Installed Weatherproofing Sealant Joints.

L. ASTM D2240 - Standard Test Method for Rubber Property--Durometer Hardness.

M. California Code of Regulations, Title 24, Part 11 California Green Building Standards Code, "CAL-Green".

N. Manufacturer's recommendations and specifications.

O. SWRI (VAL) - SWR Institute Validated Products Directory.

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data for Sealants: Submit manufacturer's technical data sheets for each product to be used, that includes the following.
   1. Physical characteristics, including movement capability, VOC content, hardness, cure time, and color availability.
   2. List of backing materials approved for use with the specific product.
   3. Substrates that product is known to satisfactorily adhere to and with which it is compatible.
   4. Substrates the product should not be used on.
   5. Substrates for which use of primer is required.
   6. Substrates for which laboratory adhesion and/or compatibility testing is required.
   7. Installation instructions, including precautions, limitations, and recommended backing materials and tools.
   8. Sample product warranty.
   9. Certification by manufacturer indicating that product complies with specification requirements.
   10. SWRI Validation: Provide currently available sealant product validations as listed by SWRI (VAL) for specified sealants.

C. Product Data for Accessory Products: Submit manufacturer's technical data sheet for each product to be used, including physical characteristics, installation instructions, and recommended tools.
   1. Manufacturer's Installation Instructions: Indicate limitations, special procedures, surface preparation, and perimeter conditions requiring special attention.
   2. Sealant, Waterproofing, and Restoration Institute (SWRI) Validation Certificate: For each sealant specified to be validated by SWRI's Sealant Validation Program.

D. Joint-Sealant Schedule: Include the following information:
   1. Joint-sealant application, joint location, and designation.
   2. Joint-sealant manufacturer and product name.
   3. Joint-sealant formulation.
   4. Joint-sealant colors (multiple colors will be required).

E. Preconstruction Compatibility and Adhesion Test Reports: From sealant manufacturer, indicating the following:
   1. Materials forming joint substrates and joint-sealant backings have been tested for compatibility and adhesion with joint sealants.
   2. Interpretation of test results and written recommendations for primers and substrate preparation needed for adhesion.

F. Color Cards for Selection: Where sealant color is not specified, submit manufacturer's color cards showing standard colors available for selection.

G. Samples for Verification: Where custom sealant color is specified, obtain directions from Architect and submit at least two physical samples for verification of color of each required sealant.

H. Sustainable Design Documentation: For sealants and primers, submit VOC content and emissions documentation as specified in Section 01 6116.

I. Manufacturer Qualifications. Demonstrate compliance with specified requirements.

J. Installer Qualifications. Demonstrate compliance with specified requirements.

K. Preconstruction Laboratory Test Reports: Submit at least four weeks prior to start of installation.

L. Installation Plan: Submit at least four weeks prior to start of installation.

M. Preinstallation Field Adhesion Test Plan: Submit at least two weeks prior to start of installation.

N. Field Quality Control Plan: Submit at least two weeks prior to start of installation.

O. Preinstallation Field Adhesion Test Reports: Submit filled out Preinstallation Field Adhesion Test Reports log within 10 days after completion of tests; include bagged test samples and photographic records.

P. Installation Log: Submit filled out log for each length or instance of sealant installed.

Q. Field Quality Control Log: Submit filled out log for each length or instance of sealant installed, within 10 days after completion of inspections/tests; include bagged test samples and photographic records, if any.

1.05 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 the work of this section and with at least three years of documented experience.

C. Testing Agency Qualifications: Independent firm specializing in performing testing and inspections of the type specified in this section.

D. Manufacturer of sealant and caulking material to certify that cleaners, joint filler or bond breakers, and primers, for a particular application, are compatible with sealant.

E. Preconstruction Laboratory Testing: Arrange for sealant manufacturer(s) to test each combination of sealant, substrate, backing, and accessories.
   1. Adhesion Testing: In accordance with ASTM C794.
   2. Compatibility Testing: In accordance with ASTM C1087.
   3. Allow sufficient time for testing to avoid delaying the work.
   4. Deliver to manufacturer sufficient samples for testing.
   5. Report manufacturer's recommended corrective measures, if any, including primers or techniques not indicated in product data submittals.
   6. Testing is not required if sealant manufacturer provides data showing previous testing, not older than 24 months, that shows satisfactory adhesion, lack of staining, and compatibility.

F. Installation Plan: Include schedule of sealed joints, including the following.
   1. Joint width indicated in Contract Documents.
   2. Joint depth indicated in Contract Documents; to face of backing material at centerline of joint.
   3. Method to be used to protect adjacent surfaces from sealant droppings and smears, with acknowledgement that some surfaces cannot be cleaned to like-new condition and therefore prevention is imperative.
   4. Approximate date of installation, for evaluation of thermal movement influence.
   5. Installation Log Form: Include the following data fields, with known information filled out.
      a. Location on project.
      b. Substrates.
      c. Sealant used.

d. Primer to be used, or indicate as "No primer" used.
e. Size and actual backing material used.
f. Date of installation.
g. Name of installer.
h. Actual joint width; provide space to indicate maximum and minimum width.
i. Actual joint depth to face of backing material at centerline of joint.
j. Air temperature.

G. Preinstallation Field Adhesion Test Plan: Include destructive field adhesion testing of one sample of each combination of sealant type and substrate, except interior acrylic latex sealants, and include the following for each tested sample.
1. Identification of testing agency.
2. Name(s) of sealant manufacturers' field representatives who will be observing
3. Preinstallation Field Adhesion Test Log Form: Include the following data fields, with known information filled out.
a. Substrate; if more than one type of substrate is involved in a single joint, provide two entries on form, for testing each sealant substrate side separately.
b. Test date.
c. Location on project.
d. Sealant used.
e. Stated movement capability of sealant.
f. Test method used.
g. Date of installation of field sample to be tested.
h. Date of test.
i. Copy of test method documents.
j. Age of sealant upon date of testing.
k. Test results, modeled after the sample form in the test method document.
l. Indicate use of photographic record of test.

H. Field Quality Control Plan:
1. Visual inspection of entire length of sealant joints.
2. Non-destructive field adhesion testing of sealant joints, except interior acrylic latex sealants.
a. For each different sealant and substrate combination, allow for one test every 12 inches in the first 10 linear feet of joint and one test every 24 inches thereafter.
b. If any failures occur in the first 10 linear feet, continue testing at 12 inch intervals at no extra cost to Owner.
3. Destructive field adhesion testing of sealant joints, except interior acrylic latex sealant.
a. For each different sealant and substrate combination, allow for one test every 100 feet in the first 1000 linear feet, and one test per 1000 linear feet thereafter, or once per floor on each elevation.
b. If any failures occur in the first 1000 linear feet, continue testing at frequency of one test per 500 linear feet at no extra cost to Owner.
4. Field testing agency's qualifications.
5. Field Quality Control Log Form: Show same data fields as on Preinstallation Field Adhesion Test Log, with known information filled out and lines for multiple tests per sealant/substrate combinations; include visual inspection and specified field testing; allow for possibility that more tests than minimum specified may be necessary.

I. Field Adhesion Test Procedures:
1. Allow sealants to fully cure as recommended by manufacturer before testing.
2. Have a copy of the test method document available during tests.

3. Take photographs or make video records of each test, with joint identification provided in the photos/videos; for example, provide small erasable whiteboard positioned next to joint.
4. Record the type of failure that occurred, other information required by test method, and the information required on the Field Quality Control Log.
5. When performing destructive tests, also inspect the opened joint for proper installation characteristics recommended by manufacturer, and report any deficiencies.
6. Deliver the samples removed during destructive tests in separate sealed plastic bags, identified with project, location, test date, and test results, to Owner.
7. If any combination of sealant type and substrate does not show evidence of minimum adhesion or shows cohesion failure before minimum adhesion, report results to Architect.

J. Non-Destructive Field Adhesion Test: Test for adhesion in accordance with ASTM C1521, using Nondestructive Spot Method.
1. Record results on Field Quality Control Log.
2. Repair failed portions of joints.

K. Destructive Field Adhesion Test: Test for adhesion in accordance with ASTM C1521, using Destructive Tail Procedure.
1. Sample: At least 18 inch long.
2. Minimum Elongation Without Adhesive Failure: Consider the tail at rest, not under any elongation stress; multiply the stated movement capability of the sealant in percent by two; then multiply 1 inch by that percentage; if adhesion failure occurs before the "1 inch mark" is that distance from the substrate, the test has failed.
3. If either adhesive or cohesive failure occurs prior to minimum elongation, take necessary measures to correct conditions and re-test; record each modification to products or installation procedures.
4. Record results on Field Quality Control Log.
5. Repair failed portions of joints.

1.06 MOCK-UP

A. Mockups: Install sealant in mockups of assemblies specified in other Sections that are indicated to receive joint sealants specified in this Section. Use materials and installation methods specified in this Section.

B. Construct mock-up with specified sealant types and with other components noted.

C. Locate where directed.

D. Mock-up may remain as part of the Work.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Comply with requirements of Section 01 6000.

B. Deliver materials to Project site in original unopened containers or bundles with labels indicating manufacturer, product name and designation, color, expiration period for use, pot life, curing time, and mixing instructions for multi-component materials.

C. Store and handle materials in compliance with manufacturer's recommendations to prevent their deterioration or damage due to moisture, high or low temperatures, contaminants, or other causes.

1.08 FIELD CONDITIONS

A. Environmental Conditions: Do not proceed with installation of joint sealants under the following conditions:

1. When ambient and substrate temperature conditions are outside the limits permitted by joint sealant manufacturer.
2. When joint substrates are wet.

B. Joint Width Conditions: Do not proceed with installation of joint sealants where joint widths are less than allowed by joint sealant manufacturer for application indicated.

C. Joint Substrate Conditions: Do not proceed with installation of joint sealants until contaminants capable of interfering with their adhesion are removed from joint substrates.

D. Maintain temperature and humidity recommended by the sealant manufacturer during and after installation.

1.09 COORDINATION

A. Coordinate the work with all sections referencing this section.

1.10 WARRANTY

A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.

B. Correct defective work within a five year period after Date of Substantial Completion.

C. Warranty: Include coverage for installed sealants and accessories that fail to achieve watertight seal , exhibit loss of adhesion or cohesion, or do not cure.

PART 2 PRODUCTS

2.01 SYSTEM DESCRIPTION

A. Performance Requirements:
1. Building envelope:
   a. Make watertight and weathertight without causing staining or deterioration of joint substrates.
   b. Exterior work that does not remain watertight and all work which does not retain all properties inherent in the product as stipulated by the manufacturer will be considered faulty.

B. Building Exterior and Interior:
1. Seal the following joints with joint sealer:
   a. Expansion and control joints in exterior walls, copings, parapets.
   b. Expansion and control joints in interior concrete slab floors.
   c. Joints between metal panels.
   d. Joints between door and window frames and adjacent materials.
   e. Joints between cabinets and countertops and walls.
   f. Control joints in interior partitions, including portion above ceilings.
   g. Expansion and control joints in solid exterior soffits.
   h. Control joints in interior ceilings and soffits.
2. Apply continuous bead of joint sealer in the following locations during installation of materials specified elsewhere:
   a. In lap joints of sheet metal construction.
   b. Roofing panels and roof-related sheet metal and flashing.
   c. Between partition floor and ceiling tracks and adjacent construction.
   d. Between end stud of partition and adjacent construction.
   e. Under door sills.
3. Acoustic Sealants at acoustic separations shall make assembly airtight.
   a. Seal perimeter and intersections of finish.

b. Seal around electrical boxes and other penetrations of finish; seal holes within electrical boxes; seal conduit ends.
c. Seal pipes which penetrate acoustic separations.

4. Joints not specifically mentioned above which require sealants to meet the performance criteria cited in this section.

2.02 MATERIALS

A. Sealants and Primers - General: Provide products having volatile organic compound (VOC) content as specified in Section 01 6116.

B. Compatibility: Provide joint sealants, joint fillers, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by sealant manufacturer based on testing and field experience.

C. Liquid-Applied Joint Sealants: Comply with ASTM C 920 and other requirements indicated for each liquid-applied joint sealant specified, including those referencing ASTM C 920 classifications for type, grade, class, and uses related to exposure and joint substrates.

D. Stain-Test-Response Characteristics: Where sealants are specified to be nonstaining to porous substrates, provide products that have undergone testing according to ASTM C 1248 and have not stained porous joint substrates indicated for Project.

E. Suitability for Contact with Food: Where sealants are indicated for joints that will come in repeated contact with food, provide products that comply with 21 CFR 177.2600.

F. Colors: Provide color of exposed joint sealants to comply with the following:
1. Provide colors matching selections made by Architect from manufacturer's full range of colors for products of type indicated. Colors may be listed in schedule at the end of this section or on the drawings. Request color selection for all products listed without a preselected color.

2.03 JOINT SEALANT APPLICATIONS

A. Scope:
1. Exterior Joints: Seal open joints, whether or not the joint is indicated on drawings, unless specifically indicated not to be sealed. Exterior joints to be sealed include, but are not limited to, the following items.
a. Wall expansion and control joints.
b. Joints between door, window, and other frames and adjacent construction.
c. Joints between different exposed materials.
d. Openings below ledge angles in masonry.
e. Other joints indicated below.
2. Interior Joints: Do not seal interior joints unless specifically indicated to be sealed. Interior joints to be sealed include, but are not limited to, the following items.
a. Joints between door, window, and other frames and adjacent construction.
b. In sound-rated wall and ceiling assemblies, gaps at electrical outlets, wiring devices, piping, and other openings; between wall/ceiling and other construction; and other flanking sound paths.
c. Other joints indicated below.
3. Do not seal the following types of joints.
a. Intentional weepholes in masonry.
b. Intentional weepholes in window assemblies and head flashings.
c. Joints indicated to be treated with manufactured expansion joint cover or some other type of sealing device.

d. Joints where sealant is specified to be provided by manufacturer of product to be sealed.
e. Joints where installation of sealant is specified in another section.
f. Joints between suspended panel ceilings/grid and walls.

B. Sound-Rated Assemblies: Walls and ceilings identified as "STC-rated", "sound-rated", or "acoustical".

2.04 JOINT SEALANTS - GENERAL

A. Sealants and Primers: Provide products with levels of volatile organic compound (VOC) content as indicated in Section 01 6116.

B. Colors: As indicated on the drawings. If no colors are indicated, request colors before preparation of schedule submittals and include on all schedule submittals.

2.05 NONSAG SILICONE JOINT SEALANTS

A. Non-Staining Silicone Sealant: ASTM C920, Grade NS, Uses M and A; not expected to withstand continuous water immersion or traffic.
1. Movement Capability: Plus 100 percent, minus 50 percent, minimum.
2. Non-Staining To Porous Stone: Non-staining to light-colored natural stone when tested in accordance with ASTM C1248.
3. Dirt Pick-Up: Reduced dirt pick-up compared to other silicone sealants.
4. Hardness Range: 15 to 35, Shore A, when tested in accordance with ASTM C661.
5. Color: To be selected by Architect from manufacturer's standard range.
6. Service Temperature Range: Minus 20 to 180 degrees F.
7. Manufacturers:
a. Dow Chemical Company; DOWSIL 790 Silicone Building Sealant: consumer.dow.com/en-us/industry/ind-building-construction.html/#sle.
b. Pecora Corporation: www.pecora.com/#sle.
c. Sika Corporation; Sikasil WS-290: www.usa-sika.com/#sle.
d. Substitutions: See Section 01 6000 - Product Requirements.

B. Silicone Sealant: ASTM C920, Grade NS, Uses M and A; not expected to withstand continuous water immersion or traffic.
1. Movement Capability: Plus and minus 50 percent, minimum.
2. Hardness Range: 15 to 35, Shore A, when tested in accordance with ASTM C661.
3. Color: To be selected by Architect from manufacturer's standard range.
4. Cure Type: Single-component, neutral moisture curing
5. Service Temperature Range: Minus 65 to 180 degrees F.
6. Manufacturers:
a. Dow Corning Corporation; 795: www.dowcorning.com.
b. Sika Corporation; Sikasil WS-295: www.usa-sika.com/#sle.
c. Substitutions: See Section 01 6000 - Product Requirements.

C. Silicone Sealant: ASTM C920, Type S, Grade NS, Class 25, single component, neutral curing, non-sagging, non-staining, non-bleeding, RTV silicone designed for adhesion to low energy surfaces common in sheet or peel-and-stick flexible flashings and air/weather barriers.
1. Color: To be selected by Architect from manufacturer's standard range.
2. Service Temperature Range: -65 to 180 degrees F.
3. Products:
a. Dow Corning Corporation; 758: www.dowcorning.com.
b. Sika Corporation, Construction Products Division; Sikasil-N.
c. Substitutions: See Section 01 6000 - Product Requirements.

D. Mildew-Resistant Silicone Sealant: ASTM C920, Grade NS, Uses M and A, Class 25; Use NT, A, and O, single component, mildew resistant; not expected to withstand continuous water immersion or traffic.
   1. Color: White.
   2. Manufacturers:
      a. Master Builders; Omniplus: www.master-builders-solutions.com.
      b. Dow Corning Corporation; 786-M White.
      c. GE Construction Sealants; SCS1700 Sanitary.
      d. Pecora Corporation; Pecora 898 NST (Non-Staining Technology): www.pecora.com/#sle.
      e. Sika Corporation; Sikasil GP: www.usa-sika.com/#sle.
      f. Substitutions: See Section 01 6000 - Product Requirements.

2.06 URETHANE NON-SAG SEALANTS

A. Polyurethane Sealant: ASTM C920, Grade NS, Uses M and A; multi-component; not expected to withstand continuous water immersion or traffic.
   1. Movement Capability: Plus and minus 35 percent, minimum.
   2. Hardness Range: 20 to 35, Shore A, when tested in accordance with ASTM C661.
   3. Color: Custom as selected..
   4. Manufacturers:
      a. Master Builders Solutions; www.master-builders-solutions.com, MasterSeal (Sonolastic) NP-2.
      b. Sika Corporation; Sikaflex-2c NS: www.usa-sika.com/#sle.
      c. Substitutions: See Section 01 6000 - Product Requirements.

B. Polyurethane Sealant: ASTM C920, Grade NS, Uses M and A; single component; not expected to withstand continuous water immersion or traffic.
   1. Movement Capability: Plus and minus 25 percent, minimum.
   2. Hardness Range: 20 to 35, Shore A, when tested in accordance with ASTM C661.
   3. Color: To be selected by Architect from manufacturer's standard range.
   4. Products:
      a. Master Builders Solutions; www.master-builders-solutions.com, MasterSeal (Sonolastic) NP-1.
      b. Sika Corporation; Sikaflex-1a: www.usa-sika.com.
      c. Substitutions: See Section 01 6000 - Product Requirements.

2.07 ACRYLIC LATEX JOINT SEALANTS

A. Acrylic Emulsion Latex: Water-based; ASTM C834, single component, non-staining, non-bleeding, non-sagging; not intended for exterior use, paintable.
   1. Color: To be selected by Architect from manufacturer's standard range.
   2. Manufacturers:
      a. Master Builders Solutions; MasterSeal NP 520 (Sonolac): www.master-builders-solutions.com.
      b. Pecora Corporation; AC-20 +Silicone: www.pecora.com/#sle.
      c. Sherwin-Williams Company; 950A Siliconized Acrylic Latex Caulk: www.sherwin-williams.com/#sle.
      d. Substitutions: See Section 01 6000 - Product Requirements.

B. Butyl Sealant: Solvent-based; ASTM C1311; single component, nonsag; not expected to withstand continuous water immersion or traffic.
   1. Color: To be selected by Architect from manufacturer's standard range.

2. Manufacturers:
   a. Bostik Inc.; Chem-Calk 300.
   b. Pecora Corporation; Pecora BC-158 Butyl Rubber Sealant: www.pecora.com/#sle.
   c. Sherwin-Williams Company; Storm Blaster All Season Sealant: www.sherwin-williams.com/#sle.
   d. Substitutions: See Section 01 6000 - Product Requirements.

C. Non-Curing Butyl Sealant: Solvent-based, single component, non-sag, non-skinning, non-hardening, non-bleeding; non-vapor-permeable; intended for fully concealed applications.
   1. Manufacturers:
      a. Pecora Corporation; Pecora BA-98 Non-Skinning Butyl Sealant: www.pecora.com/#sle.
      b. Substitutions: See Section 01 6000 - Product Requirements.

D. Type - Acoustical Sealant: Acrylic sealant; ASTM C 920, Grade NS, Class 12-1/2, Uses M and A; single component, solvent release curing, non-skinning, ASTM C-834, nonsag, paintable, nonstaining latex sealant. Effectively reduce airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies according to ASTM E 90.
   1. Composition: Acrylic latex emulsion sealant.
   2. Applications: Use for concealed locations only:
      a. Sealant bead between top stud runner and structure and between bottom stud track and floor.
      b. Locations indicated and as required to meet acoustic requirements of walls and partitions.
   3. Products:
      a. Pecora Corporation; AC-20 FTR Acoustical and Insulation Sealant: www.pecora.com, at fire-rated construction.
      b. Hilti, Inc.; CP 506 Smoke and Acoustical Sealant: www.us.hilti.com.
      c. Hilti, Inc.; CP 572 Smoke and Acoustical Spray Sealant: www.us.hilti.com.
      d. Master Builders Solutions; MasterSeal NP 520: www.master-builders-solutions.com.
      e. Substitutions: See Section 01 6000 - Product Requirements.

2.08 SELF-LEVELING SEALANTS

A. Self-Leveling Polyurethane Sealant: ASTM C920, Grade P, Uses M and A; single or multi-component; explicitly approved by manufacturer for traffic exposure; not expected to withstand continuous water immersion .
   1. Movement Capability: Plus and minus 25 percent, minimum.
   2. Hardness Range: 35 to 55, Shore A, when tested in accordance with ASTM C661.
   3. Color: To be selected by Architect from manufacturer's standard range.
   4. Color at colored concrete: Custom-mixed colors matching colored concrete floors or paving.
   5. Service Temperature Range: Minus 40 to 180 degrees F.
   6. Manufacturers:
      a. Master Builder Solutions; MasterSeal (Sonolastic) SL 2 Slope Grade or Self Leveling Sealant: www.master-builders-solutions.com
      b. Sika Corporation; Sikaflex-2c SL: www.usa-sika.com/#sle.
      c. Substitutions: See Section 01 6000 - Product Requirements.

B. Concrete Paving Joint Sealant: Polyurethane, pourable self-leveling; ASTM C920, Class 25, Uses T, I, M and A; multi- component.
   1. Color: Custom mixed color matching colored concrete.

2. Products:
    a. Master Builders Solutions; MasterSeal (Sonolastic) SL-2: www.master-builders-solutions.com.
    b. Pecora Corporation; Dyna-Trol II-SG: www.pecora.com.
    c. Sika Corporation, Construction Products Division; Sikaflex 2C-SL.
    d. Substitutions: See Section 01 6000 - Product Requirements.

C. Semi-Rigid Self-Leveling Epoxy Joint Filler: Epoxy or epoxy/polyurethane copolymer; intended for filling cracks and control joints not subject to significant movement; rigid enough to support concrete edges under traffic.
1. Meet requirements of American Concrete Institute 302.1 R-04 "Guide for Concrete Floor and Slab Construction" and American Concrete Institute 360 R10 "Guide to Design of Slabs-on-Ground" for industrial floor joint fillers
2. Composition: Multi-component, 100 percent solids by weight.
3. Durometer Hardness: Minimum of 85 for Type A or 35 for Type D, after seven days when tested in accordance with ASTM D2240.
4. Color: To be selected by Architect from manufacturer's standard colors.
5. Joint Width, Minimum: 1/8 inch.
6. Joint Width, Maximum: 1/4 inch.
7. Joint Depth: Provide product suitable for joints from 1/8 inch to 2 inches in depth including space for backer rod.
8. Manufacturers:
    a. Euco 700 by The Euclid Chemical Company.
    b. MM-80 by Metzger-McGuire.
    c. Master Builders Solutions, MasterSeal CR 190: www.master-builders-solutions.com
    d. W.R. Meadows, Inc; Rezi-Weld Flex: www.wrmeadows.com/#sle.
    e. Substitutions: See Section 01 6000 - Product Requirements.

2.09 ACCESSORIES

A. Backer Rod: Cylindrical cellular foam rod with surface that sealant will not adhere to, compatible with specific sealant used, and recommended by backing and sealant manufacturers for specific application.
1. Type for Joints Not Subject to Pedestrian or Vehicular Traffic: ASTM C1330; Type O - Open Cell Polyurethane.
2. Type for Joints Subject to Pedestrian or Vehicular Traffic: ASTM C1330; Type B - Bi-Cellular Polyethylene.
3. Open Cell: 40 to 50 percent larger in diameter than joint width.
4. Closed Cell and Bi-Cellular: 25 to 33 percent larger in diameter than joint width.

B. Tape Sealant: Double-sided rubber-backed butyl tape sealant, 35 mil thickness, adhesive strength 88 oz/in. Widths as required to suit application, black color. Grainger, www.grainger.com.
1. Substitutions: See Section 01 6000 - Product Requirements.

C. Backing Tape: Self-adhesive polyethylene tape with surface that sealant will not adhere to and recommended by tape and sealant manufacturers for specific application.

D. Masking Tape: Self-adhesive, nonabsorbent, non-staining, removable without adhesive residue, and compatible with surfaces adjacent to joints and sealants.

E. Joint Cleaner: Non-corrosive and non-staining type, type recommended by sealant manufacturer; compatible with joint forming materials.

F. Primers: Type recommended by sealant manufacturer to suit application; non-staining.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that joints are ready to receive work.

B. Verify that backing materials are compatible with sealants.

C. Verify that backer rods are of the correct size.

D. Preinstallation Adhesion Testing: Install a sample for each test location indicated in the test plan.
   1. Test each sample as specified in PART 1 under QUALITY ASSURANCE article.
   2. Notify Architect of date and time that tests will be performed, at least 7 days in advance.
   3. Arrange for sealant manufacturer's technical representative to be present during tests.
   4. Record each test on Preinstallation Adhesion Test Log as indicated.
   5. If any sample fails, review products and installation procedures, consult manufacturer, or take whatever other measures are necessary to ensure adhesion; re-test in a different location; if unable to obtain satisfactory adhesion, report to Architect.
   6. After completion of tests, remove remaining sample material and prepare joint for new sealant installation.

3.02 PREPARATION

A. Remove loose materials and foreign matter that could impair adhesion of sealant.

B. Clean joints, and prime as necessary, in accordance with manufacturer's instructions.

C. Perform preparation in accordance with manufacturer's instructions and ASTM C1193.

D. Mask elements and surfaces adjacent to joints from damage and disfigurement due to sealant work; be aware that sealant drips and smears may not be completely removable.

3.03 INSTALLATION

A. Perform work in accordance with sealant manufacturer's requirements for preparation of surfaces and material installation instructions.

B. Perform installation in accordance with ASTM C1193.

C. Perform acoustical sealant application work in accordance with ASTM C919.

D. Measure joint dimensions and size joint backers to achieve width-to-depth ratio, neck dimension, and surface bond area as recommended by manufacturer, except where specific dimensions are indicated.

E. Install bond breaker backing tape where backer rod cannot be used.

F. Install sealant free of air pockets, foreign embedded matter, ridges, and sags, and without getting sealant on adjacent surfaces.

G. Do not install sealant when ambient temperature is outside manufacturer's recommended temperature range, or will be outside that range during the entire curing period, unless manufacturer's approval is obtained and instructions are followed.

H. Install sealants by proven techniques that result in sealants directly contacting and fully wetting joint substrates, completely filling recesses provided for each joint configuration, and providing uniform, cross sectional shapes and depths relative to joint widths that allow optimum sealant movement capability. Install sealants at the same time sealant backings are installed.

I. Nonsag Sealants: Tool surface concave, unless otherwise indicated; remove masking tape immediately after tooling sealant surface.
   1. Immediately after sealant application and prior to time skinning or curing begins, tool sealants to form smooth, uniform beads of configuration indicated, to eliminate air pockets, and to ensure contact and adhesion of sealant with sides of joint. Remove excess sealants from surfaces adjacent to joint. Do not use tooling agents that discolor sealants or adjacent surfaces or are not approved by sealant manufacturer.
   2. Provide concave joint configuration per Figure 8A in ASTM C 1193, unless otherwise indicated.
   3. Provide flush joint configuration, per Figure 8B in ASTM C 1193, where indicated.
   4. Provide recessed joint configuration, per Figure 8C in ASTM C 1193, of recess depth and at locations indicated.
      a. Use masking tape to protect adjacent surfaces of recessed tooled joints.

J. Concrete Floor Joint Filler: After full cure, shave joint filler flush with top of concrete slab.

3.04 FIELD QUALITY CONTROL

A. Perform field quality control inspection/testing as specified in PART 1 under QUALITY ASSURANCE article.

B. Non-Destructive Adhesion Testing: If there are any failures in first 100 linear feet, notify Architect immediately.

C. Destructive Adhesion Testing: If there are any failures in first 1000 linear feet, notify Architect immediately.

D. Remove and replace failed portions of sealants using same materials and procedures as indicated for original installation.

E. Repair destructive test location damage immediately after evaluation and recording of results.

3.05 FINISHING

A. Work that is exposed to view: Uniform surface with neat, straight edges and no excess material on adjacent surface.

3.06 CLEANING

A. Clean adjacent soiled surfaces.

3.07 PROTECTION

A. Protect sealants until cured. Replace damaged work with repairs indistinguishable from original work.

3.08 SCHEDULE

A. Architect will provide color selections and locations for each sealant type and for Contractor's use. Not all locations will have the same color.
   1. Custom colors will be required.

B. Exterior Locations:
   1. Joints which are bordered by glass: Single-Component, Nonsag, Neutral-Curing Silicone Joint Sealant: ASTM C 920, Type S, Grade NS, Class 50, for Use NT.
      a.
   2. Joints which are bordered by plastic: Single-Component, Nonsag, Neutral-Curing Silicone Joint Sealant: ASTM C 920, Type S, Grade NS, Class 100/50, for Use NT.

a.

3. Horizontal joints in sidewalks, decks, concrete floors, and driveways: Exterior or Interior Horizontal Expansion Joint Sealant - Polyurethane, self-leveling; ASTM C 920, Grade P, Class 25, Uses T, M and A;single component.
   a. At walk expansion joints.
   b. Where walks abut structural slabs or stoops.
   c. Where walks abut exterior wall of buildings.
   d. Where exposed interior concrete slabs abut vertical surfaces.
   e. Where sealant is shown on the Drawings for concrete slabs.
   f.
4. Locations requiring adhesion to low energy surfaces common in sheet or peel-and-stick flexible flashings and air/weather barriers: ASTM C920, Type S, Grade NS, Class 25, single component, neutral curing, non-sagging, non-staining, non-bleeding, RTV silicone.
   a.
5. Membrane Roofing Sealants: Types recommended by roofing manufacturer and complying with requirements of this section.
6. Steep Slope Roofing Sealants: Types recommended by roofing manufacturer and complying with requirements of this section.
7. Sheet Metal and Roof Accessory Sealants: Types recommended by roofing manufacturer and complying with requirements of this section.
8. All other exterior joints including around perimeters of frames where door, window and louver frames abut concrete, masonry or other building materials (interior and exterior), Sills and thresholds, and at miscellaneous locations where sealant is shown on Drawings, exterior joints where no other sealant is indicated:
   a. Multicomponent, Nonsag, Urethane Joint Sealant: ASTM C 920, Type M, Grade NS, Class 25, for Use NT, M, A and O; capable of 50% extension and compression movement.
   b. Single-Component, Nonsag, Urethane Joint Sealant: ASTM C 920, Type S, Grade NS, Class 25, for Use NT.
9. Exterior Sheet Metal Lap Joints: Types recommended by manufacturer and complying with requirements of this section.
10. Exterior Metal Panel Butt Joints and trim: Types recommended by manufacturer and complying with requirements of this section.

C. Interior Locations:
   1. Expansion and control joints, around perimeters of frames where door, window and louver frames abut concrete, masonry or other building materials, sills and thresholds, and at miscellaneous locations where sealant is shown on Drawings:
      a. Multicomponent, Nonsag, Urethane Joint Sealant: ASTM C 920, Type M, Grade NS, Class 25, for Use NT, M, A and O; capable of 50% extension and compression movement.
      b. Single-Component, Nonsag, Urethane Joint Sealant: ASTM C 920, Type S, Grade NS, Class 25, for Use NT.
   2. Interior Concrete Slabs on Grade:
      a. General Locations: Exterior or Interior Horizontal Expansion Joint Sealant: Polyurethane, self-leveling; ASTM C 920, Grade P, Class 25, Uses T, M and A; single component.
   3. Interior wet areas, around plumbing fixtures, countertops abutting walls, food service applications: Mildew-Resistant, Single-Component, Acid-Curing Silicone Joint Sealant: ASTM C 920, Type S, Grade NS, Class 25, for Use NT, A and O.

4. Interior static dry joints as required to dress appearance, Other interior joints for which no other type of sealant is indicated.: Latex Joint Sealant: Acrylic latex or siliconized acrylic latex, ASTM C 834, Type OP, Grade NF.
5. Where required for sound control: Acoustical Sealant, ASTM C-834.
6. Where required for sound control with limited flame spread: Acoustical Sealant, ASTM C-834, fire-rated type.

D. General:
1. Joints in construction between interior and exterior spaces and other designated or required locations to provide effective barrier against passage of elements, Other joints for which no other type of sealant is indicated.:
   a. Multicomponent, Nonsag, Urethane Joint Sealant: ASTM C 920, Type M, Grade NS, Class 25, for Use NT, M, A and O; capable of 50% extension and compression movement.
   b. Single-Component, Nonsag, Urethane Joint Sealant: ASTM C 920, Type S, Grade NS, Class 25, for Use NT.
2. Specialty perimeters where required for appearance or weathertightness:
   a. Multicomponent, Nonsag, Urethane Joint Sealant: ASTM C 920, Type M, Grade NS, Class 25, for Use NT, M, A and O; capable of 50% extension and compression movement.
   b. Single-Component, Nonsag, Urethane Joint Sealant: ASTM C 920, Type S, Grade NS, Class 25, for Use NT.

3.09 POST-OCCUPANCY

A. Post-Occupancy Inspection: Perform visual inspection of entire length of project sealant joints at a time that joints have opened to their greatest width; i.e. at low temperature in thermal cycle. Report failures immediately and repair.

END OF SECTION 07 9200

SECTION 07 9513
EXPANSION JOINT COVER ASSEMBLIES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Expansion joint cover assemblies for floor, wall, ceiling, and soffit surfaces.

B. Roof control and expansion joint covers.

C. Internal secondary gutter and drainage system

1.02 RELATED REQUIREMENTS

A. Section 03 1000 - Concrete Forms and Accessories: Placement of joint assembly frames in formwork.

B. Section 07 9200 - Joint Sealants: Sealing expansion and control joints using gunnable and pourable sealants.

1.03 REFERENCE STANDARDS

A. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.

B. ASTM B221M - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes [Metric].

C. ASTM B308/B308M - Standard Specification for Aluminum-Alloy 6061-T6 Standard Structural Profiles.

D. ASTM E 119 - Standard Test Methods for Fire Tests of Building Construction and Materials

1.04 SUBMITTALS

A. See Section 01 3300 - Submittals, for submittal procedures.

B. Product Data: Provide joint assembly profiles, profile dimensions, anchorage devices and available colors and finish.
   1. Submit manufacturer's installation instructions and copies of UL Classification with California State Fire Marshal listing numbers for fire rated joint covers.

C. Shop Drawings: Indicate joint and splice locations, miters, layout of the work, affected adjacent construction and anchorage locations.

D. Samples: Submit two samples 10 inch long, illustrating profile, dimension, color, and finish selected.

E. Manufacturer's Installation Instructions: Indicate rough-in sizes and required tolerances for item placement.

1.05 QUALITY ASSURANCE

A. Provide systems by one manufacturer with a minimum of 5 years experience in fabrication of expansion joint systems.

B. Fire rated joint covers shall have been tested by Underwriters Laboratories in accordance with ANSI/UL No. 263 and ASTM E 119, and the following criteria:
   1. In full-scale floor and wall furnaces.
   2. With positive furnace pressures.

3. Passing both thermal conductivity and hose stream requirements.
4. Minimum deflection withstood during fire tests:
5. Wall systems: 4" deflection.

C. Field Measurements: Verify compliance with manufacturer's requirements.

1.06 EXTRA MATERIALS

A. See Section 01 6000 - Product Requirements, for additional provisions.

B. Provide 18 ft of resilient joint filler and special tools required for accessing and servicing components.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Expansion Joint Cover Assemblies:
1. Construction Specialties, Inc: www.c-sgroup.com/#sle.
2. Balco, a CSW Industrials Company;
3. Inpro: www.inprocorp.com/#sle.
4. Nystrom, Inc: www.nystrom.com/#sle.
5. MM Systems Corporation.www.mmsystemscorp.com
6. Watson Bowman Acme .www.bacorp.com

B. Substitutions: See Section 01 6000 - Product Requirements.

2.02 EXPANSION JOINT COVER ASSEMBLIES

A. Expansion Joint Cover Assemblies - General: Factory-fabricated and assembled; designed to completely fill joint openings, sealed to prevent passage of air, dust, water, smoke; suitable for traffic expected.
1. Joint Dimensions and Configurations: As indicated on drawings.
2. Joint Cover Sizes: Selected to suit joint width and configuration, based on manufacturer's published recommendations and limitations.
3. Lengths: Provide covers in full lengths required; avoid splicing wherever possible.
4. Anchors, Fasteners, and Fittings: Provided by cover manufacturer.

2.03 MATERIALS

A. Expansion Joint Covers: Shapes and profiles as indicated, as required, and as recommended by manufacturer to suit application. Fire rated assembly to match rating of walls, extruded aluminum, ASTM B221.

B. Resilient Filler: Type appropriate for installation.

C. Threaded Fasteners: Compatible with adjacent materials, sized as recommended by manufacturer in writing for proposed loading and use.

D. Backing Paint: Asphaltic type.

E. Fire barrier: Provide type required for indicated fire resistance and fabricated of layers of ceramic fiber insulation, metallic insulation.

F. Flexible secondary internal gutter: Manufacturer's standard design accommodating required joint movement and compress without damage during full joint closure. Contain and drain excess collected moisture to building exterior through drainage tubes of similar flexibility. Minimize material elongation from moisture or debris. Secure to foundation using blockouts for joint or other manufacturer approved method.
1. Wabo flexible Gutter System by Watson Bowman Acme, types to suit application.

2. Gutter profile: 0.060 inch thick single ply reinforced EPDM sheet. Shore A hardness minimum 60 +/- 5, width of profile as required by joint type and movement requirements.
3. Drain Tube: Provide 1-/12 inch i.d. 1/8 inch wall clear PVC tubing.
4. Transition element: premolded 0.060 inch EPDM taper profile with pre-taped flange and adhesive for bond to underside of gutter profile.

G. Accessories, and other materials required for complete installation.

H. Extruded Aluminum: ASTM B221 (ASTM B221M), 6063 alloy, T6 temper; or ASTM B308/B308M, 6061 alloy, T6 temper.
1. Exposed Finish Outdoors: Natural anodized.
2. Exposed Finish at Walls and Ceilings: Natural anodized.

I. Resilient Seals:
1. For Pedestrian Traffic Applications: EPDM rubber, Neoprene, or Santoprene; no PVC; Shore A hardness of 40 to 50 Durometer.
2. For Vehicular Traffic Applications: EPDM rubber, Neoprene, or Santoprene; no PVC; Shore A hardness of 40 to 50 Durometer.
3. Color: As selected by Architect.

J. Anchors and Fasteners: As recommended by cover manufacturer.

K. Backing Paint for Aluminum Components in Contact with Cementitious Materials: Asphaltic type.

2.04 FABRICATION

A. Joint Covers: Aluminum cover plate, aluminum frame construction, retainers with resilient elastomeric filler strip, designed to permit plus or minus 50 percent joint movement with full recovery, flush mounted.
1. Fabricate special transitions, corner fittings, and end closures. Miter and weld joints

B. Back paint components in contact with cementitious materials.

C. Galvanize embedded ferrous metal anchors and fastening devices.

D. Shop assemble components and package with anchors and fittings.

E. Provide joint components in single length wherever practical. Minimize site splicing.

F. Insulation blanket and fire-resistive sealant as recommended by manufacturer to achieve indicated fire ratings.

2.05 FINISHES

A. Floors: Non-slip surfacing of aluminum oxide grit.

B. Walls and Ceilings: Clear anodized.

C. Resilient Filler Exposed to View: Gray.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that joint preparation and dimensions are acceptable and in accordance with manufacturer's requirements.

3.02 PREPARATION

A. Provide anchoring devices for installation and embedding .
   1. Provide templates and rough-in measurements.

B. All surfaces to receive elastomeric compression seal shall be free from dirt, water, frost and any other loose foreign debris, which may be detrimental to effective joint sealing.

C. Remove any and all accumulated debris from interstitial spaces before enclosure.

3.03 INSTALLATION

A. Install components and accessories in accordance with manufacturer's instructions.
   1. Calculate and make allowances for change in joint size due to difference between installation and building operating temperatures

B. Fire rated joint Covers: Install to requirements of fire rated design. Install fire barriers and flame sealant as required.

C. Align work plumb and level, flush with adjacent surfaces.

D. Elastomeric Compression Seals: Install utilizing manufacturer’s lubricant adhesive. Utilize manufacturer’s specialized installation tool as required to obtain specified fit and alignment.

E. Install flexible gutter profile continuous along length of joint with drain tube assemblies spaced 25 feet on center, minimum of two drains per joint. Install drain systems as recommended by manufacturer. Direct all collected moisture to exterior of building.

F. Rigidly anchor to substrate to prevent misalignment.

3.04 PROTECTION

A. Do not permit traffic over unprotected floor joint surfaces.

B. Provide strippable coating to protect finish surface.

C. Where necessary, remove and store cover plate and install temporary protection over joints; reinstall cover plate before completion of work.

D. Protect system and its components during construction. After work is complete in adjacent areas clean exposed surfaces with a suitable cleaner that will not harm or attack the elastomeric material.

END OF SECTION 07 9513

SECTION 08 1113
HOLLOW METAL DOORS AND FRAMES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Non-fire-rated hollow metal doors and frames.

B. Hollow metal frames for wood doors.

C. Fire-rated hollow metal doors and frames.

D. Thermally insulated hollow metal doors with frames.

E. Hollow metal borrowed lites glazing and window frames.

F. Accessories, including glazing, louvers, and matching panels.

1.02 RELATED REQUIREMENTS

A. Pertinent Sections specifying Volatile Organic Compound (VOC) Content Restrictions.

B. Section 01 8113 - Sustainable Design Requirements.

C. Section 08 7100 - Door Hardware.

D. Section 08 8000: Glass for doors and borrowed lites.

1.03 ABBREVIATIONS AND ACRONYMS

A. ANSI: American National Standards Institute.

B. HMMA: Hollow Metal Manufacturers Association.

C. NAAMM: National Association of Architectural Metal Manufacturers.

D. NFPA: National Fire Protection Association.

E. SDI: Steel Door Institute.

F. UL: Underwriters Laboratories.

1.04 DEFINITIONS

A. Exterior doors: Doors exposed in whole or in part to the weather.

B. Wet Areas: Exposed in whole or in part to areas where water is used in the room; toilets, custodial closets, food service, science classrooms, locker rooms and showers.

1.05 REFERENCE STANDARDS

A. AAMA 502 - Voluntary Specification for Field Testing of Newly Installed Fenestration Products.

B. AAMA/WDMA/CSA 101/I.S.2/A440 - North American Fenestration Standard/Specification for windows, doors, and skylights.

C. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design.

D. ANSI/SDI A250.4 - Test Procedure and Acceptance Criteria for Physical Endurance for Steel Doors, Frames and Frame Anchors.

E. ANSI/SDI A250.8 - Specifications for Standard Steel Doors and Frames (SDI-100).

F. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

G. ASTM A1008/A1008M - Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Solution Hardened, and Bake Hardenable.

H. ASTM A1011/A1011M - Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength.

I. ASTM E283 - Standard Test Method for Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen.

J. 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.

K. ASTM E783 - Standard Test Method for Field Measurement of Air Leakage Through Installed Exterior Windows and Doors.

L. BHMA A156.115 - American National Standard for Hardware Preparation in Steel Doors and Steel Frames.

M. ICC A117.1 - Accessible and Usable Buildings and Facilities.

N. ITS (DIR) - Directory of Listed Products.

O. NAAMM HHMA 820 - Guidelines for Glazing of Hollow Metal Transoms, Sidelights and Windows.

P. NAAMM HMMA 830 - Hardware Selection for Hollow Metal Doors and Frames.

Q. NAAMM HMMA 831 - Hardware Locations for Hollow Metal Doors and Frames.

R. NAAMM HMMA 840 - Guide Specifications for Installation and Storage of Hollow Metal Doors and Frames.

S. NAAMM HMMA 861 - Guide Specifications for Commercial Hollow Metal Doors and Frames.

T. NFPA 80 - Standard for Fire Doors and Other Opening Protectives.

U. NFPA 105 - Standard for Smoke Door Assemblies and Other Opening Protectives.

V. NFPA 252 - Standard Methods of Fire Tests of Door Assemblies.

W. SDI 117 - Manufacturing Tolerances for Standard Steel Doors and Frames.

X. UL (DIR) - Online Certifications Directory.

Y. UL 10C - Standard for Positive Pressure Fire Tests of Door Assemblies.

Z. UL 1784 - Standard for Air Leakage Tests of Door Assemblies.

AA. California Code of Regulations, Title 24, Part 2, California Building Code (CBC), International Building Code.

AB. California Code of Regulations, Title 24, Part 11, California Green Building Standards Code, “CAL-Green”.

AC. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design; 2010.

1.06 SUBMITTALS

A. See Section 01 3300 - Submittals, for submittal procedures.

B. Product Data: Materials and details of design and construction, hardware locations, reinforcement type and locations, anchorage and fastening methods, and finishes; and one copy of referenced standards/guidelines.

C. CAL-GREEN Submittals: Product Data – VOC Limits: For adhesives sealants, fillers, primers and coatings, documentation including printed statement of VOC contents, comply with limits specified in related section.

D. Shop Drawings: Details of each opening, showing elevations, glazing, frame profiles, and any indicated finish requirements.

E. Installation Instructions: Manufacturer's published instructions, including any special installation instructions relating to this project. Include 1 copy of NAAMM HMMA-820.

F. Certificates: Provide manufacturer's certification of the following:
1. Products comply with referenced standards.
2. Each and every frame and hollow metal window, sidelite provided are UL listed and labeled for the fire rating indicated at the sizes shown.

G. Manufacturer's Qualification Statement.

1.07 QUALITY ASSURANCE

A. Manufacturer Qualifications: Provide hollow metal doors and frames from SDI Certified manufacturer: www.steeldoor.org/sdicertified.php/#sle.

B. Maintain at project site copies of reference standards relating to installation of products specified.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Comply with NAAMM HMMA 840 or ANSI/SDI A250.8 (SDI-100) in accordance with specified requirements.

B. Protect with resilient packaging; avoid humidity build-up under coverings; prevent corrosion and adverse effects on factory applied painted finish.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Hollow Metal Doors and Frames:
1. Ceco Door, an Assa Abloy Group company: www.assaabloydss.com.
2. Republic Doors, an Allegion brand: www.republicdoor.com/#sle.
3. Steelcraft, an Allegion brand: www.allegion.com/us.
4. Substitutions: See Section 01 6000 - Product Requirements.

2.02 PERFORMANCE REQUIREMENTS

A. VOC Limits for adhesives, sealants, fillers, primers and coatings . Comply with limits specified in related section.

B. Provide products and assemblies complying with recommendations of NAAMM Tech Notes HMMA-820 TN03-07 and tested to the following performance:
   1. Air Leakage Laboratory Test: Maximum of 0.06 cu ft/min sq ft of wall area, when tested in accordance with ASTM E283 at 1.57 psf pressure differential across assembly.
   2. Water Penetration Resistance: No uncontrolled water as described in paragraph "Weather Resistance" above, when tested in accordance with ASTM E331 at pressure differential of 1.57 lbf/sq ft.

C. Requirements for Hollow Metal Doors and Frames:
   1. Steel Sheet: Comply with one or more of the following requirements; galvannealed steel complying with ASTM A653/A653M, cold-rolled steel complying with ASTM A1008/A1008M, or hot-rolled pickled and oiled (HRPO) steel complying with ASTM A1011/A1011M, commercial steel (CS) Type B, for each.
   2. Accessibility: Comply with ICC A117.1 and ADA Standards.
   3. Exterior Door Top Closures: Flush end closure channel, with top and door faces aligned.
   4. Door Edge Profile: Hinged edge square, and lock edge beveled.
   5. Typical Door Face Sheets: Flush. Refer to Door Schedule for additional information.
   6. Glazed Lights: Non-removable stops on non-secure side; sizes and configurations as indicated on drawings. Style: Flush.
   7. Hardware Preparations, Selections and Locations: Comply with NAAMM HMMA 830 and NAAMM HMMA 831 or BHMA A156.115 and ANSI/SDI A250.8 (SDI-100) in accordance with specified requirements.
   8. Zinc Coating for Typical Interior and/or Exterior Locations: Provide metal components zinc-coated (galvanized) and/or zinc-iron alloy-coated (galvannealed) by the hot-dip process in accordance with ASTM A653/A653M, with manufacturer's standard coating thickness, unless noted otherwise for specific hollow metal doors and frames.
      a. A60/ZF180 (galvannealed).

D. Hollow Metal Panels: Same construction, performance, and finish as doors.

E. Combined Requirements: If a particular door and frame unit is indicated to comply with more than one type of requirement, comply with the specified requirements for each type; for instance, an exterior door that is also indicated as being sound-rated must comply with the requirements specified for exterior doors and for sound-rated doors; where two requirements conflict, comply with the most stringent.

F. Fire-rated Assemblies: Manufactured in accordance with Underwriters Laboratories Inc. or other approved independent testing laboratory and bearing their metal label affixed to both door and frame. Labels shall list fire rating and "UL 10B and 10C POSITIVE PRESSURE" label. Door labels shall also include smoke and draft "S" designation.
   1. Manufacture in accordance with positive pressure test, UL-10C.
   2. Comply with ITS/Warnock Hersey International "Category A Doors". Where intumescent edge seals are required on wood or composite doors installed in steel frames, seal shall b e built-in edge type. Edge seals are not allowed on frame. Only smoke and draft seals complying with the "S" rating are allowed to be installed on the frame.
   3. Coordinate with specification Section 08 7100 Door Hardware as required for compliance with UL 10C test, positive pressure fire-rated components and fire door assemblies.

2.03 HOLLOW METAL DOORS

A. Door Finish: Factory primed and field finished.

B. Exterior Doors: Thermally insulated.
   1. Based on SDI Standards: ANSI/SDI A250.8 (SDI-100).

a. Level 3 - Extra Heavy-duty.
b. Physical Performance Level A, 1,000,000 cycles; in accordance with ANSI/SDI A250.4.
c. Model Types as indicated on Drawings.
d. Door Face Metal Thickness: 16 gage, 0.053 inch, minimum.
e. Zinc Coating: A60/ZF180 galvanized coating; ASTM A653/A653M.

2. Door Core Material: Vertical steel stiffeners with fiberglass batts.
3. Door Thermal Resistance: R-Value of 4.
4. Door Thickness: 1-3/4 inch, nominal.

C. Interior Doors, Non-Fire Rated:
1. Based on SDI Standards: ANSI/SDI A250.8 (SDI-100).
a. Level 3 - Extra Heavy-duty.
b. Physical Performance Level A, 1,000,000 cycles; in accordance with ANSI/SDI A250.4.
c. Model Types as indicated on Drawings.
d. Door Face Metal Thickness: 16 gage, 0.053 inch, minimum.
e. Zinc Coating: A60/ZF180 galvanized coating; ASTM A653/A653M at wet areas (toilet rooms, custodial, food service, locker and shower rooms).
2. Door Core Material: Manufacturers standard core material/construction and in compliance with requirements.
3. Door Thickness: 1-3/4 inch, nominal.

D. Fire-Rated Doors:
1. Based on SDI Standards: ANSI/SDI A250.8 (SDI-100).
a. Level 3 - Extra Heavy-duty.
b. Physical Performance Level A, 1,000,000 cycles; in accordance with ANSI/SDI A250.4.
c. Model Types as indicated on Drawings.
d. Door Face Metal Thickness: 16 gage, 0.053 inch, minimum.
e. Zinc Coating: A60/ZF180 galvanized coating; ASTM A653/A653M at wet areas (toilet rooms, custodial, food service, locker and shower rooms).
2. Fire Rating: As indicated on Door Schedule, tested in accordance with UL 10C and NFPA 252 ("positive pressure fire tests").
a. Temperature-Rise Rating (TRR) Across Door Thickness: In accordance with local building code and authorities having jurisdiction.
b. Provide units listed and labeled by UL (DIR) or ITS (DIR).
c. Attach fire rating label to each fire rated unit.
d. Smoke and Draft Control Doors (Indicated with letter "S" on Drawings and/or Door Schedule): Self-closing or automatic closing doors in accordance with NFPA 80 and NFPA 105, with fire-resistance-rated wall construction rated the same or greater than the fire-rated doors, and the following;
1) Maximum Air Leakage: 3.0 cfm/sq ft of door opening at 0.10 inch w.g. pressure, when tested in accordance with UL 1784 at both ambient and elevated temperatures.
2) Gasketing: Provide gasketing or edge sealing as necessary to achieve leakage limit.
3) Label: Include the "S" label on fire-rating label of door.
3. Door Core Material: Manufacturers standard core material/construction in compliance with requirements.
4. Door Thickness: 1-3/4 inch, nominal.

2.04 HOLLOW METAL FRAMES

A. Comply with standards and/or custom guidelines as indicated for corresponding door in accordance with applicable door frame requirements.

B. Frame Finish: Factory primed and field finished.

C. Exterior Door Frames: Full profile/continuously welded type.
   1. Galvanizing: Components hot-dipped zinc-iron alloy-coated (galvannealed) in accordance with ASTM A653/A653M, with A40/ZF120 coating.
   2. Frame Metal Thickness: 12 gage, 0.093 inch, minimum.
   3. Weatherstripping: Separate, see Section 08 7100.

D. Interior Door Frames, Non-Fire Rated: Full profile/continuously welded type.
   1. Terminated Stops: Provide at interior doors; closed end stop terminated 6 inch, maximum, above floor at 45 degree angle.
   2. Frame Metal Thickness: 14 gage, 0.067 inch, minimum.

E. Door Frames, Fire-Rated: Full profile/continuously welded type.
   1. Fire Rating: Same as door, labeled.
   2. Frame Metal Thickness: 16 gage, 0.053 inch, minimum.

F. Frames for Wood Doors: Comply with frame requirements in accordance with corresponding door.

G. Mullions for Pairs of Doors: Fixed, with profile similar to jambs.

H. Borrowed Lites Glazing Frames: Construction and face dimensions to match door frames, and as indicated on drawings.

I. Transom Bars: Fixed, of profile same as jamb and head.

J. Provide mortar guard boxes for hardware cut-outs in frames to be installed in masonry or to be grouted.

K. Frames in Masonry Walls: Size to suit masonry coursing with head member 4 inch high to fill opening without cutting masonry units.

L. Frames Wider than 48 inches: Reinforce with steel channel fitted tightly into frame head, flush with top.

M. Frame Anchors: Furnished type of anchorage accepted by the Steel Door Institute. For wall conditions that do not permit installation of floor anchors furnish 1 additional wall anchor.
   1. Floor anchors: Furnish 1 per jamb. Minimum 16 gauge galvanized steel. Type with 2 bolts to structure.
   2. Jamb anchors:
      a. Stud Partitions: Furnish 4 per jamb. Minimum 18 gauge and welded inside each jamb.

2.05 FRAME FABRICATION

A. Cut-out, reinforce, punch and tap for mortise hardware. Where frames are grouted fabricate mortises in frames with mortar-tight back cover. Punch frames and provide silencers except where scheduled to have door seals.

B. Reinforce for surface hardware. Reinforce in accordance with ANSI A115 and SDI-107 except as specified for material gauge.
   1. Hinge: No. 7 gauge; 1-1/4-inch by 10-inch, minimum.

2. Strikes: No. 16 gauge formed combination reinforcement and dust cover.
3. Flush bolts, closers, and other surface mounted hardware: No. 12 gauge.

2.06 ACCESSORIES

A. Louvers: Roll formed steel with overlapping frame; finish same as door components; factory-installed.
   1. In Fire-Rated Doors: UL (DIR) or ITS (DIR) listed fusible link louver, same rating as door.
   2. Style: Sightproof inverted V blade.
   3. Security Louvers at exterior locations; Anemostat PLSL.
   4. Fasteners: Exposed, tamper proof fasteners oriented to secure side.

B. Glazing: As specified in Section 08 8000, factory installed.

C. Removable Stops: Formed sheet steel, shape as indicated on drawings, mitered or butted corners; prepared for countersink style tamper proof screws.

D. Astragals for Double Doors: Specified in Section 08 7100.

E. Mechanical Fasteners for Concealed Metal-to-Metal Connections: Self-drilling, self-tapping, steel with electroplated zinc finish.

F. Silencers: Resilient rubber, fitted into drilled hole; provide three on strike side of single door, three on center mullion of pairs, and two on head of pairs without center mullions.

G. Temporary Frame Spreaders: Provide for factory- or shop-assembled frames.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify existing conditions before starting work.

B. Verify that opening sizes and tolerances are acceptable.

C. Verify that finished walls are in plane to ensure proper door alignment.

3.02 PREPARATION

A. Coat inside of frames to be installed in masonry or to be grouted, with bituminous coating, prior to installation.

3.03 INSTALLATION

A. Install doors and frames in accordance with manufacturer's instructions and related requirements of specified door and frame standards or custom guidelines indicated.

B. Fill all spaces between frame anchors and structure with approved shim material.

C. Install fire rated units in accordance with NFPA 80.

D. Coordinate frame anchor placement with wall construction.

E. Install door hardware as specified in Section 08 7100.

F. Install exterior frames and glazing to comply with glazing installation requirements of NAAMM HMMA-820 and Section 08 8000.

3.04 TOLERANCES

A. Clearances Between Door and Frame: Comply with related requirements of specified frame standards or custom guidelines indicated in accordance with SDI 117 or NAAMM HMMA 861.

B. Maximum Diagonal Distortion: 1/16 inch measured with straight edge, corner to corner.

3.05 FIELD QUALITY CONTROL

A. See Section 01 4000 - Quality Requirements, for independent field testing and inspection requirements, and requirements for monitoring quality of specified product installations.

B. Provide field testing of installed hollow metal frames and windows by independent laboratory in accordance with AAMA 502 and AAMA/WDMA/CSA 101/I.S.2/A440 during construction process and before installation of interior finishes.
   1. Perform tests on three individual frames or windows in designated locations as directed by Architect.
   2. Conduct tests on individual frames or windows prior to 5 percent, 50 percent, and 90 percent completion of this work.
   3. 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 1.57 psf.
   4. Field test for air leakage in accordance with ASTM E783 with uniform static air pressure difference of 1.57 psf.

C. Repair or replace fenestration components that have failed designated field testing, and retest to verify performance complies with specified requirements.

3.06 ADJUSTING

A. Adjust for smooth and balanced door movement.

B. Clean and restore soiled surfaces. Remove scraps and debris, and leave site and a clean condition.

C. Protect completed work from damage. Replace damaged work.

3.07 SCHEDULE

A. Refer to Door and Frame Schedule on the drawings.

END OF SECTION 08 1113

SECTION 08 3100
ACCESS DOORS AND PANELS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Access door and frame units, fire-rated and non-fire-rated, in wall and ceiling locations wherever required for access to enclosed spaces or equipment.

1.02 RELATED REQUIREMENTS

A. Pertinent Sections specifying Volatile Organic Compound (VOC) Content Restrictions.

B. Section 09 9113 - Exterior Painting: Field paint finish.

C. Section 09 9123 - Interior Painting: Field paint finish.

D. Pertinent sections of other Divisions specifying components requiring access.

1.03 REFERENCE STANDARDS

A. ASTM A36/A36M - Standard Specification for Carbon Structural Steel.

B. ASTM A276/A276M - Standard Specification for Stainless Steel Bars and Shapes.

C. ASTM A1008/A1008M - Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Solution Hardened, and Bake Hardenable.

D. ASTM A1011/A1011M - Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength.

E. ITS (DIR) - Directory of Listed Products.

F. Manufacturer's recommendations and specifications.

G. UL (FRD) - Fire Resistance Directory.

1.04 SUBMITTALS

A. See Section 01 3300 - Submittals, for submittal procedures.

B. Schedule: Tabular listing of access doors and panels, indicating location, size, materials, fire rating, device or purpose for access.

C. Product Data: Provide sizes, types, finishes, hardware, scheduled locations, and details of adjoining work.

D. CAL-GREEN Submittals: Product Data – VOC Limits: For adhesives sealants, fillers, primers and coatings, documentation including printed statement of VOC contents, comply with limits specified in related section.

E. Shop Drawings: Indicate exact position of each access door and/or panel unit.

F. Manufacturer's Installation Instructions: Indicate installation requirements for fire rated units.

G. Project Record Documents: Record actual locations of each access unit.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum five (5) years documented experience.

1.06 REGULATORY REQUIREMENTS

A. Conform to Title 24, Part 2, California Building Code for fire rated access doors.
   1. Provide access doors of fire rating equivalent to the fire rated assembly in which they are to be installed.

B. Provide products listed and labeled by UL or ITS (Warnock Hersey) as suitable for the purpose specified and indicated.

1.07 PROJECT CONDITIONS

A. Coordinate the work with other work requiring access doors.

PART 2 PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

A. VOC Limits for adhesives, sealants, fillers, primers and coatings . Comply with limits specified in related section.

B. Provide door seals for access doors located in sound isolating walls or ceilings.

C. Provide door covered access into all attic spaces and at all portions of the work to which access is necessary for periodic inspection, adjustments, or maintenance, and which is enclosed behind finish materials, including, but not limited to, valves, water hammer arrestors, mechanical units, electrical panels and outlets, equipment and systems.

2.02 MANUFACTURERS

A. Wall and Ceiling Access Doors:
   1. Karp Associates, Inc: www.karpinc.com.
   2. Milcor by Commercial Products Group of Hart & Cooley, Inc: www.milcorinc.com.
   3. Nystrom, Inc: www.nystrom.com.
   4. J. L. Industries, www.jlindustries.com.
   5. Substitutions: See Section 01 6000 - Product Requirements.

2.03 ACCESS DOORS AND PANELS

A. All Units: Factory fabricated, fully assembled units with corner joints welded, filled, and ground flush; square and without rack or warp; coordinate requirements with assemblies where units are to be installed.

2.04 ACCESS DOOR UNITS - WALLS AND CEILINGS

A. Door sizes: Unless otherwise specifically noted on drawings; smallest standard size which will permit ready access and removal of working parts requiring maintenance.

B. Door and Frame Units: Formed steel and stainless steel where noted.
   1. Frames and flanges: 0.058 inch steel.
   2. Door panels: 0.070 inch single thickness steel sheet.
   3. Units in Fire-Rated Assemblies: Fire rating as required by applicable code for fire-rated assembly that access doors are being installed.
      a. Provide products listed by ITS (DIR) or UL (FRD) as suitable for purpose indicated.
   4. Steel Finish: Primed.

5. Stainless Steel Finish: No. 4 brushed finish.
6. Door/Panel Size: As indicated on the drawings.
7. Hardware:
   a. Hardware for Fire-Rated Units: As required for listing.
   b. Hinges for Non-Fire-Rated Units: Concealed, constant force closure spring type.
   c. Hinge: 175 degree stainless steel piano hinge with pin.
   d. Latch/Lock: Cylinder lock-operated cam latch, two keys for each unit.

2.05 FABRICATION

A. Weld, fill, and grind joints to ensure flush and square unit.

2.06 FINISHES

A. General: Provide doors and/or panels of the following finishes as scheduled.
   1. Galvanized, hot dipped finish.
   2. Prime coat with alkyd primer.
   3. Stainless Steel Finish, Type 304 or Type 316: No. 4 finish.

2.07 SOURCE QUALITY CONTROL

A. Certifications: Furnish each fire rated door with affixed label of Underwriters Laboratories (UL), Warnock Hersey International (WHI), or other approved independent testing laboratory and inspection service, certifying scheduled fire rating.

PART 3 EXECUTION

3.01 EXAMINATION

A. Investigate conditions requiring access, select panels of suitable type and configuration for conditions indicated.

B. For conditions requiring access and for which panels or doors are not otherwise shown, recommend panel or door type and size for Architect's review.

C. Verify that rough openings are correctly sized and located.

3.02 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. Avoid conflict with other building elements.

3.03 SCHEDULE

A. Exterior Doors and Panels: Galvanized for site finishing specified in 09 9113.

B. Interior Doors and Panels in Restrooms, Food Preparation, Locker Rooms and in ceramic tile surfaced walls wherever located: Stainless steel construction, Type 304, No. 4 finish.

C. Interior Doors and Panels in all other locations: Primed for site finishing specified in 09 9123.

END OF SECTION 08 3100

SECTION 08 4313
ALUMINUM ENTRANCES AND STOREFRONT

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Aluminum-framed storefront, with vision glass.

B. Infill panels of metal and glass.

C. Aluminum doors and frames.

D. Perimeter sealant.

E. Section also includes Contractor's responsibility to assume role of "Responsible Party" for NFRC label testing and inspection "Certified Project Option", to obtain Fenestration Acceptance Requirements certification required for occupancy permit. Refer to California Energy Code Section 110.6.

1.02 RELATED REQUIREMENTS

A. Section 01 6116 - Volatile Organic Compound (VOC) Restrictions.

B. Pertinent sections specifying wall framing.

C. Section 05 5000 - Metal Fabrications: Steel bracing and attachment members.

D. Section 07 2500 - Weather Barriers: Sealing framing to weather barrier installed on adjacent construction.

E. Section 07 9200 - Joint Sealants: Sealing joints between frames and adjacent construction.

F. Section 08 5113 - Aluminum Windows.

G. Section 08 7100 - Door Hardware: Hardware items other than specified in this section.

H. Section 08 8000 - Glazing: Glass and glazing accessories.

1.03 REFERENCE STANDARDS

A. 36 CFR 1191 - Americans with Disabilities Act Accessibility Guidelines for Buildings and Facilities; Final Rule; Federal Register, July 26, 1991; updated 2010.

B. AAMA CW-10 - Care and Handling of Architectural Aluminum From Shop to Site.

C. AAMA 501.2 - Field Check of Metal Storefronts, Curtain Walls, and Sloped Glazing Systems for Water Leakage.

D. AAMA 503 - Voluntary Specification for Field Testing of Newly Installed Storefronts, Curtain Walls and Sloped Glazing Systems.

E. AAMA 609 & 610 - Cleaning and Maintenance Guide for Architecturally Finished Aluminum (Combined Document).

F. AAMA 611 - Voluntary Specification for Anodized Architectural Aluminum.

G. AAMA 1503 - Voluntary Test Method for Thermal Transmittance and Condensation Resistance of Windows, Doors and Glazed Wall Sections.

H. AAMA 2605 - Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels.

I. ASCE 7 - Minimum Design Loads for Buildings and Other Structures.

J. ASTM A36/A36M - Standard Specification for Carbon Structural Steel.

K. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.

L. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.

M. ASTM B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate [Metric].

N. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.

O. ASTM B221M - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes [Metric].

P. ASTM E283 - Standard Test Method for Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen.

Q. ASTM E330/E330M - Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference.

R. ASTM E783 - Standard Test Method for Field Measurement of Air Leakage Through Installed Exterior Windows and Doors.

S. ASTM E331 - Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference.

T. 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.

U. California Code of Regulations, Title 24, Part 11 California Green Building Standards Code, “CAL-Green".

V. California Energy Code “Building Energy Efficiency Standards”.

W. California Energy Code “Reference Nonresidential Appendix NA7”.

X. National Fenestration Rating Council (NFRC). NFRC 100 Site Built Program.

Y. California Code of Regulations, Title 24, Part 2, California Building Code (CBC), International Building Code, with California Amendments.

Z. SSPC-Paint 20 - Zinc-Rich Primers (Type I, "Inorganic," and Type II, "Organic").

AA. SSPC-Paint 25 - Zinc Oxide, Alkyd, Linseed Oil Primer for Use Over Hand Cleaned Steel, Type I and Type II; Society for Protective Coatings.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Coordinate with installation of other components that comprise the exterior enclosure.

B. Preinstallation Meeting: Conduct a preinstallation meeting two weeks before starting work of this section; require attendance by all affected installers.
   1. Meet at Project site with Installer, installer of each component of associated work, installers of substrate construction to receive this work, installers of other work that must

precede or follow storefront work (including mechanical work if any), Architect/Owner, storefront system manufacturer's representative, and other representatives directly concerned with performance of the Work, including (where applicable) Owner's insurers, test agencies, and governing authorities. Objectives to include:

a. Review preparation and installation procedures and coordinating and scheduling required with related work.
b. Review methods and procedures related to storefront and glazing work.
c. Review structural loading limitations of new storefront.
d. Review storefront systems requirements (drawings, specifications, and other contract documents).
e. Review required submittals, both completed and yet to be completed.
f. Review and finalize construction schedule related to storefront work and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
g. Review required inspection, testing, certifying, and material usage accounting procedures.
h. Review weather and forecasted weather conditions and procedures for coping with unfavorable conditions, including provision of temporary enclosure of partially completed or occupied spaces.
i. Record discussion of conference, including decisions and agreements (or disagreements) reached, and furnish copy of record to each party attending. If substantial disagreements exist at conclusion of conference, determine how disagreements will be resolved and set date for reconvening conference.
j. Review notification procedures for weather or non-working days.

1.05 SUBMITTALS

A. See Section 01 3300 - Submittals, for submittal procedures.

B. Provide submittals coordinated with submittals for related sections referenced in this Section for simultaneous review.

C. Product Data: Provide component dimensions, describe components within assembly, anchorage and fasteners, glass and infill, door hardware, and internal drainage details.

D. VOC Submittals:
1. Product Data - VOC Limits: For adhesives sealants, fillers and primers, documentation including printed statement of VOC contents, demonstrate compliance with limits specified in Section 01 6116.

E. Shop Drawings: Indicate system dimensions, framed opening requirements and tolerances, affected related work, expansion and contraction joint location and details, and field welding required.
1. Shop drawings shall include project-specific integrations to surrounding cladding and waterproofing components, including items specified in other sections.
2. Provide installation instructions and isometric details indicating how system components will be installed and sealed watertight.

F. Samples: Submit two samples in manufacturer's standard size illustrating finished aluminum surface, glass, infill panels, glazing materials.

G. Design Data: Provide framing member structural and physical characteristics, and dimensional limitations.

H. Samples: Submit two samples 12x12 inches in size illustrating finished aluminum surface, glass, glazing materials.

I. Manufacturer's Certificate: Certify that the products supplied meet or exceed the specified requirements.

J. Field Quality Control Submittals: Report of field testing for water penetration and air leakage.

K. Warranty: Submit manufacturer warranty and ensure forms have been completed in Owner's name and registered with manufacturer.

1.06 INFORMATIONAL SUBMITTALS

A. Assume role of "Responsible Party" for NFRC label testing and inspection "Certified Project Option". Make all arrangements necessary to perform required testing of site-built assembly and obtain NFRC label as described in NFRC 100.5.6.

B. Manufacturer's Qualification Statement.

C. Qualification Data: For qualified Installer and testing agency.

D. Certificate of Acceptance: Refer to California Energy Code Section 110.6.
1. Submit Certificate of Acceptance certifying that the fenestration product meets the required acceptance requirements, completed, signed and submitted to the enforcement agency, with copies to Owner and Architect.

E. Seismic Qualification Certificates: For aluminum-framed systems, accessories, and components, from manufacturer.
1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.

F. Welding certificates.

G. Preconstruction Test Reports: For sealant.

H. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for aluminum-framed systems, indicating compliance with performance requirements. For each system provide test reports with shop drawings

I. Source quality-control reports.
1. Field quality-control reports.

J. NFRC 100 Label Certificate: Submit proof of testing of site-built assembly and compliance with NFRC 100. Manufacturer certificates or factory tests are not acceptable for this requirement.

K. Warranties: Sample of special warranties.

1.07 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in performing work of type specified and with at least ten (10) years of documented experience.

B. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for installation of units required for this Project. Installer shall have a minimum of 5 years experience with projects of similar type and scope.

C. NFRC Compliance: Completed site-built assembly shall conform to NFRC 100 requirements and be tested and labeled in accordance with that standard.

D. Testing Agency Qualifications: Qualified according to ASTM E 699 for testing indicated.

E. Product Options: Information on Drawings and in Specifications establishes requirements for systems' aesthetic effects and performance characteristics. Aesthetic effects are indicated by dimensions, arrangements, alignment, and profiles of components and assemblies as they relate to sightlines, to one another, and to adjoining construction. Performance characteristics are indicated by criteria subject to verification by one or more methods including preconstruction testing, field testing, and in-service performance.
   1. Do not revise intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If revisions are proposed, submit comprehensive explanatory data to Architect for review.

F. Accessible Entrances: Comply with applicable provisions in the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines and ICC/ANSI A117.1.

1.08 MOCKUPS

A. See Section 01 4000 - Quality Requirements, for general requirements for mock-ups.

B. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for fabrication and installation.
   1. Build mockup of typical wall area as shown on Drawings. Include adjacent wall construction with cladding, air barriers and related components. Demonstrate sequencing and integration of opening flashings, perimeter seals and air barrier continuity.
   2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
   3. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

C. Locate on-site where directed by Architect; mock-up may remain as part of the Work.

1.09 DELIVERY, STORAGE, AND HANDLING

A. Handle products of this section in accordance with AAMA CW-10.

B. Protect finished aluminum surfaces with wrapping. Do not use adhesive papers or sprayed coatings that bond to aluminum when exposed to sunlight or weather.

1.10 PROJECT CONDITIONS

A. Field Measurements: Verify actual locations of structural supports for aluminum-framed systems by field measurements before fabrication and indicate measurements on Shop Drawings.

B. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish dimensions and proceed with fabricating glazed aluminum curtain-wall systems correspond to established dimensions.

C. Do not install sealants when ambient temperature is less than 40 degrees F. Maintain this minimum temperature during and 48 hours after installation.

1.11 SCHEDULING

A. Failure to provide timely and complete submission of all submittals as specified requires provision of a temporary closure to fill-in wall openings until storefront assembly can be

provided. Contractor shall provide temporary closure under provisions of Division 01 sections specifying temporary facilities without additional compensation.

1. Construct temporary closure in sequence as required to permit other work to proceed without delay during processing of submittals as specified elsewhere.
2. Temporary closure shall consist of minimum 90 pound mineral cap roofing over a 30 pound base sheet over minimum one half inch plywood substrate, including all requisite support members needed to support the temporary closure indefinitely. The temporary closure shall be of equivalent load bearing capacity and watertightness as the surrounding permanent walls.
3. Provide sheet metal edges and all other flashing for temporary closure as necessary to provide waterproofing identical to the curtain walls.
4. Remove and dispose of temporary closure as part of installation of storefronts.

1.12 WARRANTY

A. See Section 01 7000 - Contract Closeout, for additional warranty requirements.

B. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of aluminum-framed systems that do not comply with requirements or that fail in materials or workmanship within specified warranty period.
   1. Failures include, but are not limited to, the following:
      a. Structural failures including, but not limited to, excessive deflection.
      b. Noise or vibration caused by thermal movements.
      c. Deterioration of metals and other materials beyond normal weathering.
      d. Adhesive, cohesive or emulsification sealant failures.
      e. Water leakage through fixed glazing or framing areas.
      f. Failure of operating components.

C. Correct defective Work within a five year period after Date of Substantial Completion.

D. Provide ten year manufacturer warranty against failure of glass seal on insulating glass units, including interpane dusting or misting. Include provision for replacement of failed units.

E. Provide ten year manufacturer warranty against excessive degradation of exterior finish. Include provision for replacement of units with excessive fading, chalking, or flaking.

PART 2 PRODUCTS

2.01 DESIGN REQUIREMENTS

A. VOC Limits for adhesives sealants, fillers, coatings and primers. Comply with limits specified in Section 01 6116.

B. Assume role of "Responsible Party" for NFRC label testing and inspection "Certified Project Option". Make all arrangements necessary to perform required testing of site-built assembly and obtain NFRC label as described in NFRC 100.5.6. Contractor is responsible to obtain, including payment of all required fees, a label certificate for the site built fenestration system meeting requirements of California Energy Code 2013 Section 10-111(a)2 as described in California Energy Code Section 110.6.

C. Thermally Broken: All components, including doors, to be thermally broken with continuous resilient elastomeric extrusions.

D. General Performance: Comply with performance requirements specified, as determined by testing of glazed aluminum storefronts representing those indicated for this Project without failure due to defective manufacture, fabrication, installation, or other defects in construction.

1. Glazed aluminum storefronts shall withstand movements of supporting structure including, but not limited to; twist, column shortening, long-term creep, and deflection from uniformly distributed and concentrated live loads.
2. Failure also includes the following:
   a. Thermal stresses transferring to building structure.
   b. Framing members transferring stresses, including those caused by thermal and structural movements, to glazing.
   c. Glass breakage.
   d. Noise or vibration created by wind and thermal and structural movements.
   e. Loosening or weakening of fasteners, attachments, and other components.
   f. Sealant failure.
   g. Failure of operating units.

E. Weather Resistance:
1. Design shall provide waterproofing and an air-vapor retarder that is continuous at all penetrations, transitions, and other conditions. System shall integrate with the building's waterproofing and air-vapor-retarder system to provide a weathertight transition. System shall not allow the movement of the interior or exterior air to flow vertically within the assembly. Methods employed to prevent internal air movement shall not restrict water flow channels or prevent thermal movement of the frames.
2. Water penetration into the system is acceptable only if all of the following conditions are satisfied; any other water penetration is considered water leakage and is unacceptable:
   a. Water is immediately contained and drained to the exterior.
   b. There is no wetting of a surface that could be damaged by moisture or that would be visible to building occupants.
   c. There would be no staining or other damage to completed building or its furnishings.
   d. This definition of water leakage governs over the other definitions that may appear in referenced documents.
3. Provide internal gutters and weep systems to collect and drain water leakage and condensation to the exterior at the sill of each opening. Glazing assemblies shall have on isolated gutter cavity at each glass perimeter so the leakage is confined to and wept from the opening of origin. Glazing assemblies shall have continuous spliced gutters at mullions splices, with sealed and caps at termination conditions. Systems shall not direct water to contact edges of insulating glass units. Prevent water infiltration at weeps. Coordinate gutter and weep systems with other sections.

F. Sound Transmission Class (STC): Rated for not less than 30 STC when tested for laboratory sound transmission loss according to ASTM E 90 and determined by ASTM E 413.
1. Locations per Drawings, coordinate with Section 08 8000 for IGU selection, values as scheduled or as shown on Drawings:

2.02 MANUFACTURERS

A. Source Limitations for Aluminum-Framed Systems: Obtain from single source from single manufacturer, same as that specified in Section 08 4413 for Glazed Aluminum Curtain Walls.

B. Aluminum-Framed Storefront and Doors:
1. EFCO Corporation; Series 433 Thermal TripleSet Storefront, www.efcocorp.com.
2. Kawneer North America; Trifab® VersaGlaze 451T: www.kawneer.com/#sle.
3. Oldcastle BuildingEnvelope; Series 3000-6000 Thermal Multiplane: www.oldcastlebe.com/#sle.
4. Wausau Window and Wall Systems; 14000-14650 Series: www.wausauwindow.com.

C. Substitutions: See Section 01 6000 - Product Requirements.

2.03 STOREFRONT

A. Aluminum-Framed Storefront: Factory fabricated, factory finished aluminum framing members with infill, and related flashings, anchorage and attachment devices.
   1. Glazing Rabbet(s): For glazing types indicated.
   2. Glazing Position: As indicated on Drawings.
   3. Vertical Mullion Dimensions: As indicated on Drawings, sized to resist imposed loads.
   4. Water Leakage Test Pressure Differential: 10 lbf/sq ft.
   5. Air Infiltration Test Pressure Differential: 6.24 psf.
   6. Finish: Superior performing organic coatings.
      a. Factory finish all surfaces that will be exposed in completed assemblies.
      b. Touch-up surfaces cut during fabrication so that no natural aluminum is visible in completed assemblies, including joint edges.
      c. Coat concealed metal surfaces that will be in contact with cementitious materials or dissimilar metals with bituminous paint.
   7. Fabrication: Joints and corners flush, hairline, and weatherproof, accurately fitted and secured; prepared to receive anchors and hardware; fasteners and attachments concealed from view; reinforced as required for imposed loads.
   8. Construction: Eliminate noises caused by wind and thermal movement, prevent vibration harmonics, and prevent "stack effect" in internal spaces.
   9. System Internal Drainage: Drain to the exterior by means of a weep drainage network any water entering joints, condensation occurring in glazing channel, and migrating moisture occurring within system.
   10. Expansion/Contraction: Provide for expansion and contraction within system components caused by cycling temperature range of 170 degrees F over a 12 hour period without causing detrimental effect to system components, anchorages, and other building elements.
   11. Movement: Allow for movement between storefront and adjacent construction, without damage to components or deterioration of seals.
   12. Perimeter Clearance: Minimize space between framing members and adjacent construction while allowing expected movement.
   13. Air and Vapor Seal: Maintain continuous air barrier and vapor retarder throughout assembly, primarily in line with inside pane of glazing and inner sheet of infill panel and heel bead of glazing compound.
   14. Preparation for Window Treatments: Provide reinforced interior horizontal head rail.

B. Performance Requirements: Wind Loads, Thermal Break, Air and Water Penetration requirements do not apply to interior-only installations.
   1. Structural Loads:
      a. Wind Loads: As indicated on the Drawings.
      b. Seismic Loads: As indicated on the Drawings.
      c. Other Design Loads: As indicated on Drawings.
   2. Wind Loads: Design and size components to withstand the specified load requirements without damage or permanent set, when tested in accordance with ASTM E330/E330M, using loads 1.5 times the design wind loads and 10 second duration of maximum load.
      a. Deflection Normal to Glazing Plane: Limited to 1/175 of clear span for spans up to 13 feet 6 inches (4.1 m) and to 1/240 of clear span plus 1/4 inch (6.35 mm) for spans more than 13 feet 6 inches (4.1 m).
      b. Deflection Parallel to Glazing Plane: Limited to amount not exceeding that which reduces glazing bite to less than 75 percent of design dimension and that which reduces edge clearance between framing members and glazing or other fixed components to less than 1/8 inch (3.2 mm).

1) Operable Units: Provide a minimum 1/16-inch (1.6-mm) clearance between framing members and operable units.

c. At safety loads of 150 percent of design load for metal members supporting glass, residual deflection of framing members shall not exceed 1/1000th of span.

d. Accommodate a minimum 1/2 in. live load deflection or greater, as determined by the Structural Engineer of Record, as well as anticipated thermal expansion and elastic shortening of the building.

3. Water Penetration Resistance: No uncontrolled water as described in paragraph "Weather Resistance" above, when tested in accordance with ASTM E331 at pressure differential of 10 lbf/sq ft.
4. Water Penetration under Dynamic Pressure: Provide aluminum-framed systems that do not evidence water leakage through fixed glazing and framing areas when tested according to AAMA 501.1 under dynamic pressure equal to 20 percent of positive wind-load design pressure, but not less than 9.0 lbf/sq. ft. (433 Pa).
5. Air Leakage Laboratory Test: Maximum of 0.06 cu ft/min sq ft of wall area, when tested in accordance with ASTM E283 at 6.27 psf pressure differential across assembly.
6. Thermally Broken: All components, including doors, to be thermally broken with continuous resilient elastomeric extrusions.
7. Condensation Resistance Factor of Framing: 50, minimum, measured in accordance with AAMA 1503.
8. Air Infiltration: Limit air infiltration through assembly to 0.06 cu ft/min/sq ft of wall area, measured at specified differential pressure of 6.24 lbf/sq. ft. across assembly in accordance with ASTM E283.
9. Failure defined to include any of the following:
   a. Deflection exceeding specified limits.
   b. Water penetration, including condensation, in excess of that specified in this section.
   c. Thermal stresses transferring to building structure.
   d. Framing members transferring stresses, including those caused by thermal and structural movements to glazing.
   e. Glazing-to-glazing contact.
   f. Noise or vibration created by wind and by thermal and structural movements.
   g. Loosening or weakening of fasteners, attachments, and other components.
   h. Sealant failure.
   i. Failure of operating units.

2.04 COMPONENTS

A. Aluminum Framing Members: Tubular aluminum sections, drainage holes and internal weep drainage system.
   1. Framing members for interior applications need not be thermally broken.
   2. Glazing Stops: Flush.
   3. Cross-Section: As indicated on drawings.
   4. Structurally Reinforced Members: Extruded aluminum with internal reinforcement of structural steel members.

B. Infill Panels: Insulated, aluminum sheet face and back, with edges formed to fit glazing channel and sealed.
   1. Finish: Same as storefront.

C. Column Covers: Brake Metal, Aluminum, 0.040 inch thick, Finish to match storefront framing.

2.05 GLAZING

A. Glazing: As specified in Division 08 Section "Glazing."

B. Glazing Gaskets: Manufacturer's standard compression types; replaceable, molded or extruded, of profile and hardness required to maintain watertight seal.

C. Spacers and Setting Blocks: Manufacturer's standard elastomeric type.

D. Bond-Breaker Tape: Manufacturer's standard TFE-fluorocarbon or polyethylene material to which sealants will not develop adhesion.

E. Glazing Sealants: For structural-sealant-glazed systems, as recommended by manufacturer for joint type, and as follows:
   1. VOC Limits, for adhesives sealants, fillers and primers. Comply with limits specified in related section.
   2. Weatherseal Sealant: If structural sealant is not the weatherseal sealant, provide ASTM C 920 for Type S, Grade NS, Class 25, Uses NT, G, A, and O; single-component neutral-curing formulation that is compatible with structural sealant and other system components with which it comes in contact; recommended by structural-sealant, weatherseal-sealant, and aluminum-framed-system manufacturers for this use.
      a. Color: As selected by Architect.

2.06 ENTRANCE DOOR SYSTEMS

A. Stile-and-Rail Type Entrance Doors for manual-swing operation: Provide storefront manufacturer's heavy duty type complying with all of the following:
   1. Door corner construction shall consist of mechanical clip fastening, SIGMA deep penetration and fillet welds.
   2. Glazing: Fabricate doors to facilitate replacement of glass or aluminum panels, without disassembly of stiles and rails. Provide beveled, snap-on, extruded-aluminum stops and preformed gaskets with exterior stops anchored for non-removal.
   3. Equip each door leaf with an adjusting mechanism located in the top rail near the lock stile, which provides for minor clearance adjustments after installation.
   4. Door Construction: Minimum 2 inch overall thickness, with minimum 0.125-inch- (3.2-mm-) thick, extruded-aluminum tubular rail and stile members. Mechanically fasten corners with reinforcing brackets that are deeply penetrated and fillet welded or that incorporate concealed tie rods.
   5. Thermal Construction: High-performance plastic connectors separate aluminum members exposed to the exterior from members exposed to the interior.
   6. Door Design: Wide stile; 5-inch (127-mm) nominal width.
      a. Stile and Rail dimensions as indicated.
      b. Accessible Doors: Smooth surfaced for width of door in area within 10 inches (255 mm) above floor or ground plane.

B. Entrance Door Hardware: As specified in Division 08 Section "Door Hardware."

2.07 VENTING WINDOWS

A. Aluminum Windows: Manufacturer's standard units, complying with AAMA/WDMA/CSA 101/I.S.2/A440, with self-flashing mounting fins, and as follows:
   1. AA 900 ISO WEB. Compatible with storefront perimeter frame.
   2. Window Type: As indicated on Drawings.
   3. Minimum Performance Class: Match criteria specified for Storefront.
   4. Minimum Performance Grade: Match criteria specified for Storefront..

5. Aluminum Extrusions: ASTM B 221 (ASTM B 221M), alloy and temper recommended by manufacturer for strength, corrosion resistance, and application of required finish, but not less than 0.064-inch (1.63-mm) thickness at any location for main frame and sash members.
    a. Thermally Improved Construction: Fabricate window units with an integral, concealed, low-conductance thermal barrier; located between exterior materials and window members exposed on interior side; in a manner that eliminates direct metal-to-metal contact.
6. Mullions: Between adjacent windows where occuring, fabricated of extruded aluminum matching finish of window units.
7. Fasteners, Anchors, and Clips: Nonmagnetic stainless steel, aluminum, or other noncorrosive material, compatible with aluminum window members, trim, hardware, anchors, and other components of window units. Fasteners shall not be exposed, except for attaching hardware.
    a. Reinforcement: Where fasteners screw-anchor into aluminum less than 0.128 inch (3.26 mm) thick, reinforce interior with aluminum or nonmagnetic stainless steel to receive screw threads, or provide standard, noncorrosive, pressed-in, spline grommet nuts.
8. Hardware: Manufacturer's standard; of stainless steel, or bronze; including the following:
    a. Cam-action sweep sash lock and keeper at meeting rails.
    b. Pole-operated, cam-action locking device on meeting rail where rail is more than 72 inches (1830 mm) above floor.
    c. Operator Pole: Provide one pole for each room having window operators more than 72 inches (1830 mm) above floor.
    d. Steel or bronze operating arms.
    e. Concealed lock operable with hex key at locations indicated in drawings to be lockable.
    f. Opening Limiters: Window manufacturer standard type of materials matching locks. Limit opening to 4 inches maximum horizontal extension where operable windows are adjacent to a path of travel.
9. Weather Stripping: Woven-pile weather stripping of wool, polypropylene, or nylon pile and resin-impregnated backing fabric; complying with AAMA 701/702.

2.08 MATERIALS

A. Extruded Aluminum: ASTM B221 (ASTM B221M). 6063 alloy, T5 temper.

B. Sheet Aluminum: ASTM B209 (ASTM B209M).

C. Fasteners: Stainless steel.

D. Exposed Flashings: Aluminum sheet, 20 gage, 0.032 inch minimum thickness; finish to match framing members.
    1. Break shapes as indicated, as recommended by manufacturer, and as required to fully enclosed and seal system.

E. Concealed Flashings: Stainless steel, 26 gage, 0.0187 inch minimum thickness.

F. Sill Flashing Sealant: Elastomeric, silicone or polyurethane, compatible with flashing material.

G. Sealant for Setting Thresholds: Non-curing butyl type.

H. Concealed Flashings: 0.018 inch thick stainless steel, dead soft, as selected by manufacturer for compatibility with other components.

I. Perimeter Sealant: Silicone, as specified in Section 07 9005.

J. Glazing Gaskets: Type to suit application to achieve weather, moisture, and air infiltration requirements.

K. Glazing Accessories: As specified in Section 08 8000.

L. Shop and Touch-Up Primer for Steel Components: SSPC-Paint 25, zinc oxide, alkyd, linseed oil primer.

M. Touch-Up Primer for Galvanized Steel Surfaces: SSPC-Paint 20, zinc rich.

N. Protective Backing Paint: Bituminous type, emulsified asphalt, ASTM D1187.

2.09 FINISHES

A. Superior Performing Organic Coatings System: Polyvinylidene fluoride (PVDF) multi-coat superior performing organic coatings system complying with AAMA 2605, including at least 70 percent PVDF resin, and at least 80 percent of aluminum extrusion and panels surfaces having minimum total dry film thickness (DFT) of 1.2 mils, 0.0012 inch.
1. Manufacturers:
   a. PPG Metal Coatings; Duranar: www.ppgmetalcoatings.com/#sle.
   b. Sherwin-Williams Company; SHER-NAR 5000: oem.sherwin-williams.com/#sle.
   c. Valspar; Fluropon: www.valsparcoilextrusion.com/#sle.
   d. Substitutions: See Section 01 6000 - Product Requirements.

B. Color(s) as selected by Architect from:
1. Manufacturer's full range of standard colors.

C. Touch-Up Materials: As recommended by coating manufacturer for field application.

2.10 HARDWARE

A. Other Door Hardware: As specified in Section 08 7100.

2.11 FABRICATION

A. General: Fabricate aluminum entrance and storefront components to designs, sizes and thickness indicated, and to comply with specified standards. Sizes and profile requirements are indicated on the drawings.

B. Prefabrication: Complete fabrication, assembly, finishing, hardware application, and other work before shipment to Project site. Disassemble components only where necessary for shipment and installation.
1. Perform fabrication operations, including cutting, fitting, forming, drilling and grinding of metal work to prevent damage to exposed finish surfaces. Complete these operations for hardware prior to application of finishes.
2. Do not drill and tap for surface-mounted hardware items until time of installation at Project site.

C. Framing Members, General: Fabricate components that, when assembled, have the following characteristics:
1. Profiles that are sharp, straight, and free of defects or deformations.
2. Accurately fitted joints with ends coped or mitered.
3. Means to drain water passing joints, condensation within framing members, and moisture migrating within the system to exterior.
4. Physical and thermal isolation of glazing from framing members.

5. Accommodations for thermal and mechanical movements of glazing and framing to maintain required glazing edge clearances.
6. Provisions for field replacement of glazing from interior for vision glass and exterior for spandrel glazing or metal panels.
7. Fasteners, anchors, and connection devices that are concealed from view to greatest extent possible.

D. Continuity: Maintain accurate relation of planes and angles with hairline fit of contacting members. Fabricate curved members to true shapes as shown on drawings, segmented or faceted curves are not acceptable.Fabricate components with minimum clearances and shim spacing around perimeter of assembly, while enabling installation and dynamic movement of perimeter seal.

E. Accurately fit and secure joints and corners. Make joints flush, hairline, and weatherproof.

F. Prepare components to receive anchor devices. Fabricate anchors.

G. Welding: Comply with AWS recommendations. Grind exposed welds smooth to remove weld spatter and welding oxides. Restore mechanical finish.
1. Welding behind finished surfaces shall be performed to minimize distortion and discoloration on the finished surface.

H. Reinforcing: Install reinforcing as required for hardware, performance requirements, sag resistance and rigidity.

I. Dissimilar Metals: Separate dissimilar metals and concealed metal surfaces that will be in contact with cementitious materials with bituminous paint, suitable sealant, elastomeric tape, or gasket between the surfaces. Do not use coatings containing lead.

J. Reinforce components internally for door hardware and door operators.

K. Reinforce framing members for imposed loads.

L. Finishing: Apply factory finish to all surfaces that will be exposed in completed assemblies.
1. Touch-up surfaces cut during fabrication so that no natural aluminum is visible in completed assemblies, including joint edges.

M. After fabrication, clearly mark components to identify their locations in Project according to Shop Drawings.

2.12 OPERABLE UNIT FABRICATION

A. Entrance Door Frames: Reinforce as required to support loads imposed by door operation and for installing entrance door hardware.
1. At exterior doors, provide compression weather stripping at fixed stops.
2. At interior doors, provide silencers at stops to prevent metal-to-metal contact. Install three silencers on strike jamb of single-door frames and two silencers on head of frames for pairs of doors.

B. Entrance Doors: Reinforce doors as required for installing entrance door hardware.
1. At pairs of exterior doors, provide sliding-type weather stripping retained in adjustable strip and mortised into door edge.
2. At exterior doors, provide weather sweeps applied to door bottoms.

C. Entrance Door Hardware Installation: Factory install entrance door hardware to the greatest extent possible. Cut, drill, and tap for factory-installed entrance door hardware before applying finishes.

D. Operable Window Frames: Reinforce as required to support loads imposed by window operation and for installing window hardware.
   1. Provide compression weather stripping at fixed stops.

E. Operable Windows: Reinforce as required for installing hardware.
   1. At pairs of windows, provide sliding-type weather stripping retained in adjustable strip .

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify, with installer present, dimensions, tolerances, and method of attachment with other work.

B. Verify that wall openings and adjoining air and vapor seal materials are ready to receive work of this section.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 INSTALLATION

A. Install wall system in accordance with manufacturer's instructions.
   1. Do not install damaged components.

B. Attach to structure to permit sufficient adjustment to accommodate construction tolerances and other irregularities.

C. Provide alignment attachments and shims to permanently fasten system to building structure.

D. Align assembly plumb and level, free of warp or twist. Maintain assembly dimensional tolerances, aligning with adjacent work.

E. Provide thermal isolation where components penetrate or disrupt building insulation.

F. Install sill and perimeter flashings. Turn up ends and edges; seal to adjacent work to form water tight dam.

G. Install components to drain water passing joints, condensation occurring within framing members, and moisture migrating within the system to exterior.

H. Where fasteners penetrate sill flashings, make watertight by seating and sealing fastener heads to sill flashing.

I. Coordinate attachment and seal of perimeter air and vapor barrier materials.

J. Pack fibrous insulation in shim spaces at perimeter of assembly to maintain continuity of thermal barrier.

K. Set thresholds in bed of sealant and secure.

L. Install glass and infill panels in accordance with Section 08 8000, using glazing method required to achieve performance criteria.

M. Install perimeter sealant in accordance with Section 07 9005.

N. Touch-up minor damage to factory applied finish; replace components that cannot be satisfactorily repaired.

3.03 OPERABLE UNITS

A. Install operable units level and plumb, securely anchored, and without distortion. Adjust weather-stripping contact and hardware movement to produce proper operation, weathertight enclosure and tight fit at weather stripping.
   1. Opening Limiters: Adjust to limit opening to 4 inches maximum horizontal extension.

B. Entrance Doors: Field-Installed Entrance Door Hardware: Install surface-mounted entrance door hardware according to entrance door hardware manufacturers' written instructions using concealed fasteners to greatest extent possible.

3.04 TOLERANCES

A. Maximum Variation from Plumb: 0.06 inch per 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.

3.05 FIELD QUALITY CONTROL

A. Provide services of storefront manufacturer's field representative to observe for proper installation of system and submit report.

B. Water-Spray Test: Provide water spray quality test of installed storefront components in accordance with AAMA 501.2 during construction process and before installation of interior finishes.
   1. Perform a minimum of two tests in each designated area as directed by Architect.
   2. Conduct tests in each area prior to 10 percent and 50 percent completion of this work.

C. Provide field testing of installed storefront system by independent laboratory in accordance with AAMA 503 during construction process and before installation of interior finishes.
   1. Perform a minimum of two tests in each designated area as directed by Architect.
   2. Conduct tests in each area prior to 10 percent and 50 percent completion of this work.
   3. Field test for water penetration in accordance with ASTM E1105 with uniform static air pressure difference (Procedure A) not less than 6.20 psf.
      a. Maximum allowable rate of water penetration in 15-minute test is 0.5 ounce that is not contained in an area with provisions to drain to exterior, or collected on surface of interior horizontal framing member.
   4. Field test for air leakage in accordance with ASTM E783 with uniform static air pressure difference of 6.20 psf.
      a. Maximum allowable rate of air leakage is 0.09 cfm/sq ft.

D. Repair or remove work if test results and inspections indicate that it does not comply with specified requirements.

E. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

F. Aluminum-framed assemblies will be considered defective if they do not pass tests and inspections. Should failure occur, Contractor shall test one additional are for each failed location.

G. Prepare test and inspection reports.

H. Fenestration Acceptance Requirements: Refer to California Energy Code Section 110.6.
   1. Before an occupancy permit is granted, site-built fenestration products in other than low-rise residential buildings shall be certified as meeting the Acceptance Requirements for

Code Compliance, as specified in the Reference Nonresidential Appendix NA7 to ensure that site-built fenestration meet Standards requirements, including a matching label certificate for product(s) installed and be readily accessible at the project location.

2. Contractor is responsible to prepare and obtain a Certificate of Acceptance certifying that the fenestration product meets the acceptance requirements, completed, signed and submitted to the enforcement agency, including payment of all fees, with copies to Owner and Architect.

3.06 ADJUSTING

A. Adjust operating hardware and sash for smooth operation.

B. Verify opening limiters prevent extension of operable units more than 4 inches horizontal from the face of the window frame.

C. Provide window operating poles in each room having operable hardware more than 72 inches (1830 mm) above floor.

3.07 CLEANING

A. Remove protective material from pre-finished aluminum surfaces.
   1. Wash down surfaces with a solution of mild detergent in warm water, applied with soft, clean wiping cloths, and take care to remove dirt from corners and to wipe surfaces clean.
   2. Upon completion of installation, thoroughly clean aluminum surfaces in accordance with AAMA 609 & 610.

B. Remove excess sealant by method acceptable to sealant manufacturer and which will not damage pre-finished aluminum surfaces.

3.08 PROTECTION

A. Protect installed products from damage until Date of Substantial Completion.

B. Touch-up minor damage to factory applied finish, no exposed unfinished aluminum allowed in finish work; replace components that cannot be satisfactorily repaired.

END OF SECTION 08 4313

SECTION 08 5123
STEEL WINDOWS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Fire-rated steel windows, factory-finished with fixed sash.

1.02 RELATED REQUIREMENTS

A. Section 07 2500 - Weather Barriers: Sealing frames to water-resistive barrier installed on adjacent construction.

B. Section 07 9200 - Joint Sealants: Sealing joints between frames and adjacent construction.

C. Section 08 8813 - Fire-Rated Glazing.

1.03 REFERENCE STANDARDS

A. AAMA/WDMA/CSA 101/I.S.2/A440 - North American Fenestration Standard/Specification for windows, doors, and skylights.

B. AAMA 502 - Voluntary Specification for Field Testing of Newly Installed Fenestration Products.

C. ASTM A36/A36M - Standard Specification for Carbon Structural Steel.

D. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.

E. ASTM E283/E283M - Standard Test Method for Determining Rate of Air Leakage Through Exterior Windows, Skylights, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen.

F. ASTM E330/E330M - Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference.

G. ASTM E331 - Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference.

H. ASTM E783 - Standard Test Method for Field Measurement of Air Leakage Through Installed Exterior Windows and Doors.

I. 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.

J. ASTM E2112 - Standard Practice for Installation of Exterior Windows, Doors and Skylights.

K. NFPA 80 - Standard for Fire Doors and Other Opening Protectives.

L. NFPA 101 - Life Safety Code.

M. SWI (INTRO) - Architect's Guide to Steel Windows and Doors.

N. UL 9 - Standard for Fire Tests of Window Assemblies.

1.04 SUBMITTALS

A. Product Data: Provide component dimensions, fasteners, anchors, glass, and _____.

B. Shop Drawings: Indicate opening dimensions, framed opening tolerances, affected related work; installation requirements.

C. Certificates: Certify that products of this section meet or exceed specified requirements.

D. Test Reports: Prior to submitting shop drawings or starting fabrication, submit test report(s) by independent testing agency showing compliance with performance requirements.

E. Field Quality Control Submittals: Report of field testing for water penetration and air leakage.

F. Warranty: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing windows specified in this section, with not less than three years of documented experience.

B. Installer Qualifications: Company specializing in performing work of the type specified and with at least three years of documented experience and approved by manufacturer.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Protect factory finished surfaces with wrapping. Do not use adhesive papers or sprayed coatings that bond when exposed to sunlight or weather.

1.07 FIELD CONDITIONS

A. Do not install sealants when ambient temperature is less than 40 degrees F.

B. Maintain this minimum temperature during and after installation of sealants.

1.08 WARRANTY

A. Correct defective Work within a ten year period after Date of Substantial Completion.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Fire-Rated Steel Windows:
1. Fyre-Tec; Series 950 - Fixed Lite: www.fyre-tec.com/#sle.
2. Substitutions: See Section 01 6000 - Product Requirements.

2.02 STEEL WINDOWS

A. Steel Windows: Hot rolled steel sections, factory fabricated, factory finished, with vision glass, infill panels, related flashings, anchorage and attachment devices.
1. Grade: Standard Intermediate design based on SWI (INTRO).
2. Sash Configuration: Provide fixed non-operable sash layout.

2.03 PERFORMANCE REQUIREMENTS

A. Wind Loads: Design and size components to withstand wind loads without damage or permanent set, when tested in accordance with ASTM E330/E330M, using pressure equal to 1.5 times specified design pressures, with 10 second duration of maximum load.

B. Design Pressure: In accordance with applicable codes.

C. Member Deflection: Limit member deflection to 1/200 of the longer dimension; with full recovery of glazing materials.

D. Air Leakage: 0.06 cfm/sq ft maximum leakage of window when tested at 1.57 psf pressure difference in accordance with ASTM E283/E283M.

E. Overall Thermal Transmittance (U-value): 0.35, maximum, including glazing, measured on window sizes required for this project.

F. Water Leakage: None, when measured in accordance with ASTM E331 with a test pressure difference of 2.86 lbf/sq ft.

G. System Internal Drainage: Drain water entering joints, condensation occurring in glazing channels, or migrating moisture occurring within system to the exterior by a weep drainage network.

H. Fire-Rated Steel Windows: Comply with UL 9 and labeled with a 3/4 hour or 1 hour fire-test rating as indicated in window schedule, design and fabricate units to meet glass size and configuration, window size and opening dimensions in compliance with NFPA 80, and provide hardware complying with NFPA 80 requirements.

2.04 MATERIALS

A. Hot Rolled Steel Sections: ASTM A36/A36M, galvanized to ASTM A123/A123M requirements; 3 lb/ft; with slot for fitting weather stripping integral with sash section.

B. Fasteners: Stainless steel.

2.05 GLASS AND GLAZING MATERIALS

A. Glass and Glazing Materials: See Section 08 8813 for Fire-Rated Glazing.

2.06 FABRICATION

A. Fabricate components with minimum clearances and shim spacing around perimeter of assembly, yet enabling installation and dynamic movement of perimeter seal.

B. Accurately fit and secure joints and corners. Make joints flush and hairline.

C. Prepare components to receive anchor devices. Fabricate anchors.

D. Arrange fasteners to conceal from view.

E. Provide internal drainage weep holes and channels to migrate moisture to exterior. Provide internal drainage of glazing spaces to exterior through weep holes.

2.07 FINISHES

A. Window Frames: Urethane finish. Color as selected by Architect.
1. Factory-finished before forming.

B. Concealed Steel Items:
1. Galvanized in accordance with requirements of ASTM A123/A123M.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that wall openings and adjoining water-resistive barrier materials are ready to receive steel windows; see Section 07 2500.

3.02 INSTALLATION

A. Install window frames and glass and glazing in accordance with manufacturers instructions.

B. Install windows in accordance with ASTM E2112.

C. Install fire-rated windows in accordance with NFPA 80 and NFPA 101.

D. Attach window frame and shims to perimeter opening to accommodate construction tolerances and other irregularities.

E. Align window plumb and level, free of warp or twist. Maintain dimensional tolerances and alignment with adjacent work.

F. Set sill members and sill flashing in continuous bead of sealant.

G. Provide thermal isolation where components penetrate or disrupt building insulation. Pack fibrous insulation in shim spaces at perimeter of assembly to maintain continuity of thermal barrier.

H. Install glass in accordance with glazing method required to achieve performance criteria; see Section 08 8813.

3.03 TOLERANCES

A. Maximum Variation from Level or Plumb: 1/16 inches in 3 ft non-cumulative or 1/8 inches per 10 ft.

3.04 FIELD QUALITY CONTROL

A. See Section 01 4000 - Quality Requirements for independent field testing and inspection requirements, and requirements for monitoring quality of specified product installations.

B. Provide field testing of installed steel windows by independent laboratory in accordance with AAMA 502 and AAMA/WDMA/CSA 101/I.S.2/A440 during construction process and before installation of interior finishes.
   1. Perform tests on three individual windows in designated locations as directed by Architect.
   2. Conduct tests on individual windows prior to 5 percent and 50 percent completion of this work.
   3. 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.
   4. Field test for air leakage in accordance with ASTM E783 with uniform static air pressure difference of 6.27 psf.
      a. Maximum allowable rate of air leakage is 1.5 times specified rate of 0.10 cfm/sq ft as indicated in AAMA/WDMA/CSA 101/I.S.2/A440.

C. Repair or replace fenestration components that have failed designated field testing, and retest to verify performance complies with specified requirements.

3.05 CLEANING

A. Remove protective material from factory finished surfaces.

B. Remove labels and visible markings.

C. Wash surfaces by method recommended and acceptable to window manufacturer; rinse and wipe surfaces clean.

D. Remove excess glazing sealant by method acceptable to sealant manufacturer.

3.06 PROTECTION

A. Do not permit continuing construction activities near unprotected finish surfaces.

END OF SECTION 08 5123

SECTION 08 7100

DOOR HARDWARE

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:
   1. All door hardware required to complete the work as indicated on the drawings and as specified herein.

B. Related Sections/Work Specified Elsewhere
   1. Section 08 1113 – Hollow Metal Doors and Frames
   2. Section 08 4313 – Aluminum Entrances and Storefronts

1.02 REFERENCES

A. CBC - California Building Code –(Title 24, Part 2, California Code of Regulations (CCR)

B. ADAAG – Americans with Disabilities Act Accessibility Guidelines

C. NFPA 101 Life Safety Code – National Fire Protection Association

D. NFPA 80 – Standard for Fire Doors and Other Opening Protectives - National Fire Protection Association

E. NFPA 252 – Standard Methods of Fire Tests of Door Assemblies - National Fire Protection Association

F. ANSI A156.1 through A156.20 – American National Standards Institute hardware standards as applicable

G. U.L. – Underwriters Laboratories, Inc.

H. BHMA – Builders Hardware Manufacturers Association

I. DHI – Door and Hardware Institute – "Keying Systems and Nomenclature" and mounting heights/locations procedures and standards

1.03 SUBMITTALS

A. Submit in accordance with Section 01 3300.

B. Hardware Schedule
   1. Within 30 days following Notice of Award, submit a complete Schedule of Hardware to Architect for review. Schedule criteria:
      a. Prepare in Door and Hardware Institute (DHI) vertical format only. Horizontal schedules will be rejected.
      b. Include index of doors, listing door number, page and heading number for each door listed.

c. Include a legend of abbreviations, symbols, finishes and manufacturers.
d. Schedule each hardware item with quantity, type, manufacturer's model number, size/handing as applicable, screws/fasteners, finish, manufacturer's name and any additional information required for proper installation/operation.
e. List hardware for each door in groups, referencing the same group numbers and numerical group sequence as specified in 3.06 HARDWARE SCHEDULE.
f. Include in each hardware group/heading, the door number/location, door and frame types, material, size, thickness, fire rating and any additional door and frame information required for proper installation/operation of hardware.

C. Review and approval of the Hardware Schedule by Architect does not absolve Contractor of responsibility for missing and/or incorrect items.

D. When requested, provide the District/Architect, copies of purchase orders showing the dates hardware orders were placed with the factories.

E. Product Data: Include catalog cut sheets on each type of hardware scheduled to include pictures/drawings, specifications and/or data sheets.

F. Samples
1. Provide physical samples of hardware as requested by Architect.
2. Samples will be returned upon request.
3. Contractor is responsible for cost of samples.

G. Keying Schedule
1. Prior to submission of the 08 7100 Door Hardware submittal, the Contractor to have a keying conference with the District to determine the specific key/keying requirements of the project for inclusion in the Keying Schedule and submittal. Conference to confirm/establish:
   a. Key system.
   b. Keyway.
   c. Specific keying for each cylinder.
2. Refer to 2.04 KEYING for additional items to be confirmed/established for inclusion in the Keying Schedule and submittal.
3. Pursuant to the keying conference, Contractor shall submit a final Keying Schedule to the District for approval.

H. Operations and Maintenance Data
1. At contract closeout, provide District with 2 copies of an "Owners Operation and Maintenance Manual". The manual to consist of a hard cover, three-ring binder with the manual's title and project name listed on the outside, front cover. The manual to include:
   a. Maintenance data for each item of hardware.
   b. Manufacturer's installation instructions for each hardware item.
   c. Name, address and phone number of the local representative for each product manufacturer.
   d. Parts list for each product.
   e. Copy of final hardware schedule to include all items listed in 1.03 SUBMITTALS, B. and E.
   f. Copy of final Keying Schedule.
   g. Manufacturer's warranty for each product.

1.04 QUALITY ASSURANCE/REGULATORY REQUIREMENTS

A. Substitutions
1. Provide manufacturers of products listed in 2.01 MANUFACTURERS.
2. Substitution requests to be made only in writing and no later than 10 days prior to bid opening.
3. Substitutions will not be allowed after the bid.

B. Supplier Qualifications
1. Hardware supplier to be a recognized finish hardware supplier, regularly engaged in contracting work, who has been furnishing projects of this size and scope in the project's vicinity for a period of not less than 5 years.
2. The firm must have warehousing facilities and a sufficient staff to accommodate a project of this size and scope.
3. The supplier must have in his employ a certified Architectural Hardware Consultant (AHC) who is available at reasonable times during the course of the project for consultation with District, Architect and Contractor.
4. The supplier must be an authorized factory distributor of the key system specified.

C. Installer Qualifications
1. Hardware installer must have at least 2 years' experience in installing all types of finish hardware with specific experience in hardware installation on a project of this type and scope.

D. Exit Doors
1. Doors shall be operable from the inside with "non-grasping" trim that does not require the use of a key or any special knowledge.

1.05 DELIVERY, STORAGE AND HANDLING

A. Marking and Packaging
1. Package each hardware item individually in manufacturer's original box/package.
2. Mark all packages with respective door, room, hardware heading and hardware set number.

B. Delivery
1. Deliver all hardware to jobsite unless otherwise directed by Contractor or specified herein.

C. Storage
1. Store all hardware in a dry, secured, enclosed area that is not subject to any corrosive elements that could damage the operation or appearance of the product.

1.06 COORDINATION

A. Templates
1. Distribute door hardware templates for doors, frames and other work specified to be factory prepared for hardware installation.
2. Review shop drawings of other work to confirm that adequate provisions are made for locating and installing door hardware with requirements specified herein.

1.07 WARRANTY

A. Product Warranties
1. Butt Hinges: Lifetime
2. Continuous Hinges: Lifetime
3. Locksets: 7 years
4. Exit Devices: 3 years
5. Surface Closers: 30 years
6. Remaining hardware warranted for a minimum period of 2 years. The manufacturer's specific product warranty, if greater than 2 years, shall take precedence.

B. Manufacturer's product warranty to commence from date of substantial completion. The manufacturer is responsible for re-installation of defective product during the warranty period.

1.08 MAINTENANCE

A. Tools and Instructions
1. Provide District at contract closeout, any specialized tools and maintenance instructions required for Owner's continued adjustment, maintenance, removal and replacement of door hardware.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Provide hardware from listed manufacturers. To match existing District / Campus design, function and security / keying system, provide only the specified manufacturer of scheduled hardware where "Matches Existing" is listed. Refer to 1.04, A. for substitutions.

HARDWARE ITEM	SPECIFIED MANUFACTURER	APPROVED EQUALS
Hinges - Butts	HAG Hager	Ives, Mckinney, PBB, Stanley, Bommer, or approved equal
Continuous Hinges	SEL Select	Ives, Pemko, McKinney, Stanley, ABH, PBB or Approved equal.
Locksets, Cylinders	SCH Schlage	Matches Existing
Exit Devices	VON Von Duprin	Matches Existing
Surface Closers	LCN	Matches Existing
Kick Plates, Stops, Flush Bolts, Misc.	ROC Rockwood	Burns, Trimco, Ives,
Overhead Stops	ABH Architectural Builders Hardware	Glynn-Johnson or approved equal
Thresholds, Sweeps, Seals,	PEM Pemko	Zero, Reese, National Guard or approved equal
Electric Strikes	HES H.E.S.	Matches Existing
Key Cabinets	MMF MMF Industries	Bommer, Telkee or approved equal

2.02 MATERIALS

A. Screws and Fasteners
1. Install all hardware only with screws and fasteners furnished with hardware.
2. Where a specific type of hardware is packaged by the manufacturer with "screws and

fasteners by others", install hardware with manufacturer's recommended type(s).
3. Finish to match hardware.

B. Hinges (butts)
1. Unless otherwise specified, furnish full mortise, template type butts with non-rising loose pins.
2. Furnish Hager as specified or approved equal as listed in 2.01, A. Provide:
   a. 4.5 x 4.5 size for doors up to 3'0" wide.
   b. 5 x 4.5 size for doors 3'1" and wider.
   c. Three hinges for doors less than 7'6" tall and four hinges for doors 7'6" tall and greater.
   d. Exterior, out-swinging door hinges in non-ferrous material with stainless steel, Non Removable Pin (NRP).
   e. Interior hinges in wrought steel, polished and plated to match specified finish of other hardware.
   f. Hinges of sufficient width, where required to clear frame and trim, to allow door to open180 degrees.

C. Continuous Hinges
1. Furnish Select geared type as specified or approved equal as listed in 2.01.

D. Locks
1. Except where otherwise specified, furnish all locksets, latchsets, deadbolts and component parts by Schlage as specified. Provide:
   a. Lock series and trim/design as specified.
   b. Locksets and cylinders with 6-pin, full size interchangeable cores (FSIC) in the designated keyway (refer to 1.03, G. Keying Schedule).
   c. Locksets and cylinders with temporary construction cores installed.
   d. Box strikes as required by frame types with sufficient length lip to prevent latchbolt from damaging trim.

E. Exit Devices
1. Conform to ANSI A156.3 Grade 1 Standard.
2. Comply with CBC 309.4 Operation: The force required to activate operable parts…push bar force required to retract latch…shall be 5 pounds maximum.
3. Furnish Von Duprin as specified.

F. Closers
1. Comply with CBC opening force requirements.
   a. Interior non-rated doors – 5 lbs.
   b. Exterior doors – 5 lbs.
   c. Fire doors to have minimum opening force allowable by the appropriate authority having jurisdiction, not to exceed 15 lbs.
2. Surface Closers
   a. Conform to ANSI A156.4 Grade 1 Standard. Furnish LCN as specified or approved equal listed in 2.01, A. Provide:
      1). Non-handed type that allows 180-degree door opening.
      2). Drop plates, back plates, brackets, mortise shoes, spacer blocks and long arms as required.
      3). Parallel arm closers with heavy-duty arm (EDA).
      4). Multi-size, power adjustable type with independent latch speed, sweep speed and back check cushioning valve controls.

G. Protective Plates
1. Furnish Rockwood kick plates as specified or approved equal listed in 2.01,A. Provide:
a. .050 thick.
b. Beveled 4 edges.
c. Sizes specified.

H. Stops and Holders
1. Furnish Rockwood as specified or approved equal listed in 2.01, A.
2. Where conditions will not allow installation of wall or floor stops as specified in 3.02 INSTALLATION, furnish overhead stop ABH 9000 series.

I. Thresholds, Sweeps and Seals
1. Furnish Pemko as specified or approved equal listed in 2.01, A.
2. Provide per plan details and as specified in 3.06 HARDWARE SCHEDULE.
3. Thresholds shall not exceed ½" in height with a slope no greater than 1:2.
a. Furnish with appropriate screws and anchors for floor material.

J. Silencers
1. For frames without seals, provide push-in type silencers. Self-adhesive type is not allowed. Provide:
a. Pairs of doors: 2 each
b. Single doors: 3 each

K. Miscellaneous Hardware
1. Provide remaining hardware items as specified in 3.06 HARDWARE SCHEDULE. The manufacturers and model numbers listed establish design, function and quality requirements.

2.03 FINISHES

A. Provide finishes specified in 3.06 HARDWARE SCHEDULE. BHMA finish designation indicates base metal as well as finish.

2.04 KEYING

A. Refer to 1.03, G. Keying Schedule for requirements for preparation of specific keying schedule.

B. Factory key all locksets and cylinders:
1. Master key/grand master and/or higher level key as required
2. Construction master key

C. Furnish the following keys and related items:
1. 2 blanks and 2 change per keyed different lock
2. 4 each keyed alike set
3. 5 masters each MK set
4. 2 grand masters and/or higher level keys as required
5. 10 construction masters
6. 2 control
7. 1 bitting list

D. Stamp all key bows with "DO NOT DUPLICATE" and with any other inscription as directed by the District/Architect.

E. Paper tag all permanent keys with door and hardware heading numbers.

F. Deliver keys and permanent interchangeable cores to District.

2.05 KEY CONTROL

A. Key Cabinet
1. Provide MMF Industries STEELMASTER Dupli-Key model or approved equal products listed in 2.01, A.
2. Furnish with keyed lock and all accessories.
3. Cabinet size to accommodate 125 percent of total number of locks and cylinders.
4. Deliver cabinet to District prior to building occupancy.
5. The District is responsible for installation and hanging of keys on hooks.

PART 3 EXECUTION

3.01 EXAMINATION

A. Prior to installation of hardware, examine doors, frames and related items for defects or other conditions that would prevent the proper installation and operation of specified hardware. Do not proceed with hardware installation until deficiencies are corrected.

3.02 INSTALLATION

A. Install hardware in accordance with manufacturer's instructions.

B. Surface Closers
1. Install inside rooms, in stairwells and inside vestibules. Do not mount closers in corridors except at exterior doors that open off a corridor.
2. Install with sex nuts and bolts.
3. Template for maximum degree of opening:
   a. Parallel arm: 180 degrees
   b. Regular arm: Maximum degree listed by manufacturer
      1). Where adjacent wall, obstruction or closer stop type arm will not permit maximum degree of opening, install closers to allow the maximum degree of opening allowed by the stop arm or before door contacts wall or obstruction. In no instance are closers to be templated for less than 90 degree opening.
4. Adjust closers per 2.02, F. and comply with closer sweep requirements so that from an open position of 90 degrees, the time required to move door to a position 12 degrees from the latch is 5 seconds minimum.

C. Exit Devices
1. Install with sex nuts and bolts.

D. Contractor to remove construction cores and install permanent cores in all locksets and cylinders.

E. Kick Plates
1. Install plates on push side of door unless otherwise specified.

2. Install only with screws furnished.
3. Align centered between door edges and with bottom edge flush with door bottom.
4. Plates are to fit flat against the face of the door without any modification to the plate.
5. Replace plates of incorrect size that encroach on glass area, hang below door bottom or extend beyond door edges.

F. Stops
1. Floor Stops:
   a. Install in a position that permits maximum door swing but does not exceed 4" from wall.
   b. Furnish stops of proper height to engage door.
   c. Position to contact the door at a point 6 inches from the latch edge, but no further than 1/3 the door width as measured from the latch edge.
2. Wall Stops:
   a. Fasten to solid blocking/backing.
   b. Install at height that will engage operating trim/levers.

G. Thresholds
1. Set in full bed of sealant complying with requirements specified in Division 07 Section "Joint Sealants".
2. Secure to concrete with flat head machine screws and expansion anchors.

H. Seals
1. As required, notch jamb seals around hardware items (closer arms, strikes, etc.).

I. Fasten miscellaneous wall-mounted hardware to solid blocking/backing.

J. Unless otherwise specified, all hardware mounting heights shall be per drawings, CBC and/or Door and Hardware Institute (DHI) mounting location standards. Operating/opening hardware shall be installed between 34" minimum and maximum 44" centerline above finished floor.

3.03 FIELD QUALITY CONTROL

A. After hardware installation has been completed, Architect, District's representative and/or project inspector shall:
1. Visually inspect installed hardware to determine compliance with the approved hardware and keying schedules.
2. Cycle doors to determine proper operation of hardware.

3.04 ADJUSTING AND CLEANING

A. At the end of project, clean and make final adjustments to all hardware. Where hardware is found defective, repair or replace as directed.

3.05 PROTECTION

A. Provide proper care and protection for all hardware items and finishes until completion of project.

3.06 HARDWARE SCHEDULE

A. The following is a schedule of hardware to be furnished for this work. The listed material to conform throughout with the requirements of the foregoing specification.

HW-1

Each door to have

	Hinges	BB1199	630	HAG
1	Electrical Power Transfer	EPT-2	628	VON
1	Electrified Exit Device	QEL-PA-AX99NL-F-990NL	626	VON
1	IC Rim Cylinder	Model number required	626	SCH
1	Closer	4040XP EDA	689	LCN
1	Kick Plate	K1050 10″ x 2″ LDW	630	ROC
1	Floor Stop	463-RKW	630	ROC
1	Threshold	Per detail		PEM
1	Sweep	29326CNB		PEM
1	Set Seals	S88GR		PEM

Note: Card reader, door position switch/contact, power supply and miscellaneous electrical components by the security contractor.

HW-2

Each door to have

1	Continuous Hinge	SL11HD	628	SEL
1	Electric Strike and Latch Guard	1006J-150	630	HES
1	Classroom Security Lockset	ND95RD RHO	626	SCH
1	Closer	4040XP EDA	689	LCN
1	Floor Stop	463-RKW	630	ROC
1	Threshold	Per detail		PEM
1	Sweep	29326CNB		PEM
1	Set Seals	By door/frame mfr.		

Note: Card reader, door position switch/contact, power supply and miscellaneous electrical components by the security contractor.

HW-3

Each door to have

1	Continuous Hinge	SL11HD	628	SEL
1	Classroom Security Lockset	ND95RD RHO	626	SCH
1	Closer	4040XP EDA	689	LCN
1	Floor Stop	463-RKW	630	ROC
1	Threshold	Per detail		PEM
1	Sweep	29326CNB		PEM
1	Set Seals	By door/frame mfr.		

HW-4

Each door to have

	Hinges	BB1168	652	HAG
1	Classroom Security Lockset	ND95RD RHO	626	SCH
1	Closer/Stop/Holder	4040XP SHCUSH	689	LCN
1	Kick Plate	K1050 10″ x 2″ LDW	630	ROC

HW-5

Each pair to have

2	Continuous Hinges	SL11HD	628	SEL
1	Set Combination Flush Bolts	2845	626	ROC
1	Dust Proof Strike	570	626	ROC
1	Storeroom Lockset	ND96RD RHO @ LHR active leaf	626	SCH
1	Closer/Stop/Holder	4040XP SHCUSH @ LHR	689	LCN
2	Kick Plates	K1050 10″ x 1 ½″ LDW	630	ROC
1	Overhead Stop & Holder	9000 series @ RHR	630	ABH
1	Threshold	Per detail		PEM
2	Sweeps	29326CNB		PEM
1	Set Seals	By door/frame mfr.		
1	Astragal	355CS @ LHR		PEM

END OF SECTION

ALLEGION™

SCHLAGE®

ND Series

Grade 1 cylindrical locks

Mechanical
Wired electrified
Wireless electronic







Accessibility and life safety

Door hardware should be as effective in helping people go about their lives as it is in securing their environments. The Schlage ND is designed with this requirement in mind.

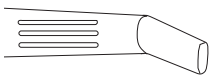
Accessibility

All Schlage ND levers comply with the Americans with Disabilities Act (ADA), which requires that "Operable parts shall be operable with one hand and shall not require tight grasping, pinching, or twisting of the wrist. The force required to activate operable parts shall be 5 pounds (22.2 N) maximum."

Tactile warning for the visually impaired

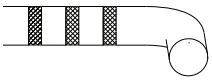
Tactile warning is a special texture applied to the outside lever to alert the visually impaired to a potential hazard on the opposite side of the door (exit to street, a workshop or other hazardous area, etc). Tactile warning is typically applied to the outside lever only, and is specified by an 8 prefix on the lever design.

Milled



Order as follows:
8AT for Athens
8RO for Rhodes
8SP for Sparta
8LT for Latitude
8LN for Longitude

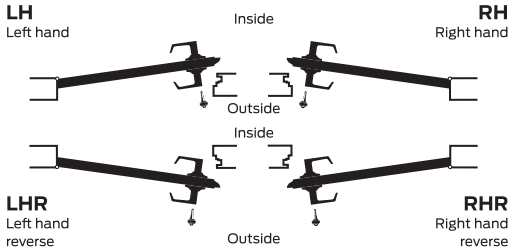
Knurled



Order as follows:
8TR for Tubular
8BW for Broadway
8BK for Boardwalk

Door handing

The ND lock family can be configured during installation to support any door handing. As a result, it is not necessary to specify handing during the ordering process.



Life safety

The Schlage ND is UL listed for use on 3-hour fire doors up to 4'0" x 10'0". The Boardwalk, Longitude, Omega, Rhodes, Sparta and Tubular levers levers comply with the California State fire code for return to within 1/2" of the door face.

Additionally, the Schlage ND exceeds the BHMA warped door test by 4x. The BHMA standard requires that the latch be able to retract with a 50lb pre-load; the ND can retract the latch with a 200lb preload - providing more range to open the door in the event the opening becomes bound or otherwise compromised.

Classroom security indicator rose

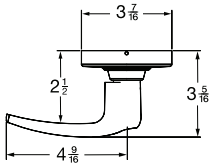
Schlage ND classroom security functions come standard with an indicator rose that clearly identify key rotation direction for rapid lockdown. For ND mechanical classroom security function only.



Lever designs and finishes

Athens (ATH)[2]

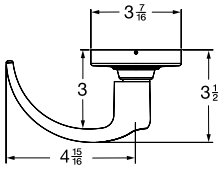




Mechanical | Wired electrified | Wireless electronic

Sparta (SPA)[1, 2]

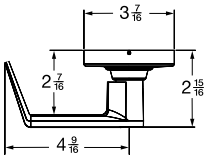




Mechanical | Wired electrified | Wireless electronic

Rhodes (RHO)[1, 2]

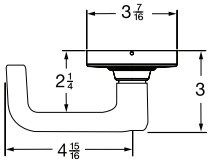




Mechanical | Wired electrified | NDE wireless electronic

Tubular (TLR)[1, 2]

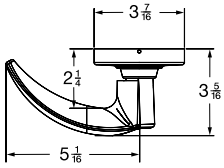




Mechanical | Wired electrified | Wireless electronic

Omega (OME)[1]

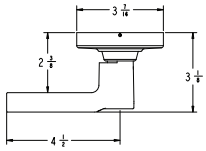




Mechanical | Wired electrified | Wireless electronic

Latitude (LAT)

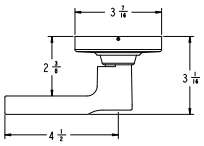




Mechanical | Wired electrified | Wireless electronic

Broadway (BRW)

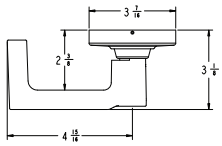




Mechanical | Wired electrified | Wireless electronic

Longitude (LON)

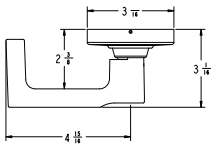




Mechanical | Wired electrified | Wireless electronic

Boardwalk (BWK)





Mechanical | Wired electrified | Wireless electronic

All levers comply with the Americans with Disabilities Act (ADA).

1 Boardwalk, Longitude, Omega, Rhodes, Sparta and Tubular levers comply with California State code for return within 1/2" of door face.

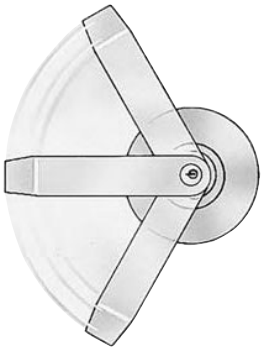
2 Athens, Rhodes, Sparta and Tubular levers support cylinders from other manufacturers, see cylinder section on page 24 for details.

Finish options									
Color	Bright brass	Satin brass	Satin bronze	Oil rubbed bronze	Satin nickel	Matte black	Bright chrome	Satin chrome	Aged bronze
ANSI/BHMA number	605	606	612	613	619	622	625	626/626AM	643e
US number	US3	US4	US10	US10B	US15	US19	US26	US26D	US11
Mechanical	■	■	■	■	■	■	■	■	■
Wired electrified	■	■	■	■	■	■	■	■	■
Wireless electronic	■	■	■	—	■	■	■	■	■

Product information and specifications contained in this catalog are subject to change without notice. Please consult the factory.

ND Series mechanical lock
Vandlgard™ function list

Vandlgard™ trim is specifically designed for highly abusive environments. The outside lever rotates freely up and down when locked, limiting the ability of vandals to apply excessive force to the chassis



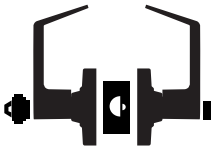
Schlage ANSI

ND91PD F82

Entrance/office lock

- Push-button locking.
- Push-button disengages outside lever until unlocked with key or by turning inside lever.
- Vandlgard allows outside spindle to disengage from latch when locked.
- Inside lever always free for immediate egress.

Outside **Inside**



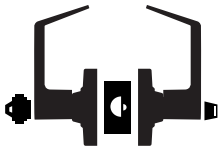
Schlage ANSI

ND92PD F109

Entrance lock

- Turn/push-button locking: Pushing and turning button disengages outside lever, requiring using of key until button is manually unlocked.
- Push-button locking: Pushing button disengages outside lever until unlocked by key or by turning inside lever.
- Vandlgard allows outside spindle to disengage from latch when locked.
- Inside lever always free for immediate egress.

Outside **Inside**



Schlage ANSI

ND93PD F88

Vestibule lock

- Latch retracted by key from outside when outside lever is disengaged by key in inside lever.
- Vandlgard allows outside spindle to disengage from latch when locked.
- Inside lever always free for immediate egress.

Outside **Inside**



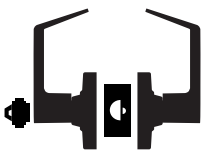
Schlage ANSI

ND94PD F84

Classroom lock

- Outside lever disengaged and unlocked by key.
- Vandlgard allows outside spindle to disengage from latch when locked.
- Inside lever always free for immediate egress.

Outside **Inside**



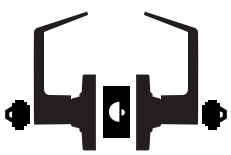
Schlage ANSI

ND95PD -

Classroom security lock

- Key in either lever locks or unlocks outside lever.
- Vandlgard allows outside spindle to disengage from latch when locked.
- Inside lever always free for immediate egress.

Outside **Inside**



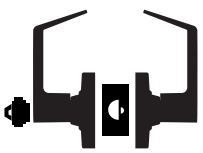
Schlage ANSI

ND96PD F86

Storeroom lock

- Outside lever always disengaged.
- Entrance by key only.
- Vandlgard allows outside spindle to disengage from latch when locked.
- Inside lever always free for immediate egress.

Outside **Inside**



Available with RX

Ordering instructions

Example

		Outside		Inside		Door				
	Function + cylinder	Lever	Finish	Lever	Finish	Latch	Strike	Thickness	Extension	Dimension
Mechanical	ND53PD	ATH	626							
Wired electrified	ND80EUL	RHO	605	SPA	619	14-048	10-013	214	EE	118
Wireless electronic	NDE80BD	SPA	619							

Detail

Function	Mechanical: See pages 12-17 Wired electrified: See pages 18-19 Wireless electronic: NDE80; see pages 20-21		
Cylinder	Standard: P (Patented Everest 29) L (less cylinder) C (less double cylinder) Z (Everest SL)	Full size Interchangeable (FSIC): R (FSIC, Patented Everest29) J (FSIC, less core) T (FSIC, Construction Core)	Small format Interchangeable: GD (SFIC, Patented Everest 29) BD (SFIC, less core) BDC (SFIC, disposable core) HD (SFIC, construction core)
	For non-Schlage cylinders please see page 24		
Outside lever	ATH (Athens), RHO (Rhodes), SPA (Sparta), TLR (Tubular), OME (Omega), LAT (Latitude), LON (Longitude), BRW (Broadway), BRK (Boardwalk) Note: Specify tactile as: 8AT (Athens), 8RO (Rhodes), 8SP (Sparta), 8TR (Tubular), 8LT (Latitude), 8LN (Longitude), 8BY (Broadway), 8BK (Boardwalk)		
Outside finish	605 Bright brass (US3) 606 Satin brass (US4) 612 Satin bronze (US10) 613 Oil rubbed bronze (US10B)[1] 619 Satin nickel (US15) 622 Matte black (US19) 626 Satin chrome (US26D) 626AM Satin chrome anti-microbial 625 Bright chrome (US26) 643e Aged bronze (US11) [1] Not available NDE wireless electronic		
Inside lever	Specify only if different from outside lever. Same options as outside lever.		
Inside finish	Specify only if different from outside finish. Same options as outside finish.		
Latch	Specify only if different from standard latch; see page 24 for options.		
Strike	Specify only if different from standard strike; see page 24 for options.		
Door thickness	Specify only if outside standard door range (1 5/8"-2 1/8"). Extended door thickness not available NDE wireless electronic.		
Extension	Specify only for doors 2 1/8" or greater. Example: EE = Extended Equally, EI = Extended Inside, EO = Extended Outside, ED = Extended Differently		
Dimension	Specify only for non-standard strike lip length.		
Options	Specify any additional requirements or options. Example: KA = Keyed Alike, KD = Keyed Different, 0bit, etc.		

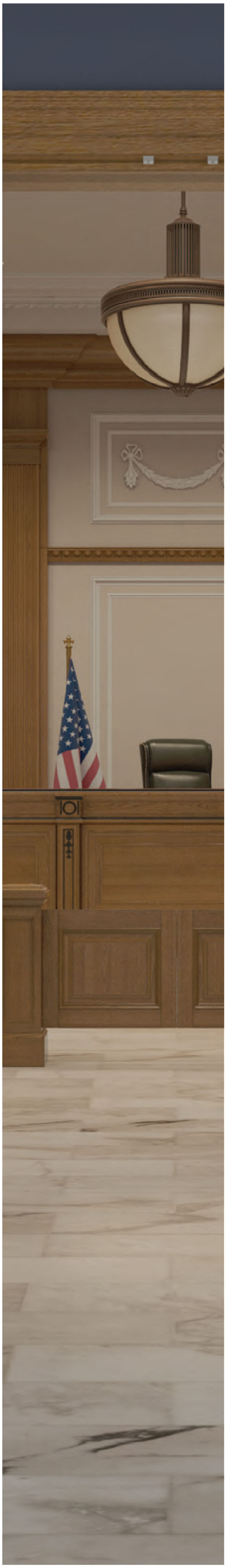
ALLEGION™



VON DUPRIN®

98/99 Series

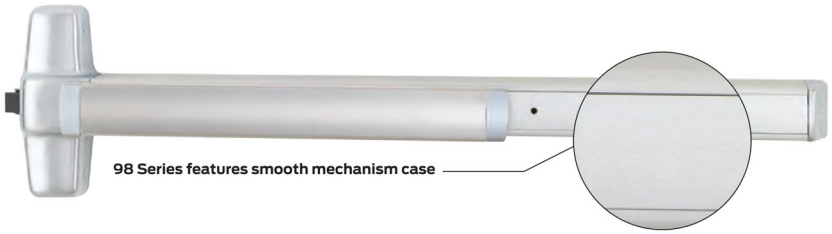
Exit devices

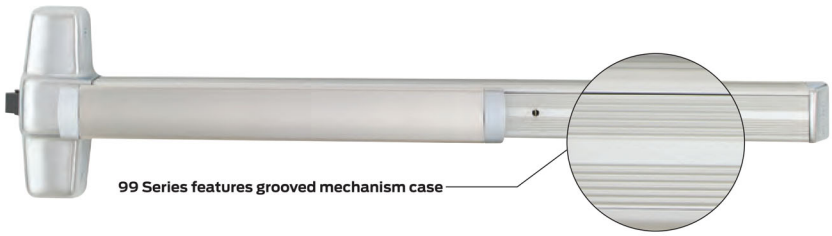


Engineered for value and performance

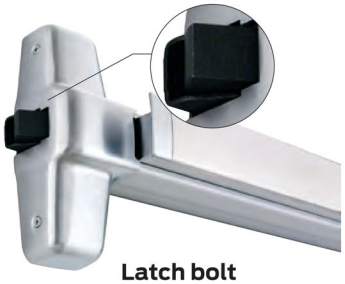
Von Duprin® empowers its customers to embrace change by providing flexible solutions that can be modified over time, protecting your investment well into the future. Von Duprin 98/99 Series push pad devices have a universal center case design that is unique to the industry and provides superior flexibility—from adding trim, switching handing or adding new retrofit options, you can configure numerous variations in the field without replacing your device.

Von Duprin's exit devices offer durable solutions that are proven in the field to perform under heavy use and abuse and backed by a team of experts experienced in door hardware application and code compliance. Allegion stands behind every Von Duprin product we make with unparalleled customer support thanks to our team of experts based in the U.S. that average more than 15 years of experience, so you are assured to receive expert advice.

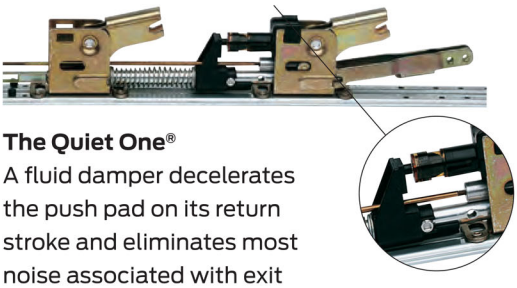




Von Duprin exit devices are available in two external surface styles, designated 98 and 99 Series.



Latch bolt
Deadlocking latch bolt provides security and improved performance at standard device cost.



The Quiet One®
A fluid damper decelerates the push pad on its return stroke and eliminates most noise associated with exit device operations. Furnished on all 98/99™ Series exit devices.

Nomenclature – how to order

Prefix	Device series/type		Trim/ rating		Suffix/ finish		Door width	Handing	Less bottom rod/cable	Trim options/ finish	Lever style	Accessories	Other information
1	2	3	4	5	6	7	8	9	10	11	12	13	14
QEL -	98 -	27 -	L -	F -	— -	626 -	3' -	RHR -	LBR -	996/626 -	299F/06 -	SNB -	HM

Detail

1 Prefixes

None	Standard
AX	Accessible device
CD	Cylinder dogging - panic only
CDSI	Cylinder dogging with security indicator
CI	Cylinder dogging indicator
CD-CX	Chexit cylinder dogging
CX	Chexit
DI	Dogging indicator
E	Electric locking mortise/lever
EL	Electric latch retraction
HDSI	Hex dogging with security indicator
HH	Hurrican device
LD	Less dogging
LX	Latch bolt monitoring
LX-LC	Latch bolt monitoring, low current
LX-RX	Latch bolt monitoring, request to exit
LX-RX-LC	Latch bolt monitoring, request to exit low current
PL	Pullman latch
PN	Pneumatic latch retraction
QEL	Quiet electric latch retraction
QM	Quiet mechanical
RX	Request to exit
RX2	Double request to exit
RX-AUX	Request to exit, auxiliary
RX-LC	Request to exit, low current
SD	Special dogging -panic only
SS	Signal switch
WP-RX	Waterproof request to exit
WS	Windstorm (FEMA rated) surface vertical rod device
XP	Heavy protection - rim

2 Device series

98	Series 98-smooth
99	Series 99-grooved

3 Device type

None	Rim device
27	Surface mounted vertical rod device
47	Concealed vertical rod device
47WDC	Concealed vertical rod wood door device
48	Concealed vertical rod device
49	Concealed vertical cable device
50WDC	Concealed vertical cable wood door device
52	Rim device with remote trim input (pool exit hardware)
57	Three-point latch device
75	Mortise lock device

4 Trim functions

EO	For AD or CO locks, order the panic as Exit Only (EO)
DT	Dummy trim
EO	Exit only
HL	Hospital pull trim
K	Knob
K-BE	Knob - blank escutcheon
K-DT	Knob, rigid - dummy trim
K-NL	Knob, rigid - night latch
L	Lever (classroom)
L-BE	Lever - blank escutcheon
L-DT	Lever, rigid - dummy trim
L-NL	Lever, rigid - night latch
NL	Night latch
NL-OP	Night latch cylinder assembly, optional pull
TL	Turn lever
TL-BE	Turn lever - blank escutcheon
TP	Thumbpiece
TP-BE	Thumbpiece - blank escutcheon

5 Rating

F	Fire exit hardware
Blank	Panic exit hardware

6 Suffix

-2	Double cylinder (rim and mortise only)
-2SI	Double cylinder with security indicator (rim only)
CON	Connectors
WH	Weep holes

7 Finish

605	Bright Brass
606	Satin Brass
612	Satin Bronze
619	Satin Nickel
622/711	Matte Black/Matte Black, Anodized
625	Bright Chrome
626	Satin Chrome
626AM	Satin Chrome, Antimicrobial
628	Aluminum, Anodized
630	Satin Stainless
630AM	Satin Stainless, Antimicrobial
643e	Aged Bronze
693	Black Paint
710	Dark Brown, Anodized

8 Door width

3'	Standard default
4'	
2'	Vertical only

Door thickness

1 3/4"	Standard
2 1/4"	Optional

9 Handing

LHR	Left hand reverse
RHR	Right hand reverse

10 Less bottom rod/cable

LBR	Less bottom rod
LBL	Less bottom latch
LBR-AFL	LBR with fire pin
LBL-AFL	LBL with fire pin

11 Trim options/finish

See trim options/finish for each device type

12 Lever style

06	Standard default (optional levers available

13 Accessories

CYL	Cylinder
GBK	Glass bead kit
SEC	Security screws
SLM	SLM blocking
SNB	Sex bolts

14 Other information

Touchbar options

BRAILLE	Vision impaired touchpad, raised letter, and braille
PUSH	Touchbar trim embossed 'PUSH'
RSS	Red silk-screened lettered touchbar trim
KN	Knurled touchbar
SG	Safety glow

Miscellaneous

CE	CE labeled
LCP	Less cover plate
IOWDA	#IOWDA cover plate
RAT REL	Ratchet release assy

Door material

AL	Aluminum door
HM	Hollow metal
WD	Wood door
CP	Composite door
INS2	Insulclad - 1/2"
INS4	Insulclad - 1/4"
SC	Steelcraft, HH device only

Door application

D	Double egress
P	Pair of doors
S	Single door

Note: Not all options are listed. See the specific device type pages for complete options available.

98/99 Rim exit device



98 and 99 rim exit devices for all types of single and double doors with mullion, UL listed for panic exit hardware. Devices are certified to ANSI/BHMA A156.3 2014, Grade 1. The 98 device has a smooth mechanism case and the 99 device has a grooved case. The rim device is non-handed except when the following device options are used: SD (special dogging), -2 (double cylinder) or SS (signal switch). Covers stock hollow metal doors with 86 or 161 cutouts on single doors (may cover cutouts on pairs – consult template).

Specifications

Device functions	Device ships EO/DT/NL; Field selectable; For TP, K or L remove NL drive screw from device
Device lengths	3' 2'4' to 3' (711mm to 914mm) Door size 4' 2'10" to 4' (864mm to 1219mm) Door size
Device centerline from finished floor	39 13/16" (1011mm) 39 11/16" (1008mm) with mullion
Center case	8" x 2 3/4" x2 3/8" (203mm x 70mm x 60mm)
Mechanism case	2 1/4" x 2 1/4" (57mm x 57mm)
Projection	Pushbar neutral – 3 13/16" (97mm) Pushbar depressed – 3 1/16" (78mm)
Latch bolt	Deadlocking, 3/4" (19mm) throw
Finishes	605, 606, 612, 625, 626/626AM, 628, 710, 711 and 643e (619 and 630 available with 98 Series only)
Fasteners and sex bolts (SNB)	Includes screw pack for 1 3/4" (44mm) and 2 1/4" (57mm) thick metal or wood doors (Optional 425 SNB available, see page 64 for quantities)

Accessories



299 Strike
Ships standard,
optional strikes available.



Hex key dogging
Comes standard on
98/99 rim exit devices.

Features and options

Electrified options

LX	Latch bolt monitor switch
RX	Request to exit
RX2	Double request to exit
E	Electric locking and unlocking trim
EL	Electric latch retraction
QEL	Quiet electric latch retraction
SS	Signal switch
CX	Chexit delayed exit
ALK	Alarm exit kit
WP-RX	Waterproof request to exit
CON	Allegion Connect

Mechanical options

-2	Double cylinder
-2SI	Double cylinder with security indicator
AX	Accessible device
GBK	Glass bead kit
PN	Pneumatic latch retraction
QM	Quiet mechanical
SNB	Sex bolts
SEC	Security screws
WH	Weep holes
XP	Extra protection

Dogging feature
Hex key dogging standard

Dogging options

CD	Cylinder dogging
CD-CX	Chexit cylinder dogging
CDSI	Cylinder dogging with security indicator
HDSI	Hex dogging with security indicator
SD	Special center case dogging
LD	Less dogging
DI	Dogging indicator
CI	Cylinder dogging indicator

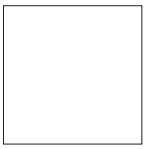
Strikes
299 – Dull black

Trim functions

Von Duprin protects your investment by empowering you to adapt with flexible solutions and modular options. The 98/99 Series features numerous trim options to serve your different needs. Designed with flexibility in mind, our solutions offer ease of adding new options as they are developed.

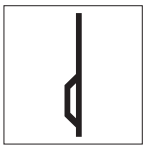
With Von Duprin, you can be confident that as the needs of your facility change, our products can be upgraded easily to meet your needs, especially as the mechanical and electronic technology converge. Von Duprin's versatile design enables you to add functionality to existing devices in a cost-effective way, protecting your investment well into the future.

A variety of device trim lock type functions such as key lock and unlock, latch bolt retraction with key and no cylinder designs for an "always operable" function are available in levers, knobs, latches, thumbpiece and thumbturn designs.



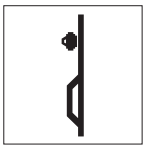
EO **No outside trim**

- Exit only



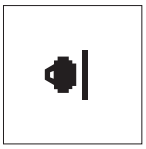
DT **Dummy trim**

- Pull when dogged (not recommended for fire device)



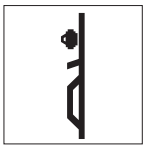
NL **Night latch**

- Key retracts latchbolt
- Rim and 1 ¼" mortise cylinder



NLOP **Night latch**

- Key retracts latchbolt, pull required



TP **Thumbpiece**

- Key locks and unlocks
- Rim and 1 ¼" mortise cylinder



TPBE **Thumbpiece, blank escutcheon**

- Blank escutcheon always operable (no cylinder, use with DT trim)



L **Lever**

K **Knob**

- Key locks and unlocks
- Rim and 1 ¼" mortise cylinder
- Handed, reversible lever
- Electrified lever operation available



LDT **Lever, dummy trim**

KDT **Knob, dummy trim**

- Pull when dogged



LNL **Lever, night latch**

KNL **Knob, night latch**

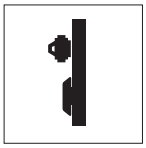
- Key retracts latchbolt
- Rim and 1 ¼" mortise cylinder
- Handed, reversible lever



LBE[1] **Lever, blank escutcheon**

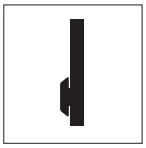
KBE **Knob, blank escutcheon**

- Always operable (no cylinder)



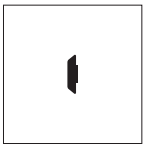
TL **Turn lever**

- Key locks and unlocks (use with DT trim)
- 1 ¼" mortise cylinder

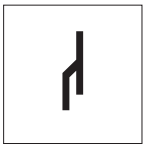


TLBE **Turn lever, blank escutcheon**

- Blank escutcheon always operable (no cylinder, use with DT trim)



TLOP **Turn lever, optional pull**



HL **Hospital latch**

- Key locks and unlocks
- 1 ¼" mortise cylinder

990 trim



Trim description					
Nomenclature	990EO	990DT	990NL*	990TP*	990TP-BE*
Trim function	Exit only plate	Dummy trim	Night latch	Thumbpiece	Thumbpiece blank escutcheon
Function description	Exit only plate	Pull when dogged	Key retracts latch bolt	Key locks and unlocks	Always operable, no cylinder
ANSI function	01	02	03	05	15
Device compatibility					
98/99 Rim/Rim-F	■	■	■	■	■
XP98/XP99 Rim/Rim-F	■	■	■	■	■
98/9927/27-F	■	■	■	■	■
98/9947/47-F	■	■	■	■	■
98/9947WDC/WDC-F	■	■	■	■	■
98/9948/48-F	■	■	■	■	■
98/9949/49-F	■	■	■	■	■
98/9950WDC/50WDC-F	■	■	■	■	■
98/9952†					
98/9957/57-F	■	■	■	■	■
98/9975/75-F	■	■	■	■	■
Dimensions					
Escutcheon plate size	3" x 14 3/16" x 3/32" (76 x 360 x 2mm)				
Pull center to center	—	5 1/2" (140mm)	5 1/2" (140mm)	5 1/2" (140mm)	5 1/2" (140mm)
Projection	—	2" (51mm)	2" (51mm)	2" (51mm)	2" (51mm)
Handing					
	—	—	—	—	—
Cylinder type					
Rim or vertical device	—	—	Rim	Rim	—
Mortise lock device	—	—	1 1/4" mortise	1 1/4" mortise	—

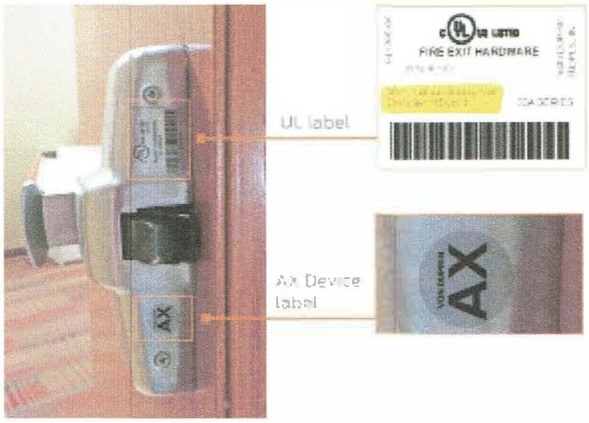
* Specify R/V if used for rim and vertical devices, M for mortise device. Example, 990NL-R/V or 990NL-M.

† Default trim is 252L /L-BE. Must be ordered as EO when paired with other trims (ordered separately).

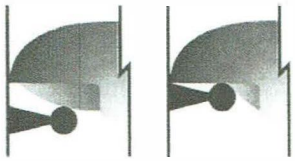
Mechanical options

AX Accessible device

The AX device is a UL certified exit device designed to meet the progressive requirements of the California Building Code for accessible openings. This device meets the 5 lbs of operating force requirement called for in chapter 11B-309.4. The AX device also exceeds ANSI/BHMA requirements. Available devices include: AX98/99, AX98/99-F, AX98/9949LBL, AX98/9949-F LBL, AX98/9949-F LBLAFL. Additionally, all AX devices will be shipped with a new UL label clearly stating "Meets California building Code (2013) Sec. 11B-309.4" and an "AX" identifier label on device center case. See images below for reference.



XP Extra performance



For increased security the XP98/99 Rim exit device has a static load force resistance of more than 2,000 pounds, twice that of standard rim exit devices. The two-piece latch bolt forms a 90° latch-to-strike contact. The "smart" latch changes shape when subjected to external forces. This design enables the exit door to withstand an external attack and remain secure. Additionally, the patented latch bolt design provides a greater, longer-lasting latch bolt to strike contact which is not easily affected by the twisting motion of a weakened frame, resulting in an opening that will remain strong.

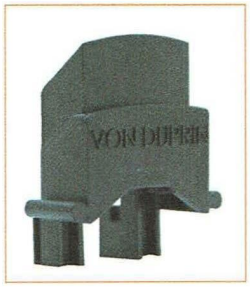
With a door loaded to 250 pounds, XP98/99 requires less than 40 pounds of pressure to open, 25% less than the safety code requires.

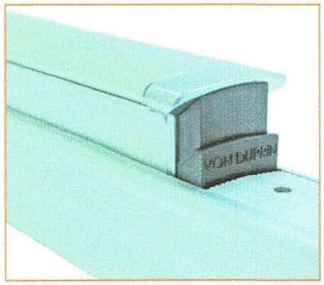
XP98/99 is available for panic or fire exit hardware applications. Dimensions, finishes and trim options are equal to the standard 98/99 series rim exit device.

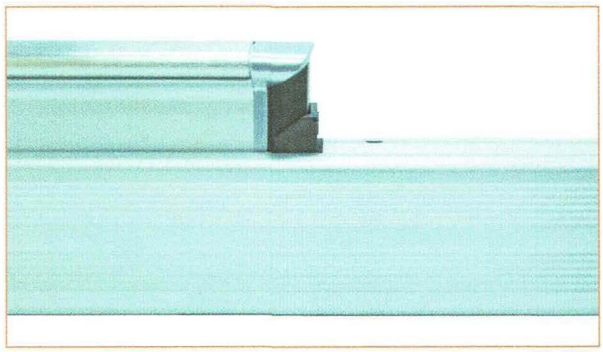
Note: The 909 strike is to be used for all applications.
The exception occurs with the use of fire rated double door applications, in this instance the 954 strike is required.

PA Pushpad armor

Built to absorb impact, the pushpad armor stands up to the wear and tear of demanding high-traffic areas. This composite accessory provides added support, while protecting the pushpad on the hinge side of the device. Available for 33A/35A and 98/99 series exit devices. See images below for reference.







ALLEGION™



LCN®

Door controls

4040XP Series

Features

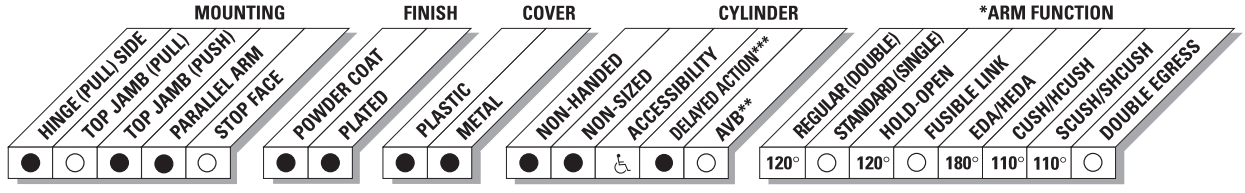


The 4040XP is LCN's most durable and flexible heavy duty closer designed for institutional and other demanding high traffic applications.

Certifications	Grade 1 - ANSI A156.4, UL 10C, ADA, 100 Hour Salt Spray, Meets BAA - Buy American Act
Body Construction	■ Cast Iron Body ■ Full Complement Bearings ■ 1-1/2″ Diameter Piston ■ 3/4″ Diameter Double Heat Treated Pinion Journal
Fluid	All Weather Liquid X Fluid
Handing	Non-Handed
Templating	Peel-n-Stick templates - 2-1/4″ x 5″ Mounting Hole Pattern
Size	Adjustable Spring Size 1-6, includes Patented Green Dial
Warranty	30 years

Cover	■ Plastic, Standard ■ Metal, Optional
Fasteners	Self Reaming and Tapping Screws (SRT)
Mounting	Hinge (Pull Side), Top Jamb (Push Side), Parallel Arm (Push Side)
Arms	Regular Arm
Finishes/Colors/ Powder Coat	■ Aluminum (689) ■ Statuary Bronze (690) ■ Light Bronze (691) ■ Black (693) ■ Dark Bronze (695) ■ Brass (696) ■ Custom colors optional ■ Optional SRI primer - powder coat only ■ Optional plated finishes

Special Templates | Customized installation templates or products may be available to solve unusual applications. Contact LCN Product Support for assistance.



● AVAILABLE
○ NOT AVAILABLE

♿ *Closer available with less than 5.0 lbs. opening force on 36″ door.*
* *Maximum opening/hold-open point with standard template.*
** *Advanced Variable Backcheck.*
*** *Delay feature incorporates standard 4040 cylinder (not XP).*

Arms



4040XP-3077
Regular Arm

- Non-handed
- Mounts pull side or top jamb with shallow reveal P4041 closer includes PA SHOE, 4040XP-62PA required for parallel arm mounting



4040XP-3077L
Long Arm

- Non-handed
- Includes LONG ROD AND SHOE, 4040XP-79LR for top jamb mount
- Optional



4040XP-3077ELR
Extra Long Arm

- Non-handed
- Includes EXTRA LONG ROD AND SHOE, 4040XP-79ELR for top jamb mount with deep reveal
- Optional



4040XP-3049
Hold-Open Arm

- Non-handed
- Mounts pull side or top jamb with shallow reveal, hold-open adjustable shoe
- 4040XP closer includes 4040XP-62PA shoe required for parallel arm mounting
- Optional



4040XP-3049L
Long Hold-Open Arm

- Non-handed
- Includes LONG HEAD AND TUBE, 4040XP-3048L for top jamb mount
- Optional



4040XP-3077EDA
Extra Duty Arm

- Non-handed
- Features forged, solid steel main and forearm for potentially abusive installations
- Optional



4040XP-3049EDA
Hold-Open Extra Duty Arm

- Handed
- Parallel arm features forged, solid steel main and forearm for potentially abusive installations
- Hold-open function is adjusted at the shoe
- Optional



4040XP-3077EDA/62G
Extra Duty Arm with 62G

- Non-handed
- Features forged, solid steel main and forearm for potentially abusive installations
- 62G shoe provides additional blade stop clearance
- Optional



4040XP-3049EDA/62G
Hold-Open Extra Duty Arm with 62G

- Handed
- Features forged, solid steel main and forearm for potentially abusive installations
- 62G shoe provides additional blade stop clearance. Hold-open function is adjusted at the shoe
- Optional



4040XP-3077CNS
Cush-N-Stop® Arm

- Non-handed
- Features solid forged steel main arm and forearm with stop in soffit shoe.
- Optional



4040XP-3049CNS
HCUSH Arm

- Non-handed
- Hold-open function with templated stop/hold-open points
- Handle controls hold-open function
- Optional



4040XP-3077SCNS
Spring CUSH Arm

- Non-handed
- For abusive applications features solid forged steel main arm and forearm with spring loaded stop in the soffit shoe
- Optional



4040XP-3049SCNS
Spring HCUSH Arm

- Non-handed
- For abusive applications features solid forged steel main arm and forearm with spring loaded stop in the soffit shoe
- Handle controls hold-open function
- Optional

How-to-order 4040XP Series closers

1. Select finish
☐ Standard Powder Coat _____
Aluminum, Dark Bronze, Statuary, Light Bronze, Black, Brass.

Closer will be shipped with:
- Standard cylinder
- Standard cover
- Regular arm
- Self-reaming and tapping screws

unless options listed below are selected.

Closer options

Cylinder
☐ Delayed Action (4041 DEL)

Cover
☐ Metal (specify right or left hand) (MC)

Finish
☐ Custom Powder Coat (RAL) _____
(handed metal cover required)
☐ Plated Finish, US _____
(handed metal cover required)
☐ SRI primer (use with powder coat finishes only)

Arm
☐ Regular (REG)
☐ Regular w/62PA (Rw/PA)
☐ Regular w/62A (R/62A)
☐ Long (LONG)
☐ Extra Long (XLONG)
☐ Hold-Open (H)
☐ Hold-Open w/62PA (Hw/PA)
☐ Long Hold-Open (HLONG)
☐ Extra Duty Arm (EDA)
☐ Extra Duty Arm with 62G (EDA/62G)
☐ Hold Open Extra Duty Arm (HEDA) (Handed)
☐ Hold Open Extra Duty Arm with 62 (HEDA/62G) (Handed)
☐ Cush-N-Stop (CUSH)
☐ HCush-N-Stop (HCUSH)
☐ Spring Cush (SCUSH)
☐ Spring HCush (SHCUSH)

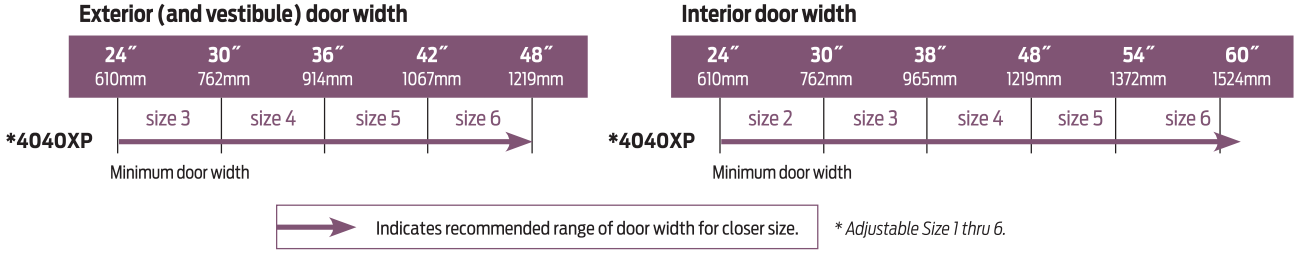
Optional Screw Packs
☐ TB* w/Self-Reaming and Tapping (TBSRT)
☐ Wood & Machine Screw (WMS)
☐ TB*, Wood & Machine Screw (TBWMS)
☐ TORX Machine Screw (TORX)
☐ TB* & TORX Machine Screw (TBTRX)
* Specify door thickness if other than 1-3/4″.

Installation Accessories
☐ Plate, 4040XP-18
☐ Plate, 4040XP-18TJ
☐ Plate, 4040XP-18G
☐ Plate, 4040XP-18PA
☐ CUSH Shoe Support, 4040XP-30
☐ Blade Stop Spacer, 4040XP-61
☐ Auxiliary Shoe, 4040XP-62A
☐ PA Flush Panel Adapter, 4040XP-419

Special Template
☐ ST-_____

Table of sizes

- 4040XP cylinders are adjustable from size 1 through size 6 and is shipped set to size 3
- Closing power of 4040XP Series closers may be adjusted 50%



Reduced opening force 4040XP Series closers

CAUTION ! Any manual door closer, including those certified by BHMA to conform to ANSI Standard A156.4, that is selected, installed and adjusted based on ADA or other reduced opening force requirements may not provide sufficient power to reliably close and latch a door.

Refer to POWER OPERATORS section for information on systems that meet reduced opening force requirements without effecting closing power.

	DOOR WIDTH	36″	42″	48″
♿	8.5* lbs.	4040XP	4040XP	4040XP
	5.0* lbs.	4040XP	4040XP	4040XP

Maximum opening force.

SECTION 08 8000
GLAZING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Insulating glass units.

B. Monolithic Glazing units.

C. Glazing compounds and accessories.

1.02 RELATED REQUIREMENTS

A. Section 06 4100 - Architectural Wood Casework: Cabinets with glass shelves, glass doors and door lites.

B. Section 07 2500 - Weather Barriers.

C. Section 08 1113 - Hollow Metal Doors and Frames: Glazed lites in doors and borrowed lites.

D. Section 08 4313 - Aluminum Entrances and Storefront to receive glazing specified in this section..

E. Section 08 4313 - Aluminum Curtain Wall to receive glazing specified in this section..

F. Section 08 8300 - Mirrors.

G. Section 10 2800 - Toilet Accessories: Mirrors.

1.03 REFERENCE STANDARDS

A. 16 CFR 1201 - Safety Standard for Architectural Glazing Materials.

B. ANSI Z97.1 - American National Standard for Safety Glazing Materials Used in Buildings, Safety Performance Specifications and Methods of Test.

C. ASCE 7 - Minimum Design Loads for Buildings and Other Structures.

D. ASTM C864 - Standard Specification for Dense Elastomeric Compression Seal Gaskets, Setting Blocks, and Spacers.

E. ASTM C920 - Standard Specification for Elastomeric Joint Sealants.

F. ASTM C1036 - Standard Specification for Flat Glass.

G. ASTM C1048 - Standard Specification for Heat-Strengthened and Fully Tempered Flat Glass.

H. ASTM C1172 - Standard Specification for Laminated Architectural Flat Glass.

I. ASTM C1193 - Standard Guide for Use of Joint Sealants.

J. ASTM C1376 - Standard Specification for Pyrolytic and Vacuum Deposition Coatings on Flat Glass.

K. ASTM E1300 - Standard Practice for Determining Load Resistance of Glass in Buildings.

L. ASTM E2190 - Standard Specification for Insulating Glass Unit Performance and Evaluation.

M. California Code of Regulations, Title 24, Part 11 California Green Building Standards Code, “CAL-Green”.

N. California Code of Regulations, Title 24, Part 2, California Building Code (CBC), International Building Code with California Amendments.

O. GANA (GM) - GANA Glazing Manual.

P. GANA (SM) - GANA Sealant Manual.

Q. GANA (LGRM) - Laminated Glazing Reference Manual.

R. IGMA TM-3000 - North American Glazing Guidelines for Sealed Insulating Glass Units for Commercial & Residential Use.

S. NFRC 100 - Procedure for Determining Fenestration Product U-factors.

T. NFRC 200 - Procedure for Determining Fenestration Product Solar Heat Gain Coefficient and Visible Transmittance at Normal Incidence.

U. NFRC 300 - Test Method for Determining the Solar Optical Properties of Glazing Materials and Systems.

1.04 DEFINITIONS

A. Manufacturers of Glass Products: Firms that produce primary glass, fabricated glass, or both, as defined in referenced glazing publications.

B. Glass Thicknesses: Indicated by thickness designations in millimeters according to ASTM C 1036.

C. Interspace: Space between lites of an insulating-glass unit that contains dehydrated air or a specified gas.

D. Deterioration of Coated Glass: Defects developed from normal use that are attributed to the manufacturing process and not to causes other than glass breakage and practices for maintaining and cleaning coated glass contrary to manufacturer's written instructions. Defects include peeling, cracking, and other indications of deterioration in metallic coating.

E. Deterioration of Insulating Glass: Failure of hermetic seal under normal use that is attributed to the manufacturing process and not to causes other than glass breakage and practices for maintaining and cleaning insulating glass contrary to manufacturer's written instructions. Evidence of failure is the obstruction of vision by dust, moisture, or film on interior surfaces of glass.

F. Deterioration of Laminated Glass: Defects developed from normal use that are attributed to the manufacturing process and not to causes other than glass breakage and practices for maintaining and cleaning laminated glass contrary to manufacturer's written instructions. Defects include edge separation, delamination materially obstructing vision through glass, and blemishes exceeding those allowed by referenced laminated-glass standard.

G. Glazing Units Surfaces:
   1. Insulated units:
      a. Side 1 - Exterior surface of outer pane.
      b. Side 2 - Interior surface of outer pane.
      c. Side 3 - Interior surface of inner pane.
      d. Side 4 - Exterior surface of inner pane
   2. Laminated units:
      a. Side 1 - Top surface of top outer pane in horizontal orientation.
      b. Interlayer: PVB material between two pieces of monolithic glass
      c. Side 2 - Underside of bottom outer pane in horizontal orientation.

1.05 SUBMITTALS

A. General: Submit in accordance with Section 01 3300.

B. Provide complete submittals at the same time as submittals for work in related sections to permit review of complete and integrated systems and assemblies.

C. Product Data on Insulating Glass Unit and Glazing Unit Glazing Types: Provide structural, physical and environmental characteristics, size limitations, special handling and installation requirements.

D. Product Data on Glazing Compounds and Accessories: Provide chemical, functional, and environmental characteristics, limitations, special application requirements, and identify available colors.

E. Preconstruction Compatibility and Adhesion Test Report: Submit statement from sealant manufacturer indicating that glass and glazing materials have been tested for compatibility and adhesion with glazing sealants and interpreting test results relative to material performance, including recommendations for primers and substrate preparation needed to obtain adhesion.

F. CAL-GREEN Submittals:
   1. Product Data - VOC Limits: For adhesives sealants, fillers and primers, documentation including printed statement of VOC contents, comply with limits specified in Section 01 6116.

G. Samples: Submit two samples 12 by 12 inch in size of glass units.

H. Samples: Submit 2 inch long bead of glazing sealant, color as selected.

I. Certificate: Certify that products of this section meet or exceed specified requirements.

J. Installer's Qualification Statement.

K. Warranty Documentation: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

L. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
   1. See Section 01 6000 - Product Requirements, for additional provisions.
   2. Extra Insulating Glass Units: One of each glass size and each glass type.

1.06 QUALITY ASSURANCE

A. Perform Work in accordance with GANA (GM), GANA (SM), GANA (LGRM), IGMA TM-3000, and SIGMA TM-3000 for glazing installation methods. Maintain one copy on site.

B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years of documented experience.

C. Installer Qualifications: Company specializing in performing work of the type specified and with at least five (5) years documented experience.

D. Glass Product Testing: Obtain glass test results for product test reports in "Submittals" Article from a qualified testing agency based on testing glass products.
   1. Glass Testing Agency Qualifications: An independent testing agency with the experience and capability to conduct the testing indicated, as documented according to ASTM E 548.

E. Elastomeric Glazing Sealant Product Testing: Obtain sealant test results for product test reports in "Submittals" Article from a qualified testing agency based on testing current sealant formulations within a 36-month period.
   1. Sealant Testing Agency Qualifications: An independent testing agency qualified according to ASTM C 1021 to conduct the testing indicated, as documented according to ASTM E 548.
   2. Test elastomeric glazing sealants for compliance with requirements specified by reference to ASTM C 920, and where applicable, to other standard test methods.

F. Glazing for Fire-Rated Door Assemblies: Glazing for assemblies that comply with NFPA 80 and that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire-protection ratings indicated, based on testing according to NFPA 252.

G. Glazing for Fire-Rated Window Assemblies: Glazing for assemblies that comply with NFPA 80 and that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire ratings indicated, based on testing according to NFPA 257.

H. Safety Glazing Products: Comply with testing requirements in 16 CFR 1201 .
   1. Provide safety glazing products permanently marked with certification label of the Safety Glazing Certification Council (SGCC) <http://www.sgcc.org/> or another certification agency acceptable to authorities having jurisdiction.
   2. Where glazing units, including Kind FT glass and laminated glass, are specified in Part 2 articles for glazing lites, provide glazing products that comply with Category II materials only.

I. Insulating-Glass Certification Program: Permanently marked either on spacers or on at least one component lite of units with appropriate certification label of the following testing and inspecting agency:
   1. Insulating Glass Certification Council.
   2. Associated Laboratories, Inc.

J. Source Limitations for Glass: Provide materials produced by a single manufacturer or fabricator for each kind and condition of glass indicated and composed of primary glass obtained from a single source for each type and class required.

K. Source Limitations for Glazing Accessories: Obtain glazing accessories through one source from a single manufacturer for each product and installation method indicated.

1.07 MOCK-UPS

A. See Section 01 4000 - Quality Requirements, for additional mock-up requirements.

B. Provide mock-up of storefront / curtain wall assembly including glass and air barrier and vapor retarder seal.

C. Locate where directed.

D. Mock-ups may remain as part of the Work.

1.08 FIELD CONDITIONS

A. Do not install glazing when ambient temperature is less than 40 degrees F.

B. Maintain minimum ambient temperature before, during and 24 hours after installation of glazing compounds.

1.09 WARRANTY

A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.

B. Insulating Glass Units: Provide a ten (10) year manufacturer warranty to include coverage for seal failure, interpane dusting or misting, including providing products to replace failed units.

C. Laminated Glass: Provide a ten (10) year manufacturer warranty to include coverage for delamination, including providing products to replace failed units.

D. Manufacturer's Special Warranty for Coated-Glass Products: Manufacturer's standard form, made out to Owner and signed by coated-glass manufacturer agreeing to replace coated-glass units that deteriorate as defined in "Definitions" Article, f.o.b. the nearest shipping point to Project site, within specified warranty period indicated below.
   1. Warranty Period: Ten (10) years from date of Substantial Completion.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Glass Fabricators:
   1. Any of the glass manufacturers named below.
   2. Viracon, Inc: www.viracon.com/#sle.
   3. Substitutions: Refer to Section 01 6000 - Product Requirements.

B. Float Glass Manufacturers:
   1. Guardian Glass, LLC: www.guardianglass.com/#sle.
   2. Pilkington North America Inc: www.pilkington.com/na/#sle.
   3. Vitro Architectural Glass (formerly PPG Glass): www.vitroglazings.com/#sle.
   4. Substitutions: Refer to Section 01 6000 - Product Requirements.

2.02 PERFORMANCE REQUIREMENTS - EXTERIOR GLAZING ASSEMBLIES

A. General: Provide glazing systems capable of withstanding normal thermal movement and wind and impact loads (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; or other defects in construction.

B. VOC Limits for all adhesives sealants, fillers, primers and coatings: Comply with limits specified in Section 01 6116.

C. Glass Design: Glass thickness designations indicated are minimums and are for detailing only. Confirm glass thicknesses by analyzing Project loads and in-service conditions. Provide glass lites in the thickness designations indicated for various size openings, but not less than thicknesses and in strengths (annealed or heat treated) required to meet or exceed the following criteria.

D. Provide type and thickness of exterior glazing assemblies to support assembly dead loads, and to withstand live loads caused by positive and negative wind pressure acting normal to plane of glass.
   1. Specified Design Wind Loads: As indicated on structural drawings, but not less than wind loads applicable to Project as required by ASCE 7 "Minimum Design Loads for Buildings and Other Structures": Section 6.0 "Wind Loads."
   2. Comply with ASTM E1300 for design load resistance of glass type, thickness, dimensions, and maximum lateral deflection of supported glass.

3. Probability of Breakage for Vertical Glazing: 8 lites per 1000 for lites set vertically or not more than 15 degrees off vertical and under wind action.
   a. Load Duration: 3 seconds.
4. Seismic Loads: Design and size glazing components to withstand seismic loads and sway displacement in accordance with the requirements of ASCE 7.
5. Provide glass edge support system sufficiently stiff to limit the lateral deflection of supported glass edges to less than 1/175 of their lengths under specified design load.
6. Glass thicknesses listed are minimum.

E. Vapor Retarder and Air Barrier Seals: Provide completed assemblies that maintain continuity of building enclosure vapor retarder and air barrier.
1. In conjunction with vapor retarder and joint sealer materials described in other sections.
   a. Refer to Section 07 2500.
2. To utilize the inner pane of multiple pane insulating glass units for the continuity of the vapor retarder and air barrier seal.
3. To maintain a continuous vapor retarder and air barrier throughout the glazed assembly from glass pane to heel bead of glazing sealant.

F. Thermal Movements: Provide glazing that allows for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures acting on glass framing members and glazing components. 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.

G. Thermal and Optical Performance: Provide exterior glazing products with performance properties as indicated. Performance properties are in accordance with manufacturer's published data as determined with the following procedures and/or test methods:
1. Center of Glass U-Value: Comply with NFRC 100 using Lawrence Berkeley National Laboratory (LBNL) WINDOW 6.3 computer program.
2. Center of Glass Solar Heat Gain Coefficient (SHGC): Comply with NFRC 200 using Lawrence Berkeley National Laboratory (LBNL) WINDOW 6.3 computer program.
3. Solar Optical Properties: Comply with NFRC 300 test method.

H. Provide Kind FT (fully tempered) glass lites or laminated glass in all locations.

I. Optical Distortion Limits (Roll Wave Distortion Limits):
1. Maximum peak-to-valley roll wave 0.003 inch (0.08 mm) in the central area of the glass lite, and 0.008 inch (0.20 mm) within 12 inches (305 mm) of the leading and trailing edge of the lite, measured in accordance with ASTM C 1651.
2. Maximum center-kink of 0.001 inch (0.025 mm) when roll wave is measured over the surface of the glass perpendicular to the direction of travel through the heat treatment furnace.
3. Maximum localized and overall bow (warp) per lite shall each be one-half of maximum allowed by ASTM C 1048.
4. Measure glass lites for optical distortion using Osprey® (version 7 or higher, by Lite Sentry) online distortion measurement system (or equivalent approved in writing by industrial coated glass supplier). Retain test reports for three years following substantial completion. Submit test reports upon Architect's request.

2.03 GLASS MATERIALS

A. Float Glass: Provide float glass based glazing unless otherwise indicated.
1. Kind HS - Heat-Strengthened Type: Complies with ASTM C1048.
2. Kind FT - Fully Tempered Type: Complies with ASTM C1048.

3. Fully Tempered Safety Glass: Complies with ANSI Z97.1 or 16 CFR 1201 criteria for safety glazing used in hazardous locations.
4. Thicknesses: As indicated; provide greater thickness as required for exterior glazing wind load design.

B. Laminated Glass: Float glass laminated in accordance with ASTM C1172.
1. Laminated Safety Glass: Complies with ANSI Z97.1 - Class B or 16 CFR 1201 - Category I impact test requirements.
2. Polyvinyl Butyral (PVB) Interlayer: 0.060 inch thick, minimum.

C. Sputter-Coated Float Glass: ASTM C 1376, float glass with metallic-oxide or -nitride coating deposited by vacuum deposition process after manufacture and heat treatment (if any), and complying with other requirements specified.
1. Approved Manufacturers:
a. Vitro, www.vitro.com, Basis of Design.
b. AGC Flat Glass North America; www.agc.com.
c. Guardian Industries, www.guardian.com.
d. Viracon, Inc., www.viracon.com.
e. Substitutions: Refer to Section 01 6000 - Product Requirements.

2.04 INSULATING GLASS UNITS

A. Manufacturers:
1. Any of the manufacturers specified for float glass.
2. Fabricator certified by glass manufacturer for type of glass, coating, and treatment involved and capable of providing specified warranty.
3. AGC Glass North America, Inc: www.agcglass.com/#sle.
4. Guardian Glass, LLC: www.guardianglass.com.
5. Viracon, Apogee Enterprises, Inc: www.viracon.com.
6. Vitro Architectural Glass (formerly PPG Glass): www.vitroglazings.com/#sle.
7. Substitutions: Refer to Section 01 6000 - Product Requirements.

B. Insulating Glass Units: Types as indicated.
1. Durability: Certified by an independent testing agency to comply with ASTM E2190.
2. Coated Glass: Comply with requirements of ASTM C1376 for pyrolytic (hard-coat) or magnetic sputter vapor deposition (soft-coat) type coatings on flat glass; coated vision glass, Kind CV; coated overhead glass, Kind CO; or coated spandrel glass, Kind CS.
3. Metal Edge Spacers: Aluminum, bent and soldered corners.
4. Spacer Color: Black.
5. Edge Seal:
a. Dual-Sealed System: Provide polyisobutylene sealant as primary seal applied between spacer and glass panes, and silicone, polysulfide, or polyurethane sealant as secondary seal applied around perimeter.
6. Color: Black.
7. Purge interpane space with dry air, hermetically sealed.

C. Type Clear - Sealed Insulating Glass Units: Vision glazing, low-E.
1. Application: All exterior glazing unless otherwise indicated.
2. Substitutions: Refer to Section 01 6000 - Product Requirements.
a. Other products of the basis of design manufacturer and products of other manufacturers will be considered provided the overall performance is within the specified range(s) and the overall appearance is not significantly different from that of the specified product.
b. Architect's decision on substitutions is final.

3. Between-lite space filled with air.
4. Thermal Resistance (U-Value): 0.28, maximum.
5. Total Solar Heat Gain Coefficient: 0.27, maximum.
6. Total Visible Light Transmittance: 64 percent, minimum.
7. Basis of Design: Vitro Architectural Glass (formerly PPG Glass).
8. Outboard Lite: Fully tempered float glass, 1/4 inch thick, minimum.
   a. Coating: Solarban 70 on #2 surface, no coating on #3 surface.
   b. Tint: None (clear).
9. Inboard Lite: Fully tempered float glass, 1/4 inch thick.
   a. Tint: None (clear).
10. Total Thickness: 1 inch.

2.05 GLAZING UNITS

A. Type G-2 - Monolithic Interior Vision Glazing:
   1. Applications: Interior glazing unless otherwise indicated.
   2. Glass Type: Fully tempered float glass.
   3. Tint: Clear.
   4. Thickness: 1/4 inch, nominal.

2.06 GLAZING COMPOUNDS

A. Butyl Sealant: Single component; ASTM C920, Grade NS, Class 12-1/2, Uses M and A, Shore A hardness of 10 to 20; black color.

B. Silicone Sealant: Single component; neutral curing; capable of water immersion without loss of properties; non-bleeding, non-staining; ASTM C920, Type S, Grade NS, Class 25, Uses M, A, and G; with cured Shore A hardness range of 15 to 25; black color.

2.07 ACCESSORIES

A. Setting Blocks: Silicone, with 80 to 90 Shore A durometer hardness; ASTM C864 Option II. Length of 0.1 inch for each square foot of glazing or minimum 4 inch by width of glazing rabbet space minus 1/16 inch by height to suit glazing method and pane weight and area.

B. Spacer Shims: Neoprene, 50 to 60 Shore A durometer hardness; ASTM C864 Option II. Continuous by one half the height of the glazing stop by thickness to suit application, self adhesive on one face.

C. Glazing Tape, Back Bedding Mastic Type: Preformed, butyl-based, 100 percent solids compound with integral resilient spacer rod applicable to application indicated; 5 to 30 cured Shore A durometer hardness; coiled on release paper; black color.
   1. Width: As required for application.
   2. Thickness: As required for application.
   3. Spacer Rod Diameter: As required for application.
   4. Manufacturers:
      a. Pecora Corporation; _____: www.pecora.com/#sle.
      b. Substitutions: Refer to Section 01 6000 - Product Requirements.

D. Glazing Splines: Resilient silicone extruded shape to suit glazing channel retaining slot; ASTM C864 Option II; color black.

2.08 SOURCE QUALITY CONTROL

A. Provide shop inspection and testing for insulated glass.

PART 3 EXECUTION

3.01 VERIFICATION OF CONDITIONS

A. Verify that openings for glazing are correctly sized and within tolerances, including those for size, squareness, and offsets at corners.

B. Verify that the minimum required face and edge clearances are being provided.

C. Verify that surfaces of glazing channels or recesses are clean, free of obstructions that may impede moisture movement, weeps are clear, and support framing is ready to receive glazing system.

D. Verify that sealing between joints of glass framing members has been completed effectively.

E. Glass Product:
   1. Verify that each piece of glass is free of scratches or marred surfaces.
   2. Verify that all edges are clean cut and finished in the specified manner.

F. Obtain installers written report listing conditions detrimental to performance of glazing work. Proceed with glazing system installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

A. Clean contact surfaces with appropriate solvent and wipe dry within maximum of 24 hours before glazing. Remove coatings that are not tightly bonded to substrates.

B. Seal porous glazing channels or recesses with substrate compatible primer or sealer.

C. Prime surfaces scheduled to receive sealant where required for proper sealant adhesion.

3.03 INSTALLATION, GENERAL

A. Install glazing in compliance with written instructions of glass, gaskets, and other glazing material manufacturers, unless more stringent requirements are indicated, including those in glazing referenced standards.

B. Install glazing sealants in accordance with ASTM C1193, GANA (SM), and manufacturer's instructions.

C. Do not exceed edge pressures around perimeter of glass lites as stipulated by glass manufacturer.

D. Protect glass from edge damage during handling and installation. Inspect glass during installation and discard pieces with edge damage that could affect glass performance.
   1. Use a rolling block in rotating glass units to prevent damage to glass corners.
   2. Do not impact glass with metal framing.
   3. Use suction cups to shift glass units within openings; do not raise or drift glass with a pry bar.
   4. Rotate glass with flares or bevels along one horizontal edge which would occur in vicinity of setting blocks so that these are located at top of opening.
   5. Discard glass units with edge damage or other imperfections of kind that, when installed, weakens glass and impairs performance and appearance.

E. Provide spacers for glass lites where length plus width is larger than 50 -inches (1270 mm) as follows:
   1. Locate spacers directly opposite each other on both inside and outside faces of glass. Install correct size and spacing to preserve required face clearances, unless gaskets and

glazing tapes are used that have demonstrated ability to maintain required face clearances and to comply with system performance requirements.

2. Provide 1/8-inch (3-mm) minimum bite of spacers on glass and use thickness equal to sealant width. With glazing tape, use thickness slightly less than final compressed thickness of tape.

F. Set glass lites of system with uniform pattern, draw, bow, and similar characteristics.

G. Set glass lites in proper orientation so that coatings face exterior or interior as indicated.

H. Provide edge blocking where indicated or needed to prevent glass lites from moving sideways in glazing channel, as recommended in writing by glass manufacturer and according to requirements in referenced glazing publications.

I. Install so that appropriate rating agency markings remain permanently visible.

J. Prevent glass from contact with any contaminating substances that may be the result of construction operations such as, and not limited to the following; weld splatter, fire-safing, plastering, mortar droppings, etc.

3.04 INSTALLATION - WET/DRY GLAZING METHOD (PREFORMED TAPE AND SEALANT)

A. Application - Exterior Glazed: Set glazing infills from the exterior of the building.

B. Cut glazing tape to length and set against permanent stops, 3/16 inch below sight line. Seal corners by butting tape and dabbing with butyl sealant.

C. Apply heel bead of butyl sealant along intersection of permanent stop with frame ensuring full perimeter seal between glass and frame to complete the continuity of the air and vapor seal.

D. Place setting blocks at 1/4 points with edge block no more than 6 inch from corners.

E. Rest glazing on setting blocks and push against tape and heel bead of sealant with sufficient pressure to attain full contact at perimeter of pane or glass unit.

F. Install removable stops, with spacer strips inserted between glazing and applied stops 1/4 inch below sight lines.

1. Place glazing tape on glazing pane of unit with tape flush with sight line.

G. Fill gap between glazing and stop with silicone type sealant to depth equal to bite of frame on glazing, but not more than 3/8 inch below sight line.

H. Apply cap bead of silicone type sealant along void between the stop and the glazing, to uniform line, flush with sight line. Tool or wipe sealant surface smooth.

3.05 INSTALLATION - WET/DRY GLAZING METHOD (TAPE AND SEALANT)

A. Application - Interior Glazed: Set glazing infills from the interior of the building.

B. Cut glazing tape to length and install against permanent stops, projecting 1/16 inch above sight line.

C. Place setting blocks at 1/4 points with edge block no more than 6 inch from corners.

D. Rest glazing on setting blocks and push against tape to ensure full contact at perimeter of pane or unit.

E. Install removable stops, spacer shims inserted between glazing and applied stops at 24 inch intervals, 1/4 inch below sight line.

F. Fill gaps between pane and applied stop with silicone type sealant to depth equal to bite on glazing, to uniform and level line.

G. Carefully trim protruding tape with knife.

3.06 TOLERANCES

A. Erection Tolerances: Install components plumb, level, accurately aligned, and located in reference to column lines and floor levels. Erection tolerances indicated below are the maximum allowable for both no-load and full-load conditions and are not cumulative. Adjust work to conform to the following tolerances:
   1. Plumb: 1/8 -inch in 10 -feet; 1/4 -inch in 40 -feet.
   2. Level: 1/8 -inch in 20 -feet; 1/4 -inch in 40 -feet.
   3. Alignment: Limit offset of member alignment to 1/16 -inch where surfaces are flush or less than 1/2 -inch out of flush and separated by less than 3 -inches by protruding work; otherwise limit offsets to 1/8 inch.

3.07 FIELD QUALITY CONTROL

A. Glass and Glazing product manufacturers to provide field observation of the installation of their products.

B. Monitor and report installation procedures and unacceptable conditions.

3.08 CLEANING

A. Remove excess glazing materials from finish surfaces immediately after application using solvents or cleaners recommended by manufacturers.

B. Remove non-permanent labels immediately after glazing installation is complete.

C. Clean glass and adjacent surfaces after sealants are fully cured.

D. Clean glass on both exposed surfaces not more than 4 days prior to Date of Substantial Completion in accordance with glass manufacturer's written recommendations.

3.09 PROTECTION

A. After installation, mark pane with an 'X' by using removable plastic tape or paste; do not mark heat absorbing or reflective glass units.

B. Examine glass surfaces adjacent to or below exterior concrete and other masonry surfaces at frequent intervals during construction, but not less often than once a month, for build-up of dirt, scum, alkali deposits or staining. When examination reveals presence of these forms of residue, remove by method recommended by glass manufacturer.

C. Remove and replace glass that is damaged during construction period prior to Date of Substantial Completion.

END OF SECTION 08 8000

SECTION 08 8813
FIRE-RATED GLAZING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Fire-rated glazing units.

B. Glazing compounds.

1.02 RELATED REQUIREMENTS

A. Section 08 5123 - Steel Windows: Windows to receive Fire-Rated Glazing.

1.03 REFERENCE STANDARDS

A. 16 CFR 1201 - Safety Standard for Architectural Glazing Materials.

B. ASTM C864 - Standard Specification for Dense Elastomeric Compression Seal Gaskets, Setting Blocks, and Spacers.

C. ASTM C920 - Standard Specification for Elastomeric Joint Sealants.

D. ASTM C1193 - Standard Guide for Use of Joint Sealants.

E. ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials.

F. ASTM E1300 - Standard Practice for Determining Load Resistance of Glass in Buildings.

G. GANA (GM) - GANA Glazing Manual.

H. GANA (SM) - GANA Sealant Manual.

I. GANA (LGRM) - Laminated Glazing Reference Manual.

J. ICC (IBC) - International Building Code.

K. IGMA TM-3000 - North American Glazing Guidelines for Sealed Insulating Glass Units for Commercial & Residential Use.

L. ITS (DIR) - Directory of Listed Products.

M. NFPA 252 - Standard Methods of Fire Tests of Door Assemblies.

N. NFRC 100 - Procedure for Determining Fenestration Product U-factors.

O. NFRC 200 - Procedure for Determining Fenestration Product Solar Heat Gain Coefficient and Visible Transmittance at Normal Incidence.

P. NFRC 300 - Test Method for Determining the Solar Optical Properties of Glazing Materials and Systems.

Q. UL (DIR) - Online Certifications Directory.

R. UL 10B - Standard for Fire Tests of Door Assemblies.

S. UL 10C - Standard for Positive Pressure Fire Tests of Door Assemblies.

T. UL 263 - Standard for Fire Tests of Building Construction and Materials.

1.04 SUBMITTALS

A. Product Data on Glazing Unit Glazing Types: Provide structural, physical, and environmental characteristics, size limitations, special handling and installation requirements.

B. Product Data on Glazing Compounds and Accessories: Provide chemical, functional, and environmental characteristics, limitations, special application requirements, and identify available colors.

C. Certificate: Certify that products of this section meet or exceed specified requirements.

D. Manufacturer's qualification statement.

E. Installer's qualification statement.

F. Specimen warranty.

1.05 QUALITY ASSURANCE

A. Perform work in accordance with GANA (GM), GANA (SM), GANA (LGRM), and IGMA TM-3000 for glazing installation methods. Maintain one copy on site.

B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years of documented experience.
   1. Provide certified glass products through ANSI accredited certifications that include plant audits and independent laboratory performance testing.

C. Installer Qualifications: Company specializing in performing work of type specified and with at least three years of documented experience.
   1. Provide company, field supervisors, and installers that hold active ANSI accredited certifications in appropriate categories for work specified.
      a. North American Contractor Certification (NACC) for glazing contractors.
      b. Equivalent independent third-party ANSI accredited certification.

1.06 FIELD CONDITIONS

A. Ambient Conditions: Do not install glazing when ambient temperature is less than 40 degrees F.

B. Maintain minimum ambient temperature before, during, and 24 hours after installation of glazing compounds.

1.07 WARRANTY

A. See Section 01 7800 - Closeout Submittals for additional warranty requirements.

B. Manufacturer Warranty for Insulating Glass Units: Provide ten year manufacturer warranty coverage for seal failure, interpane dusting or misting, including providing products to replace failed units, and commencing on the Date of Substantial Completion. Complete forms in Owner's name and register with manufacturer.

PART 2 PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

A. Provide type and thickness of exterior glazing assemblies to support assembly dead loads and withstand live loads caused by positive and negative wind pressure acting normal to plane of glass.
   1. Comply with ASTM E1300 for design load resistance of glass type, thickness, dimensions, and maximum lateral deflection of supported glass.

2. Provide glass edge support system sufficiently stiff to limit lateral deflection of supported glass edges to less than 1/175 of their lengths under specified design load.
3. Glass thicknesses listed are minimum.

B. Vapor Retarder and Air Barrier Seals: Provide completed assemblies that maintain building enclosure vapor retarder and air barrier continuity.

C. Thermal and Optical Performance: Provide exterior glazing products with performance properties as indicated, in accordance with manufacturer's published data as determined with the following procedures or test methods:
1. Center of Glass U-Value: Comply with NFRC 100 using Lawrence Berkeley National Laboratory (LBNL) WINDOW software.
2. Center of Glass Solar Heat Gain Coefficient (SHGC): Comply with NFRC 200 using Lawrence Berkeley National Laboratory (LBNL) WINDOW software.
3. Solar Optical Properties: Comply with NFRC 300 test method.

2.02 GLASS MATERIALS

2.03 GLAZING UNITS

A. Type FRG-1 - Fire-Resistance-Rated Glazing: Type, thickness, and configuration of glazing that contains flames, smoke, and blocks radiant heat, as required to achieve indicated fire rating period exceeding 45 minutes.
1. Applications:
a. Glazing in fire-rated window assembly.
b. Other locations as indicated on drawings.
2. Provide products listed by ITS (DIR) or UL (DIR) and approved by authorities having jurisdiction.
3. Safety Glazing Certification: 16 CFR 1201 Category II.
4. Glazing Method: As required for fire rating.
5. Fire Rating Period: 60 minutes.
6. Markings for Fire-Resistance-Rated Glazing Assemblies: Provide permanent markings on fire-resistance-rated glazing in compliance with ICC (IBC), local building code, and authorities having jurisdiction.
a. "W" - meets wall assembly criteria of ASTM E119 or UL 263 fire test standards.
b. "D" - meets fire door assembly criteria of NFPA 252, UL 10B, or UL 10C fire test standards.
c. "H" - meets fire door assembly hose stream test of NFPA 252, UL 10B, or UL 10C fire test standards.
d. "T" - meets temperature rise of not more than 450 degrees F above ambient at end of 30 minutes fire exposure in accordance with NFPA 252, UL 10B, or UL 10C fire test standards.
e. "XXX" - placeholder that represents fire rating period, in minutes.
7. Products:
a. SAFTIFIRST, a division of O'Keeffe's Inc; SuperLite II-XL 60: www.safti.com/#sle.
b. SAFTIFIRST, a division of O'Keeffe's Inc; SuperLite II-XLM 60: www.safti.com/#sle.
c. Technical Glass Products; Pilkington Pyrostop 60: www.fireglass.com/#sle.
d. Vetrotech North America; Contraflam 60: www.vetrotechusa.com/#sle.
e. Substitutions: See Section 01 6000 - Product Requirements.

2.04 GLAZING COMPOUNDS

A. Type GC-1 - Silicone Sealant: Single component; neutral curing; capable of water immersion without loss of properties; nonbleeding, nonstaining; ASTM C920, Type S, Grade NS, Class 25, Uses M, A, and G; with cured Shore A hardness range of 15 to 25; selected color.

2.05 ACCESSORIES

A. Setting Blocks: Aluminum silicate, with 80 to 90 Shore A durometer hardness; ASTM C864 Option II. Length of 0.1 inch for each square foot of glazing or minimum 4 inch by width of glazing rabbet space minus 1/16 inch by height to suit glazing method and pane weight and area.

B. Spacer Shims: Neoprene, 50 to 60 Shore A durometer hardness; ASTM C864 Option II. Continuous by one half the height of glazing stop by thickness to suit application, self adhesive on one face.

C. Glazing Tape: Flexible tape made from spun calcium-magnesium-silica fibers in binder; designed to remain stable at temperatures up to 2,012 degrees F.
   1. Thickness: As recommended by framing manufacturer for glazing application.

D. Glazing Gaskets: Flexible intumescent seals.

PART 3 EXECUTION

3.01 Examination

A. Verify that openings for glazing are correctly sized and within tolerances, including those for size, squareness, and offsets at corners.

B. Verify that surfaces of glazing channels or recesses are clean, free of obstructions that may impede moisture movement, weeps are clear, and support framing is ready to receive glazing system.

C. Verify that sealing between joints of glass framing members has been completed effectively.

D. Proceed with glazing system installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

A. Clean contact surfaces with appropriate solvent and wipe dry within maximum of 24 hours before glazing. Remove coatings that are not tightly bonded to substrates.

B. Seal porous glazing channels or recesses with substrate compatible primer or sealer.

C. Prime surfaces scheduled to receive sealant where required for proper sealant adhesion.

3.03 INSTALLATION - GENERAL

A. Install glazing in compliance with written instructions of glass, gaskets, and other glazing material manufacturers unless more stringent requirements are indicated, including those in referenced glazing standards.

B. Install glazing sealants in accordance with ASTM C1193, GANA (SM), and manufacturer's instructions.

C. Do not exceed edge pressures around perimeter of glass lites as stipulated by glass manufacturer.

D. Set glass lites of system with uniform pattern, draw, bow, and similar characteristics.

E. Set glass lites in proper orientation so that coatings face exterior or interior as indicated.

F. Prevent glass from contact with contaminating substances that may result from construction operations including, but not limited to weld spatter, fire-safing, plastering, mortar droppings, etc.

3.04 INSTALLATION - WET/DRY GLAZING METHOD (TAPE AND SEALANT)

A. Application - Interior Glazed: Set glazing infills from interior of building.

B. Cut glazing tape to length and install against permanent stops, projecting 1/16 inch above sightline.

C. Place setting blocks at 1/4 points with edge block no more than 6 inches from corners.

D. Rest glazing on setting blocks and push against tape to ensure full contact at perimeter of pane or unit.

E. Install removable stops, spacer shims inserted between glazing and applied stops at 24-inch intervals, 1/4 inch below sight line.

F. Fill gaps between pane and applied stop with silicone type sealant to depth equal to bite on glazing, to uniform and level line.

G. Carefully trim protruding tape with knife.

3.05 FIELD QUALITY CONTROL

A. Manufacturer Services: Provide services of glass and glazing manufacturer's field representative to observe installation of their products.

3.06 CLEANING

A. Remove excess glazing materials from finish surfaces immediately after application using solvents or cleaners recommended by manufacturers.

B. Remove nonpermanent labels immediately after glazing installation is complete.

C. Clean glass and adjacent surfaces after sealants are fully cured.

D. Clean glass on both exposed surfaces not more than four days prior to Date of Substantial Completion in accordance with glass manufacturer's written recommendations.

3.07 PROTECTION

A. After installation, mark pane with 'X' by using removable plastic tape or paste; do not mark heat-absorbing or reflective glass units.

B. Remove and replace glass that is damaged during construction period prior to Date of Substantial Completion.

END OF SECTION 08 8813

SECTION 08 9100
LOUVERS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Section specifies shop fabricated and manufactured metal louvers and vents which are not an integral part of the mechanical system. Metal mesh screens are also specified.

1.02 RELATED REQUIREMENTS

A. Pertinent Sections specifying Volatile Organic Compound (VOC) Content Restrictions.

B. Section 07 2500 - Weather Barriers: Sealing framing to weather barrier installed on adjacent construction.

C. Section 07 6200 - Sheet Metal Flashing and Trim.

D. Section 07 9200 - Joint Sealants: Sealing joints between frames and adjacent construction.

E. Section 08 4313 - Aluminum-Framed Storefronts: Louvers in storefront framing.

F. Pertinent sections of Division 23 specifying ductwork, mechanical registers, and mechanical systems connecting to louvers.

1.03 REFERENCE STANDARDS

A. AAMA 611 - Voluntary Specification for Anodized Architectural Aluminum.

B. AAMA 2604 - Voluntary Specification, Performance Requirements and Test Procedures for High Performance Organic Coatings on Aluminum Extrusions and Panels.

C. AAMA 2605 - Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels.

D. AMCA 500-L - Laboratory Methods of Testing Louvers for Rating.

E. AMCA 511 - Certified Ratings Program for Air Control Devices.

F. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar.

G. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.

H. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.

1.04 SUBMITTALS

A. See Section 01 3300 - Submittals for submittal procedures.

B. Provide complete submittals at the same time as submittals for work in related sections to permit review of complete and integrated systems and assemblies.

C. Product Data: Provide data describing design characteristics, maximum recommended air velocity, design free area, materials and finishes. Demonstrate compliance with specified requirements.

D. CAL-GREEN Submittals: Product Data – VOC Limits: For adhesives sealants, fillers, primers and coatings, documentation including printed statement of VOC contents, comply with limits specified in related section.

E. 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.

F. Samples: Submit two samples 2 by 2 inches in size illustrating finish and color of exterior and interior surfaces.

G. Test Reports: Independent agency reports showing compliance with specified performance criteria.

H. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing products of the type specified in this section, with minimum three years of documented experience.

1.06 PROJECT CONDITIONS

A. Coordinate work of this section with installation of mechanical ductwork .

1.07 WARRANTY

A. See Section 01 700 - Contract Closeout, for additional warranty requirements.

B. 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

2.01 MANUFACTURERS

A. Airolite Company, LLC: www.airolite.com/#sle.

B. American Warming and Ventilating: www.awv.com/#sle.

C. Construction Specialties, Inc: www.c-sgroup.com/#sle.

D. Ruskin Company: www.ruskin.com/#sle.

E. Substitutions: See Section 01 6000 - Product Requirements.

2.02 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 of 25 psf 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: Horizontal blade, extruded aluminum construction, with intermediate mullions matching frame.
   1. Free Area: 50 percent, minimum.

2. Static Pressure Loss: As required for proper operation of mechanical systems as designed. Provide test data confirming appropriate values in inches wg maximum per square foot of free area at indicated velocity(ies) in fpm, when tested in accordance with AMCA 500-L.
3. Blades: Drainable.
4. Frame: 4 inches deep, channel profile; corner joints mitered andprovided with sill pan and flashing flanges at head and jamb..
5. Aluminum Thickness: Frame 12 gage, 0.0808 inch minimum; blades 12 gage, 0.0808 inch minimum.

2.03 MATERIALS

A. Extruded Aluminum: ASTM B221 (ASTM B221M).

2.04 FINISHES

A. Superior Performing Organic Coatings System: Polyvinylidene fluoride (PVDF) multi-coat superior performing organic coatings system complying with AAMA 2605, including at least 70 percent PVDF resin, and at least 80 percent of aluminum extrusion and panels surfaces having minimum total dry film thickness (DFT) of 1.2 mils, 0.0012 inch.
   1. Manufacturers:
      a. PPG Metal Coatings; Duranar: www.ppgmetalcoatings.com/#sle.
      b. Sherwin-Williams Company; Fluropon: www.coil.sherwin.com/#sle.
      c. Valspar; Fluropon: www.valsparcoilextrusion.com/#sle.
      d. Substitutions: See Section 01 6000 - Product Requirements.

B. Color(s) as selected by Architect from:
   1. Manufacturer's full range of available colors, including premium Pearlescent Metallic selections, minimum 18 premium selections.

C. Touch-Up Materials: As recommended by coating manufacturer for field application.

2.05 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. Screens: Frame of same material as louver, with reinforced corners; removable, screw attached; installed on inside face of louver frame.

C. Bird Screen: Interwoven wire mesh of steel, 14 gage, 0.0641 inch diameter wire, 1/2 inch open weave, diagonal design.

D. Insect Screen: 18 x 16 size aluminum mesh.

E. Fasteners and Anchors: Stainless steel.

F. Flashings: Of same material as louver frame, formed to required shape, single length in one piece per location.

G. Sealant for Setting Sills and Sill Flashing: Non-curing butyl type.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that prepared openings and flashings are ready to receive this work and opening dimensions are as indicated on shop drawings.

B. Verify that field measurements are as indicated.

3.02 INSTALLATION

A. Install louver assembly in accordance with manufacturer's instructions.

B. Install louvers level and plumb.

C. Set sill members and sill flashing in continuous bead of sealant.

D. Install flashings and align louver assembly to ensure moisture shed from flashings and diversion of moisture to exterior.

E. Integrate Air-Weather Barrier of wall assembly with louver flashing flanges.

F. Secure louver frames in openings with concealed fasteners.

3.03 CLEANING

A. Strip protective finish coverings.

B. Clean surfaces and components.

C. Touch-up surfaces damaged after installation so that no unfinished substrate is visible in completed assemblies, including joint edges.

END OF SECTION 08 9100

SECTION 09 0511
CONCRETE FLOOR PREPARATION

PART 1 GENERAL

1.01 SUMMARY

A. Mechanical cleaning of new concrete floor surfaces for application of finished flooring.

1.02 RELATED REQUIREMENTS

A. Pertinent Sections specifying Volatile Organic Compound (VOC) Content Restrictions.

B. Section 01 8113 - Sustainable Design Requirements.

C. Division 03 Section - Cast-In-Place Concrete for concrete floor slabs.

D. Division 07 Section - Water Vapor Emission Control System.

E. Division 09 Sections for applied floor finishes.

1.03 REFERENCES

A. ASTM C1583 - Standard Test Method for Tensile Strength of Concrete Surfaces and the Bond Strength or Tensile Strength of Concrete Repair and Overlay Materials by Direct Tension (Pull-off Method).

B. ASTM D4258 - Standard Practice for Surface Cleaning Concrete for Coating.

C. ASTM D4259 - Standard Practice for Abrading Concrete.

D. California Code of Regulations, Title 24, Part 11 California Green Building Standards Code, “CAL-Green”.

E. California Code of Regulations, Title 24, Part 2, California Building Code (CBC), International Building Code.

F. International Concrete Repair Institute (ICRI) Guideline No. 03732- Selecting and Specifying Concrete; Surface Preparation for Sealers, Coatings and Polymer Overlays.

1.04 ADMINSTRATIVE REQUIREMENTS

A. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Management and Coordination."
   1. Review conditions affecting substrate preparation.
   2. Review procedures that will be used for substrate preparation.
   3. Require attendance by Water Vapor Emission Control and Finish Flooring installers to review preparation requirements of floor finish product and flooring adhesive manufacturers

1.05 SUBMITTALS

A. Product Data: For each type of mechanical cleaning equipment used on the project.

B. CAL-Green Submittals:
   1. Dust Control Plan: Written description of materials and procedures used to control and remove dust from working area, prevent contamination of HVAC systems.

C. Informational Submittals
   1. Qualification Data: For Installer performing surface preparation.
   2. Field quality-control reports.

a. Submit report of observations.
b. Certify installation is complete in accordance with acceptance criteria specified.
c. Indicate supplementary instructions provided for Project specific conditions.

1.06 QUALITY ASSURANCE

A. Installer Qualifications: An entity that employs installers and supervisors who are trained in the use of the equipment and techniques required to produce the specified results.

B. Mockups: Provide field mockups to set quality standards for surface preparation execution and for preconstruction testing.
1. Provide mockup of typical surface preparation, minimum 100 sq. ft. area. Coordinate required size with requirements for preconstruction testing.
2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
3. Subject to compliance with requirements, approved mockups may become part of the completed Work..

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify new concrete floors have cured minimum 28 days.

B. Examine substrates, with Installer (s) present, for compliance with requirements for surface contamination, damage, and other conditions affecting performance of the Work.

C. Examine substrate to determine repairs required to restore substrate surface to be within tolerances required for floor finishes specified in other sections, prior to completing Work of this section.

D. Examine substrate to verify surfaces prepared in accordance with this section will be suitable for application of finishes specified in other sections.

E. Prepare written report, endorsed by Installer, listing conditions detrimental to performance with recommendations for methods and materials required to correct conditions before proceeding with work of this section.

F. Proceed with surface preparation only after unsatisfactory conditions have been corrected.
1. Proceeding with surface preparations indicates acceptance and of surfaces and conditions of substrate.

3.02 SURFACE PREPARATION EQUIPMENT

A. Mechanical Cleaning Equipment: Automatic, dry shot blast type, self contained capable of recycling blast materials and collecting surface abrasions.

3.03 SURFACE PREPARATION

A. Protection: Mask and protect walls, equipment from adjacent work and finishes during installation process.

B. Mechanically clean concrete substrate and create surface profile in existing concrete substrate in accordance with ASTM D 4259 as required to meet acceptance criteria specified.
1. Acceptable methods include shotblasting, scarifying or grinding. Grinding is only acceptable in locations unreachable by shotblast or scarification equipment.

C. Acceptance Criteria:
   1. Surface profile of ICRI CSP 3 minimum, and greater as required by coating manufacturer in related sections, all in accordance with ICRI Technical Bulletin No. 03732.
   2. Tensile Strength of Concrete Surface: 200 psi minimum according to ASTM C1583 Test Method.
   3. Free of laitance, oil, grease, flooring adhesive, paint, and other surface contaminants capable of affecting bond of specified floor coatings and finishes to concrete substrate.

D. If floor develops areas of surface roughness greater than ICRI CSP-4 during preparation, apply patching/leveling compound in those areas and re-abrade to produce specified profile.

E. Repair surface irregularities after cleaning.
   1. Fill bugholes, spalls, cracks, deteriorated joints and other surface damage exposed or created as a result of substrate cleaning operations flush with adjacent surfaces to provide sound substrate for specified floor finish.

F. Dry broom or vacuum clean concrete substrates immediately before application of specified floor finishes in accordance with ASTM D 4258 to remove loose materials on substrate surface.

G. When field quality control report indicates portions are unsatisfactory, repeat process until field quality control report indicates there are no unsatisfactory portions remaining.
   1. Areas of insufficient strength shall be ground to remove weak materials and abrasively prepared again using appropriately modified methods. Retest these areas for tensile strength until compliance is determined.

3.04 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified testing and inspecting agency to perform the following field tests and inspections and prepare test reports:
   1. Visual inspection of completed substrate preparation to verify contamination is removed.
   2. Visual inspection of completed substrate preparation to verify surface profile matches ICRI profile required for specified coating or finish, using ICRI standard rubber mold for visual comparison.
   3. Test tensile strength of the concrete surface according to ASTM C1583 Test Method to verify tensile strength of 200 psi minimum.
   4. Prepare field quality control report. Clearly indicate the locations, extents, and conditions of areas where surface preparation does not conform to specified profile and cleanliness. Document observed conditions with digital photographs.
   5. Repeat inspections when additional surface preparation for unsatisfactory conditions indicated in the previous field quality control report is completed.

3.05 PROTECTION

A. Protect prepared concrete substrates from contamination. Reclean substrates that are contaminated by construction operations prior to installation of specified floor coatings or finishes.

END OF SECTION 09 0511

SECTION 09 0512

CONCRETE FLOOR MOISTURE CONTENT AND PH TESTING

PART 1 GENERAL

1.01 SUMMARY

A. Concrete moisture content testing using relative humidity method.

B. Concrete pH testing.

1.02 RELATED REQUIREMENTS

A. Pertinent section of Division 07 specifying water vapor emission control coating.

B. Pertinent section of Division 09 specifying concrete floor preparation.

C. Division 09 flooring sections specifiying flooring and accessories requiring moisture and pH testing.

1.03 REFERENCES

A. ASTM F2170-09 Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using in situ Probes.

B. California Code of Regulations, Title 24, Part 11 California Green Building Standards Code, “CAL-Green”.

C. California Code of Regulations, Title 24, Part 2, California Building Code (CBC), International Building Code with California Amendments.

1.04 ADMINISTRATIVE REQUIREMENTS

A. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Management and Coordination."

B. Scheduling: Schedule work to permit concrete moisture testing to be completed minimum one week and maximum 3 weeks before floor coverings are installed.

1.05 SUBMITTALS

A. Product Data:
   1. Submit data indicating model, manufacturer, and calibration record for relative humidity measuring equipment.
   2. Submit data for pH test material products.

B. Shop Drawings:
   1. Indicate test locations shown on building floor plan,

C. Informational Submittals:
   1. Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for concrete moisture acceptable limits. Report test results in chart form.
      a. Relative Humidity Test Method: Indicate test dates, time, depth of test well, in-situ temperature, relative humidity and pH levels.
      b. Submit record of ambient air temperature, ambient relative humidity, and floor slab surface temperature when test sites are prepared, start of test, and end of test.
      c. Indicate condition of building enclosure including position of operable windows and exterior doors when test sites are prepared, start of test, and end of test.
      d. Submit transcript of datalogger.

e. Indicate operational status of HVAC systems maintaining environmental condition of spaces where tests are conducted when test sites are prepared, start of test, and end of test.

1.06 FIELD CONDITIONS

A. Ambient Conditions:
1. Do not perform concrete moisture testing until building is enclosed and HVAC system is operational.
2. Maintain building test areas at design operating conditions for minimum 48 hours before, during, and continuously after conducting testing.
3. When HVAC system is not operational at start of tests, maintain ambient conditions within test areas at 65 to 85 degrees F and 40 to 60 percent relative humidity for minimum 48 hours before, during, and continuously after conducting testing until building HVAC system is capable of maintaining design operating conditions.

PART 2 PRODUCTS

2.01 RELATIVE HUMIDITY TEST EQUIPMENT

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Vaisala www.vaisala.com.
2. Wagner Moisture Meters, Rapid RH, www.wagnermeters.com.
3. Substitutions: Section 01 6000.

B. Humidity and Temperature Probe and Meter: Comply with ASTM F2170.

2.02 PH TEST MATERIALS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Micro Essential Laboratory www.microessentiallab.com.
2. Substitutions: Section 01 6000.

B. pH Test Paper: Capable of indicating minimum 7.0 to 13 pH range.

C. pH Color Gage: Furnish pH test paper manufacturer's visual color gage to identify measured pH.

D. Water: Distilled or de-ionized.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify new concrete floors have cured minimum 28 days.

3.02 PREPARATION

A. When a building HVAC system is not operational and maintaining test areas at design operational conditions, install recording hygrometer or data logger in each separate test area to record ambient temperature and relative humidity beginning 48 hours before start of tests until completion of tests within each area.

B. Identify three moisture test sites for first 1,000 sf and one moisture test site for each additional 1,000 sf of floor area receiving floor covering on each separate floor slab.
1. Uniformly distribute test site locations throughout each test area.

3.03 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified testing and inspecting agency to perform concrete moisture tests and inspections and prepare test reports.
   1. Test all concrete slabs (on grade and elevated) in accordance with ASTM F-2170, not more than 45 days prior to the installation of the finished flooring. Test all floors scheduled to receive adhered floor coverings, such as hardwood, wood athletic flooring, bamboo, carpet, resilient tile, resilient sheet goods, rubber, fluid-applied, cork tile, ceramic tile, cementititious and epoxy resin terrazzo, and porcelain tile.

B. Acceptance Criteria at HVAC Design Operating Conditions:
   1. Relative Humidity Test Result: 75 percent maximum relative humidity.
   2. pH Test Result: Within alkalinity range of 7.0 to 9.0.

C. Concrete Moisture Testing – General
   1. Conduct relative humidity test at each test site.
   2. Conduct one pH test at each test site.

D. Relative Humidity Testing:
   1. Perform tests in accordance with ASTM F2170.
   2. Conduct relative humidity testing at the following depths:
      a. Slabs-On-Grade: Measure temperature and relative humidity at 40 percent of slab thickness measured from top surface.
      b. Elevated Slabs: Measure temperature and relative humidity at 20 percent of slab thickness measured from top surface.
   3. Drill test hole at each test site to accommodate test sleeve.
      a. Hole Diameter: In accordance with test equipment manufacturer's instructions.
      b. Drilling Fluids: Not permitted.
   4. Vacuum dust and debris from test hole.
   5. Insert sleeve, to the full depth of test hole. Cap or plug sleeve to prevent test hole contamination.
   6. Permit the test site to acclimate for minimum 72 hours before measuring relative humidity.
   7. Remove sleeve plug and insert probe to bottom of test hole. Allow test probe to reach temperature equilibration with concrete slab.
   8. Measure and record temperature and relative humidity at the test site.
   9. Record and report results.

E. pH Testing:
   1. Place several drops of water onto the concrete surface to form a puddle approximately 1 inch in diameter.
   2. Allow the water to set for approximately 60 seconds
   3. After 60 seconds, dip the pH paper into the water and remove immediately, compare color to chart provided by paper supplier to determine pH reading.
   4. Record and report results.

3.04 PROTECTION

A. Protect tested concrete substrates from contamination. Reclean substrates that are contaminated by construction operations prior to installation of specified water vapor emission control coating, floor coatings or finishes.

END OF SECTION 09 0512

SECTION 09 2116
GYPSUM BOARD ASSEMBLIES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Metal channel ceiling framing.

B. Gypsum board furring systems.

C. Shaft wall system.

D. Gypsum sheathing.

E. Gypsum wallboard.

F. Joint treatment and accessories.

G. Textured finish system.

H. Trim and accessories.

1.02 RELATED REQUIREMENTS

A. Section 01 6116 - Volatile Organic Compound (VOC) Content Restrictions.

B. Section 07 2100 - Thermal Insulation.

C. Section 07 2500 - Weather Barriers: Water-resistive barrier over sheathing.

D. Section 07 8400 - Firestopping: Top-of-wall assemblies at fire rated walls, sealing penetrations in rated assemblies.

E. Division 09: Pertinent sections specifying finishes installed over gypsum board substrates.

F. Section 09 9123 - Interior Painting.

G. Pertinent sections specifying facility services items penetrating gypsum board.

1.03 REFERENCE STANDARDS

A. ANSI A108.11 - American National Standard Specifications for Interior Installation of Cementitious Backer Units.

B. ANSI A118.9 - American National Standard Specifications for Test Methods and Specifications for Cementitious Backer Units.

C. ASTM C475/C475M - Standard Specification for Joint Compound and Joint Tape for Finishing Gypsum Board.

D. ASTM C557 - Standard Specification for Adhesives for Fastening Gypsum Wallboard to Wood Framing.

E. ASTM C 635, Standard Specifications for Metal Suspension Systems.

F. ASTM C 636, Recommended Practice for Installation of Metal Suspension Systems.

G. ASTM C645 - Standard Specification for Nonstructural Steel Framing Members.

H. ASTM C754 - Standard Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products.

I. ASTM C840 - Standard Specification for Application and Finishing of Gypsum Board.

J. 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.

K. ASTM C1002 - Standard Specification for Steel Self-Piercing Tapping Screws for Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs.

L. ASTM C1047 - Standard Specification for Accessories For Gypsum Wallboard and Gypsum Veneer Base.

M. ASTM C1177/C1177M - Standard Specification for Glass Mat Gypsum Substrate for Use as Sheathing.

N. ASTM C1178/C1178M - Standard Specification for Coated Glass Mat Water-Resistant Gypsum Backing Panel.

O. ASTM C1280 - Standard Specification for Application of Gypsum Sheathing Board.

P. ASTM C1325 - Specification for Non-Asbestos Fiber-Mat Reinforced Cementitious Backer Units.

Q. ASTM C1396/C1396M - Standard Specification for Gypsum Board.

R. ASTM C1629/C1629M - Standard Classification for Abuse-Resistant Nondecorated Interior Gypsum Panel Products and Fiber-Reinforced Cement Panels.

S. ASTM C1658/C1658M - Standard Specification for Glass Mat Gypsum Panels.

T. ASTM D3273 - Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber.

U. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.

V. ASTM E 119 - Standard Test Methods for Fire Tests of Building Construction and Materials.

W. ASTM E413 - Classification for Rating Sound Insulation.

X. ASTM G21 - Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi.

Y. CISCA Ceiling Systems Installation Handbook.

Z. California Code of Regulations, Title 24, Part 2, California Building Code (CBC), International Building Code.

AA. California Code of Regulations, Title 24, Part 11, California Green Building Standards Code, “CAL-Green”.

AB. Division of the State Architect (DSA) Interpretation of Regulations: IR 25-3, Drywall Ceiling Suspension Conventional Construction One-Layer.

AC. GA-214 - Recommended Levels of Gypsum Board Finish; Gypsum Association

AD. GA-216 - Application and Finishing of Gypsum Board.

AE. GA-226 - Application of Gypsum Board to Form Curved Surfaces; Gypsum Association.

AF. California Building Code,Title 24, Part 2, California Building Code, Chapter 8.

1.04 SUBMITTALS

A. See Section 01 3300 - Submittals, for submittal procedures.

B. Provide complete submittals at the same time as submittals for work in related sections to permit review of complete and integrated systems and assemblies.

C. Shop Drawings: Indicate special details associated with fireproofing and metal suspension systems.
   1. Reflected ceiling plans: Submit ceiling suspension system layout indicating dimensions, lighting fixture locations, and related mechanical components.
   2. Assembly drawings: Indicate installation details, accessory attachments and installation of related lighting fixtures and related mechanical system components.
   3. System details: Submit manufacturer's catalogue cuts or standard drawing showing details of system with project conditions clearly identified and manufacturer's recommended installation instructions.

D. Product Data: For each type of product indicated, demonstrate compliance with specified attributes.

E. Product Data: Provide data on metal framing, gypsum board, accessories, and tackboard.

F. CAL-GREEN Submittals: Product Data – VOC Limits: For adhesives sealants, fillers, primers and coatings, documentation including printed statement of VOC contents, comply with limits specified in related section.

G. Samples: Submit two samples of gypsum board finished with proposed texture application, 12 by 12 inches in size, illustrating finish color and texture.

H. Two samples 8 x 10 inch in size of tack board substrate, with manufacturer's labeling attached.

1.05 QUALITY ASSURANCE

A. Perform in accordance with ASTM C 840. Comply with requirements of GA-600 for fire-rated assemblies.
   1. Maintain one copy of standards at project site.

B. Installer Qualifications: Company specializing in performing gypsum board installation and finishing, with minimum five years of experience.

1.06 REGULATORY REQUIREMENTS

A. Conform to applicable code for fire rated assemblies as indicated on drawings.

1.07 PROJECT CONDITIONS

A. Suspended Ceiling Systems - General: Coordinate with other work supported by or penetrating through the ceiling, including mechanical and electrical work and partition systems.
   1. Mechanical work: Ductwork and piping above system shall be complete, and permanent HVAC systems operating.
   2. Electrical Work: Installation of conduit above suspension system shall be complete before installation of suspension system.

PART 2 PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

A. VOC Limits for adhesives, sealants, fillers, primers and coatings . Comply with limits specified in related section.

2.02 BOARD MATERIALS

A. Manufacturers - Gypsum-Based Board:
   1. Georgia-Pacific Gypsum: www.gpgypsum.com.
   2. National Gypsum Company: www.nationalgypsum.com.
   3. PABCO Gypsum: www.pabcogypsum.com.
   4. USG Corporation: www.usg.com.
   5. Substitutions: See Section 01 6000 - Product Requirements.

B. Gypsum Wallboard: Paper-faced gypsum panels as defined in ASTM C1396/C1396M; sizes to minimize joints in place; ends square cut.
   1. Application: Use for vertical surfaces and ceilings, unless otherwise indicated.
   2. Glass mat faced gypsum panels as defined in ASTM C1658/C1658M, suitable for paint finish, of the same core type and thickness may be substituted for paper-faced board.
   3. Mold Resistance: Score of 10, when tested in accordance with ASTM D3273.
      a. Mold resistant board is required at all locations.
   4. At Assemblies Indicated with Fire-Rating: Use type required by indicated tested assembly; if no tested assembly is indicated, use Type X board, UL or WH listed.
   5. Thickness:
      a. Vertical Surfaces: 5/8 inch.
      b. Ceilings: 5/8 inch.
      c. Multi-Layer Assemblies: Thicknesses as indicated on drawings.
   6. Mold Resistant Paper Faced Products:
      a. Georgia-Pacific Gypsum; ToughRock Fireguard X Mold-Guard.
      b. National Gypsum Company; Gold Bond XP Gypsum Board.
      c. Substitutions: See Section 01 6000 - Product Requirements.
   7. Glass Mat Faced Products:
      a. Georgia-Pacific Gypsum; DensArmor Plus Fireguard C.
      b. National Gypsum Company; Gold Bond eXP Fire-Shield Interior Extreme Gypsum Panel.
      c. Substitutions: See Section 01 6000 - Product Requirements.

C. Impact Resistant Wallboard:
   1. Application: High-traffic areas indicated.
   2. Indentation: Level 1, minimum, when tested in accordance with ASTM C1629/C1629M.
   3. Soft Body Impact: Level 3, minimum, when tested in accordance with ASTM C1629/C1629M.
   4. Hard Body Impact: Level 2, minimum, when tested in accordance with ASTM C1629/C1629M.
   5. Mold Resistance: Score of 10, when tested in accordance with ASTM D3273.
   6. Paper-Faced Type: Gypsum wallboard as defined in ASTM C1396/C1396M.
   7. Type: Fire resistance rated Type X, UL or WH listed.
   8. Thickness: 5/8 inch.
   9. Edges: Tapered.
   10. Glass Mat Faced Products:
      a. Georgia-Pacific Gypsum; DensArmor Plus Impact-Resistant.
      b. National Gypsum Company; Gold Bond eXP Interior Extreme IR Gypsum Panel.
      c. Substitutions: See Section 01 6000 - Product Requirements.

D. Backing Board For Wet Areas:
   1. Application: Surfaces behind tile in wet areas including tub and shower surrounds and shower ceilings.
   2. Mold Resistance: Score of 10, when tested in accordance with ASTM D3273.

3. 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.
   a. Thickness: 1/2 inch.
   b. Products:
      1) Custom Building Products: www.custombuildingproducts.com/#sle.
      2) National Gypsum Company; PermaBase Cement Board: www.nationalgypsum.com/#sle.
      3) USG Corporation: www.usg.com/#sle.
4. Glass Mat Faced Board: Coated glass mat water-resistant gypsum backing panel as defined in ASTM C1178/C1178M.
   a. Fire Resistant Type: Type X core, thickness 5/8 inch.
   b. Products:
      1) Georgia-Pacific Gypsum; DensShield Tile Backer.
      2) Substitutions: See Section 01 6000 - Product Requirements.

E. Moisture-Resistant Gypsum Backing Board: ASTM C1396/C1396M; ends square cut. Fire-rated Type X where occurring in designated rated assemblies.
   1. Thickness: 5/8 inch.
   2. Edges: tapered.

F. Exterior Sheathing Board: Sizes to minimize joints in place; ends square cut.
   1. Application: Exterior sheathing, and inside faces (roof side) of parapet walls.
   2. Mold Resistance: Score of 10, when tested in accordance with ASTM D3273.
   3. Fungal Resistance: No fungal growth when tested in accordance with ASTM G21.
   4. Glass Mat Faced Sheathing: Glass mat faced gypsum substrate as defined in ASTM C1177/C1177M.
   5. At Assemblies Indicated with Fire-Rating: Use type required by indicated tested assembly; if no tested assembly is indicated, use Type X board, UL or WH listed.
   6. Core Type: Type X.
   7. Type X Thickness: 5/8 inch.
   8. Edges: Square.
   9. Glass Mat Faced Products:
      a. Georgia-Pacific Gypsum; DensGlass Fireguard Sheathing.
      b. National Gypsum Company; Gold Bond eXP Sheathing.
      c. Substitutions: See Section 01 6000 - Product Requirements.

2.03 Gypsum Wallboard ACCESSORIES

A. Acoustic Insulation: Acoustic fiberglass batt type specified in Section 07 2100. Thickness as shown on drawings or as specifically noted; Provide to fill framing cavity depth otherwise.

B. Acoustic Sealant: Acrylic emulsion latex or water-based elastomeric sealant; do not use solvent-based non-curing butyl sealant.
   1. Products:
      a. Franklin International, Inc; Titebond GREENchoice Professional Acoustical Smoke and Sound Sealant: www.titebond.com/#sle.
      b. Liquid Nails, a brand of PPG Architectural Coatings; AS-825 Acoustical Sound Sealant: www.liquidnails.com/#sle.
      c. Specified Technologies Inc; Smoke N Sound Acoustical Sealant: www.stifirestop.com/#sle.
      d. Substitutions: See Section 01 6000 - Product Requirements.

C. Board Insulation in furring cavities: Rigid polyisocyanurate, type specified in Section 07 2100.

D. Water-Resistive Barrier: As specified in Section 07 2500.

E. Finishing Accessories: ASTM C1047, galvanized steel or rolled zinc, unless otherwise indicated. Mechanically fastened.
   1. Types: As detailed or required for finished appearance.
   2. Special Shapes: In addition to conventional cornerbead and control joints, provide U-bead at exposed panel edges.

F. Beads, Joint Accessories, and Other Trim: ASTM C1047, rigid plastic, galvanized steel, or rolled zinc, unless noted otherwise.
   1. Corner Beads: Low profile, for 90 degree outside corners.
      a. Products:
         1) CertainTeed Corporation; No-Coat Drywall Corner: www.certainteed.com/#sle.
         2) ClarkDietrich; Strait-Flex Big-Stick: www.clarkdietrich.com/#sle.
         3) Phillips Manufacturing Co; Everlast Corner Bead: www.phillipsmfg.com/#sle.
         4) Substitutions: See Section 01 6000 - Product Requirements.
   2. Corner Beads: Low profile, for archways.
      a. Products:
         1) ClarkDietrich; Strait-Flex Arch-Stick: www.clarkdietrich.com/#sle.
   3. Expansion Joints:
      a. Type: V-shaped metal with factory-installed protective tape.

G. Decorative Metal Trim:
   1. Material: Extruded aluminum alloy 6063-T5 temper.
   2. Finish: Anodized, clear.
   3. Type: Profile as selected from manufacturer's standard range.
   4. Corner Trim: As indicated.
   5. Reveal Trim: Fry DA.1; Width and Depth as indicated on Drawings, minimum 1/2 inch by 1/2 inch. If no dimensions are shown, request dimensions from Architect.
   6. Products:
      a. Fry Reglet Corporation.
      b. Substitutions: See Section 01 6000 - Product Requirements.

H. Joint Materials: ASTM C 475 and as recommended by gypsum board manufacturer for project conditions. Water resistant where used with water resistant backer board.
   1. Tape: 2 inch wide, creased paper tape for joints and corners, USG "Perf-A-Tape", or equal.
   2. Joint Compound: Drying type, vinyl-based, ready-mixed.

I. Finishing Compound: Surface coat and primer, takes the place of skim coating.

J. High Build Drywall Surfacer: Vinyl acrylic latex-based coating for spray application, designed to take the place of skim coating and separate paint primer in achieving Level 5 finish.

K. Screws for Fastening of Gypsum Panel Products to Cold-Formed Steel Studs Less than 0.033 inch in Thickness and Wood Members: ASTM C1002; self-piercing tapping screws, corrosion resistant.

L. Screws for Fastening of Gypsum Panel Products to Steel Members from 0.033 to 0.112 inch in Thickness: ASTM C954; steel drill screws, corrosion resistant.

M. Anchorage to Substrate: Tie wire, nails, screws, and other metal supports, of type and size to suit application; to rigidly secure materials in place.

N. Adhesives
   1. Modified contact adhesive: As recommended by the gypsum board manufacturer and having a placement time before setting of at least 15 minutes.
   2. Joint compound adhesive: As recommended by the gypsum board manufacturer.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that project conditions are appropriate for work of this section to commence.

B. Verify that framed substrates demonstrate flatness characteristics such that work of this section will meet specified tolerances.

3.02 INSTALLATION - GENERAL

A. Install materials in accordance with gypsum board application and finishing standards referenced.
   1. Single layer application: Screw attachment.
   2. Float interior angles, except where required to conform to fire or acoustical separation requirements.
   3. Do not install scored, scratched, broken, damp, or otherwise damaged boards.
   4. Smooth cut edges and ends to obtain neat fitting joints.

3.03 ACOUSTIC ACCESSORIES INSTALLATION

A. Acoustic Insulation: Place tightly within spaces, around cut openings, behind and around electrical and mechanical items within partitions, and tight to items passing through partitions.

B. Acoustic Sealant: Install in accordance with manufacturer's instructions.
   1. Place one bead continuously on substrate before installation of perimeter framing members.
   2. Place continuous bead at perimeter of each layer of gypsum board.
   3. Seal around all penetrations by conduit, pipe, ducts, and rough-in boxes, except where firestopping is provided.

3.04 BOARD INSTALLATION

A. Comply with ASTM C840, GA-216, and manufacturer's instructions. Install to minimize butt end joints, especially in highly visible locations.

B. Single-Layer Non-Rated: Install gypsum board in most economical direction, with ends and edges occurring over firm bearing.

C. Double-Layer Non-Rated: Use gypsum board for first layer, placed parallel to framing or furring members, with ends and edges occurring over firm bearing. Use glass mat faced gypsum board at exterior walls and at other locations as indicated. Place second layer perpendicular to framing or furring members. Offset joints of second layer from joints of first layer.

D. Fire-Rated Construction: Install gypsum board in strict compliance with requirements of assembly listing.

E. Exposed Gypsum Board in Interior Wet Areas: Seal joints, cut edges, and holes with water-resistant sealant.

F. Impact Resistant Gypsum Board: Install as for gypsum board. Do not install over faced insulation or other vapor-retarders.

G. Exterior Sheathing: Comply with ASTM C1280. Install sheathing vertically, with edges butted tight and ends occurring over firm bearing.
   1. Seal joints, cut edges, and holes with water-resistant sealant.

H. Cementitious Backing Board: Install over steel framing members and plywood substrate where indicated, in accordance with ANSI A108.11 and manufacturer's instructions.

I. Installation on Metal Framing: Use screws for attachment of gypsum board except face layer of non-rated double-layer assemblies, which may be installed by means of adhesive lamination.

J. Installation on Wood Framing: For rated assemblies, comply with requirements of listing authority. For non-rated assemblies, install as follows:
   1. Single-Layer Applications: Screw attachment.
   2. Double-Layer Applications: Install base layer using screws. Install face layer by screws.

K. Curved Surfaces: Apply gypsum board to curved substrates in accordance with GA-226.

L. Moisture Protection: Treat cut edges and holes in moisture resistant gypsum board with sealant.

3.05 INSTALLATION OF TRIM AND ACCESSORIES

A. Control Joints: Place control joints consistent with lines of building spaces and as directed.

B. Corner Beads: Install at external corners, using longest practical lengths.

C. Edge Trim: Install at locations where gypsum board abuts dissimilar materials.

D. Decorative Trim: Install at locations shown on drawings and in accordance with manufacturer's instructions.

3.06 JOINT TREATMENT

A. Glass Mat Faced Gypsum Board and Exterior Glass Mat Faced Sheathing: Use fiberglass joint tape, embed and finish with setting type joint compound.

B. Finish gypsum board in accordance with levels defined in ASTM C 840, and required by Section 09 9000 Painting and Coating, as follows:
   1. Level 5: Corridor walls to receive eggshell paint finish.
   2. Level 5: Walls and ceilings to receive semi-gloss or gloss paint finish and other areas specifically indicated.
   3. Level 4: Walls and ceilings to receive paint finish or wall coverings, unless otherwise indicated.
   4. Level 3: Walls to receive textured wall finish.
   5. Level 3: Ceilings to receive glued on acoustical ceiling tiles.
   6. Level 2: Behind cabinetry and on backing board to receive tile finish.
   7. Level 1: Fire rated wall areas above finished ceilings, whether or not accessible in the completed construction.

C. Tape, fill, and sand exposed joints, edges, and corners to produce smooth surface ready to receive finishes.
   1. Feather coats of joint compound so that camber is maximum 1/32 inch.

D. Where Level 5 finish is indicated, spray apply high build drywall surfacer over entire surface after joints have been properly treated; achieve a flat and tool mark-free finish.

3.07 TEXTURE FINISH

A. Apply finish texture coating by means of spraying apparatus in accordance with manufacturer's instructions and to match approved sample.

B. Texture Required: .
   1. Finish Texture: Medium Orange Peel at walls and ceiling unless otherwise noted.
   2. No finish texture at Level 5 joint treatment walls and ceilings as noted.

3.08 TOLERANCES

A. Maximum Variation of Finished Gypsum Board, Tack Board, or Cementitious Board Surface from True Flatness: 1/8 inch in 10 feet in any direction.

END OF SECTION 09 2116

SECTION 09 2513

ACRYLIC-MODIFIED PORTLAND CEMENT PLASTER

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Acrylic-Modified Portland cement plaster assemblies for installation over metal lath.
   1. Over framed substrates.

1.02 RELATED SECTIONS

A. Pertinent Sections specifying Volatile Organic Compound (VOC) Content Restrictions.

B. Sections specifying structural support framing for plaster.

C. Section 07 6200 - Sheet Metal Flashing and Trim.

D. Section 07 9200 - Joint Sealers.

E. Sections specifying work penetrating plaster assemblies.

1.03 REFERENCES

A. California Building Code (CBC) Title 24, Part 2, Chapter 25 and DSA IR 25-4.

B. California Code of Regulations, Title 24, Part 11 California Green Building Standards Code, "CAL-Green".

C. ASTM C 847 - Standard Specification for Metal Lath.

D. ASTM C 926 - Standard Specification for Application of Portland Cement-Based Plaster.

E. ASTM C 1032 - Standard Specification for Woven Wire Lath

F. ASTM C1063 - Standard Specification for Installation of Lathing and Furring to Receive Interior and Exterior Portland Cement-Based Plaster.

G. Manufacturer's specifications and recommendations.

1.04 SUBMITTALS

A. See Section 01 3300 - Submittals, for submittals procedures.

B. Product Data: Provide data on plaster materials, characteristics and limitations of products specified. Include mix design for each coat. Demonstrate compliance with specified requirements.

C. CAL-GREEN VOC Submittals: For adhesives sealants, fillers, coatings and primers, documentation including printed statement of VOC contents, comply with limits specified in related section.

D. Samples: Submit two samples, 12 x 12 inch in size illustrating finish color and texture. Provide color samples of sealants. Provide physical samples of each type of fastener and anchorage.

E. Shop Drawings:
   1. Location, installation and pattern, fully dimensioned, of all control joints, expansion joints, embedments, inserts, penetrations and all other items that will visually affect the plaster surface for all visible portions of the plaster surfaces.
   2. Shop drawings shall be to scale and depict all visible surfaces.
   3. Include plans, elevations, sections, details of components, and attachments to other work.

4. Location of all elements and joints is subject to approval of the Architect.

F. Installer's Qualification statement.

G. Warranties: Special warranties specified in this Section.

1.05 QUALITY ASSURANCE

A. Perform Work in accordance with ASTM C 926.

B. Regulatory requirements: All plaster work shall be performed in accordance with requirements of California Building Code (CBC) Title 24, Part 2, Chapter 25, ASTM C1063 and DSA IR 25-4.

C. Fire-Resistance Ratings: Where fire resistance ratings are indicated on the drawings, provide portland cement plaster assemblies identical to those of assemblies tested for fire resistance per ASTM E 119 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
1. Conform to California Building code for fire rated assemblies as indicated on drawings.
2. Coordinate components of fire rated assemblies with materials specified for support of plaster in other sections.

D. Sound-Transmission Characteristics: Where indicated, provide portland cement plaster assemblies identical to those of assemblies tested for STC ratings per ASTM E 90 and classified according to ASTM E 413 by a qualified testing agency.

E. Manufacturer Qualifications: Company specializing in manufacturing the products of this section with minimum five years of documented experience.

F. Installer Qualifications: Installer shall be listed with Acrylic-Modified Portland Cement Plaster Systems Manufacturer as a trained contractor and shall possess a current Manufacturer-trained contractor certificate.

1.06 MOCK-UP

A. Construct mock-up of exterior wall, 8 feet long by 8 feet wide, illustrating surface finish.
1. Locate where directed.
2. Mock-up may remain as part of the Work.

B. Mockups: Build mockups to demonstrate aesthetic effects and set quality standards for materials and execution.
1. Within 120 days of mobilization, provide minimum 4’-0” x 12’-0” x 8’-0” tall onsite mock up, including field area, outside corner, full window opening (with window, head and jamb trim and sill), and representative examples of other design conditions for review and approval by Architect prior to commencing actual work.
   a. Demonstrate the proposed range of color, texture and workmanship to be expected in the completed work, including Specialty Finishes where indicated.
   b. Include through-wall flashing installed for a 24-inch length in corner of mockup approximately 16 inches down from top of mockup, with a 12-inch length of flashing left exposed to view (omit finish above half of flashing).
   c. Include framing studs, sheathing, flashing in exterior wall mockup.
   d. Show a cut-away in the panel exposing the water-resistive barriers, metal lath and drainage weep of the system on a perimeter edge of the panel.
   e. Install plaster over the top of the mockup to duplicate the project plaster parapet, including waterproofing material and parapet cap.
   f. Include foundation weep screed, corner trim, vertical expansion joint and horizontal control joint.

g. Include a sealant-filled joint at least 48 inches long in mockup.
h. Construct additional panels until finish, color and consistency is approved by Architect.

2. Obtain Architect's acceptance of visual qualities of the sample panel. Approval of mockups is for color, texture, tooling of joints; and aesthetic qualities of workmanship.
   a. Approval of mockups is also for other material and construction qualities Architect specifically approves in writing , including required tests of installed windows, as described in related Sections specifying Windows and Curtain Wall.
   b. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
3. Mock up or portions of mockup may require more than one iteration and shall be erected in a long term location near the building.
4. Approved mockup will become the standard for comparison for Architect's judging aesthetic qualities of the finished work.
5. Maintain and protect mockup throughout the construction process and dispose of when project is completed.

1.07 FIELD CONDITIONS

A. Do not apply plaster when substrate or ambient air temperature is outside the manufacturer's recommended ranges.

B. Maintain manufacturer's recommended minimum ambient temperature during installation of plaster and until cured.

C. Application of materials shall not take place during inclement weather unless appropriate protection is provided. Protect materials from inclement weather.

D. Load roofing materials onto the roof and stock interior gypsum wallboard in the building prior to the installation of cement plaster.

E. Protect the materials from uneven and excessive evaporation in warm windy weather. Always work the shady side of the wall.

1.08 WARRANTY

A. Warranty: Standard form in which manufacturer agrees to repair or replace plaster system finishes that fail in materials or workmanship within specified warranty period.
   1. Failures include, but are not limited to, the following:
      a. Manufacturing defects.
      b. Structural failures including cracking in excess of 3/32 -inch or by PCA standards.
      c. Shrinkage.
      d. Finish coat color fading.
      e. Failure of system to resist penetration of water.
      f. Failure of system to resist damage from wind.
      g. Hairline cracking due to temperature or shrinkage is not considered structural failure.
   2. Single Source System Warranty Period: 15 years from date of Substantial Completion covering base coats, lamina, primer and 100% acrylic or elastomeric finish.

B. Assist the Owner to properly execute the warranty request forms.

PART 2 PRODUCTS

2.01 SYSTEM DESCRIPTION

A. VOC Limits for adhesives sealants, fillers and primers. Comply with limits specified in related section.

B. Design Requirements:
1. Extend complete plaster assembly behind surface installed fixtures and trim.
2. Two layers of backing paper beneath lath at all locations.

C. Provide Products exhibiting the following characteristics when tested as follows:
1. ASTM C 109: Compressive Strength: 13.9 Mpa (2020 psi)
2. ASTM C 348: Flexural Strength: 3.0 Mpa (570 psi)
3. ASTM C 190: Tensile Strength: 1.2 Mpa(180 psi)
4. ICBO Procedure: Freeze/Thaw cycling: No cracking, checking or delamination
5. ASTM E 514: Water Vapor Permeability: 415 ng/ (7.2 Perms)
6. ASTM E 72: Transverse Load Strength: Wood Studs - 468.7 kg. m2 (96 psf) Metal Studs -673.8 kg/ m2 (138 psf)
7. ASTM E 119: Fire Resistive Wall Assembly, acceptable as part of One-Hour Assembly.
8. MIL STD 810B: Mildew Fungus Resistance -Passed
9. ASTM B 117: Salt Spray Resistance - 300 hrs, no deleterious effects.
10. ASTM D 968: Abrasion Resistance - 500 L(132 gal), no deleterious effects.
11. ASTM G 53: Accelerated Weathering - 5000 hrs, Passed.

D. Expansion Control: Design orientation, and location of expansion and control joints shall be determined by the Architect and as shown on the drawings. If joints are required by the following criteria and are not shown on the drawings, recommend joint locations on Shop Drawings for the Architect's approval. Do not modify aesthetic effect of joint locations shown on drawings or provide joints not shown on drawings without Architect's written approval.
1. Expansion Joints: Required at the following locations:
a. Where expansion joints occur in the substrate system.
b. Where building expansion joints occur.
c. At floor lines.
d. Where plaster abuts dissimilar materials.
e. Where the substrate material changes.
f. Where significant structural movement occurs such as changes in roofline, building shape or structural system.
2. Control joints: Horizontal and Vertical, required in accordance with ASTM C 1063 and as indicated on the contract drawings in the following locations:
a. Corners of openings
b. Such that monolithic wall areas do not exceed 144 ft2.
c. Length to width ratios of wall areas shall not exceed 2.5:1.
d. Maximum spacing of control joints shall not exceed 18 ft.
e. At intersections of natural breaks in walls and above opening jambs.

E. Performance Requirements:
1. Finish surfaces flat, true, and plumb to plus or minus 1/4-inch in 10 feet.
2. Provide weather tight assembly.

2.02 MANUFACTURER

A. Source Limitations: All components of the Acrylic-Modified Plaster System shall be provided from a single manufacturer.

B. Provide factory-mixed plaster. Job-site mixed plaster is not acceptable.
   1. Provide ready-mixed products in minimum 90 lb. sacks, supersacks or in pre-mixed silos.

C. Basis of Design Products:
   1. BMI 690 Plaster with 100 % Acrylic Primer & Finish, manufactured by BMI Products, 990 Ames Avenue, Milpitas, CA 95035-6303, (408) 293-4008, www.bmi-products.com.
      a. ICC-ES Report ESR 2535.

D. Acceptable Alternate:
   1. Dryvit CCP with TAFS (Textured Acrylic Finishes).

E. Substitutions: See Section 01 6000.

2.03 PLASTER MATERIALS

A. Plaster Base Coat: "BMI 690 Plaster": A premium pre-blended cement-lime-sand mixture with fiber that has been specially formulated for the scratch and brown coat. This pre-blended product assures consistent quality throughout the project.

B. Polymer-Modified Base Coat: Apply in thin layer over Brown Coat as Lamina/Leveling Coat to embed reinforcing lamina and mesh and provide uniform substrate for finish application.
   1. BMI 777 base coat, fiber-reinforced, high-performance polymer modified dry cementitious base coat specifically formulated for use in embedding mesh. Mix with water per instructions.

C. Reinforcing Mesh: "Standard Reinforcing Mesh": Open-weave fiberglass mesh with integral treatment for related materials compatibility. Manufacturer's standard products in 4.5 oz and 6.0 oz./ sq. yd. as appropriate for application.

D. Primer: 100% acrylic color primer; Water-based, pigmented acrylic primer applied over the cured plaster base coat to improve adhesion and provide more uniform finish appearance.
   1. BMI 100 Acrylic Primer.

E. Textured Finish: 100% acrylic finish with integral color and texture.
   1. BMI 400 Medium Finish, "Sandblast" medium texture. Color as selected by Architect from full range of available choices.

2.04 WEATHER-RESISTIVE BARRIER AND BACKING PAPERS

A. Plaster Backing Papers: Type(s) specified in related Section 07 2500.

B. Flexible Flashing: Type specified in related Section 07 2500.

C. Sheet Metal Flashing: Type specified in related Section 07 6200.

2.05 METAL LATH

A. Lath:
   1. Sheathed Framed Walls: Metal Lath conforming to CBC Chapter 25, ASTM C847, ASTM C1032 and ASTM C1063, un-backed, for installation over two continuous layers of building paper as required by code.
      a. Metal Lath: Self-Furred Diamond Mesh Metal Lath (grooved), ASTM C 847 with ASTM A 653/A 653M, G60 (Z180), hot-dip galvanized zinc coating, 2.5 lbs/sq.yd. as manufactured by CEMCO, www.cemcosteel.com.
      b. Welded Wire Lath: 1.14 lbs/sq.yd., galvanized steel, "Structalath, No.17, SF CR Twin trac" (ICC ESR-2017) as manufactured by Structa Wire Lath, www.structawire.com.
      c. Woven Wire Fabric lath: ASTM C1032, 1-1/2 inch opening, 17 gauge, self-furring with stiffener wire, un-backed.

2. Framed horizontal soffits:
   a. Flat Rib Expanded metal lath, ASTM C847 with ASTM A 653/A 653M, G60 (Z180), hot-dip galvanized zinc coating: 3.4 lbs./sq. yd., galvanized steel, 3/8 inch rib as manufactured by CEMCO.
   b. Welded wire lath: 2.2lbs./sq.yd., galvanized steel, paper backed "V Truss Wall & Ceiling - Rib lath" (ICC ESR-2017) as manufactured by Structa Wire Lath, www.structawire.com.

B. Lath Anchorage: Nails, or other metal supports conforming to requirements of referenced standards, of type and size to suit application and conforming to requirements of CBC Chapter 25 for conditions indicated, galvanized, to rigidly secure lath and associated metal accessories in place.
   1. Install metal lath on sheathed framed walls using only specified fasteners. Staples are not permitted for lath attachment on walls.
   2. Install expanded metal lath on framed horizontal soffits using specified fasteners, hook staples and j-nails as detailed on the Drawings. Staples may be provided only where specifically detailed on the Drawings.

2.06 LATH ACCESSORIES

A. General: PVC, in shapes and profile indicated, unless otherwise specified. If specific shape shown or required is not available in PVC, provide shape in zinc alloy.

B. Manufacturers:
   1. Alabama Metal Industries Corporation (AMICO); a Gibraltar Industries company.
   2. CEMCO.
   3. Clark Western Building Systems.
   4. Stockton Products, www.stocktonproducts.com.
   5. Substitutions: Section 01 6000.

C. Reinforcement
   1. Interior Corners: CEMCO, No. 30 Corner Expansion Joint.
   2. Exterior Corners: CEMCO No. 1A Expanded Corner Bead.

D. Expansion and Control Joints
   1. Vertical Joints
      a. Control Joints: CEMCO No.XJ-15; Size as noted on Drawings.
      b. Expansion Joints: CEMCO No. 40; Size as noted on Drawings.
   2. Horizontal Control Joints: CEMCO No. 15; Size as noted on Drawings.
   3. Two-Piece Expansion Joints (story drift): Fabricated from zinc or zinc-coated (galvanized) steel; formed to produce slip-joint and square-edged reveal that is adjustable from 1/4 –inch to 5/8 -inch wide; with perforated flanges. Fabricate with 3 -inch minimum vertical legs.
   4. Diagonal Joints: Type as noted on Drawings.

E. Extruded Aluminum Accessories: Provide components fabricated from 6063-T5 aluminum alloy and temper. Provide metal reveals, drip screeds, and other shapes and sizes as indicated on the Drawings, in sizes required for plaster thickness.
   1. Manufacturer:
      a. Fry Reglet Corporation; www.fryreglet.com.
      b. Substitutions: Section 01 6000. Acceptance is subject to compliance with specified design criteria, as evidenced by submittal of specified product data.
   2. Narrow V-screeds for horizontal soffits: Profiles as indicated on the Drawings.
   3. Stress Relief for Expansion and Control Joints: WLPDIA Detail 40 stress relief control joints, as dimensioned on the Drawings.

4. Expansion screeds shall be 2-piece split plaster channel type equal to Fry Reglet PCS-75-25 2-PC.
   a. Expansion screeds and vent screeds: Provide with nonstaining strippable tape or other suitable protective material to prevent plugging of perforations.
5. Provide factory fabricated channel screed connector clips for alignment of intersections and splices.
6. Clear Anodized Finish: Architectural 200R1 medium etch (AA-M32c10A21), clear color.

2.07 MISCELLANEOUS MATERIALS

A. Water for Mixing: Potable and free of substances capable of affecting plaster set or of damaging plaster, lath, or accessories.

B. Base Coat Fiber Reinforcing: Propex Concrete Systems, www.fibermesh.com, "Fibercast 500®"; 100% virgin polypropylene, fibers containing no reprocessed olefin materials and specifically manufactured for use as cementitious micro-reinforcement; ASTM C 1116, Type III 4.1.3, performance level 1. and ACI 524R-93. Detergent admixtures or clay to aid in pumping plaster will not be permitted.

C. Crack Limitation Membrane: Resin coated, open weave, glass fiber mesh treated for compatibility with base coat material; weight: 4.5 oz./square yard minimum weight.

D. Bonding Compound: ASTM C 932.

E. Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, not less than 0.0475 -inch (1.21-mm) diameter, unless otherwise indicated.

2.08 SEALANT

A. Single-Component, Nonsag, Neutral-Curing Silicone Joint Sealant: ASTM C 920, Type S, Grade NS, Class 100/50, for Use NT, complying with requirements of related Section 07 9200. Type as recommended by wall finish manufacturer for conditions indicated, and as required to maintain single-source warranty continuity.
   1. Color: As selected by Architect from manufacturer's standards.

2.09 PLASTER MIXES

A. General: Comply with ASTM C 926 for applications indicated.

B. Base Coat: BMI 690 basecoat, is a pre-blended product and therefore can be mixed in a continuous mixer or a mechanical plaster mixer.

C. Mix per manufacturer instructions for three minutes, but never more than five minutes, Do NOT over mix.

D. Traditional application or scratch and brown coat, double back method of application, or single pass of basecoats 3/4 inch - 7/8 inch in thickness is acceptable based on BMI Products ICC-ES Report ESR 2535.

E. Protect mixtures from freezing, frost, contamination, and excessive evaporation.

F. Do not retemper mixes after initial set has occurred.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine substrates and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

C. Framed Substrates: Verify that sheathing, weather barriers, continuous insulation, building papers and flashings specified in related sections are complete and ready to receive work of this section.

D. Mechanical and Electrical: Verify services within walls have been tested and accepted.

3.02 PREPARATION

A. Protect adjacent work from soiling, spattering, moisture deterioration, and other harmful effects caused by plastering.

B. Prepare smooth, solid substrates for plaster according to ASTM C 926.

3.03 INSTALLATION, GENERAL

A. Fire-Resistance-Rated Assemblies: Install components according to requirements for design designations from listing organization and publication indicated on Drawings.

3.04 LATHING

A. Metal Lath: Install according to ASTM C 1063 and as detailed on the Drawings. Fasten securely in place.

B. General: Comply with CBC Table 2507.2 and the following;
   1. Install metal lath taut, using only specified and detailed fasteners, with long dimension perpendicular to supports, over sheathing and water-resistive barrier at walls and over ceiling framing at soffits, as indicated.
   2. Attach at maximum 6 -inch intervals conforming to requirements of ASTM C1063.
      a. Use wire ties or screws at metal framing and powder driven wide-shouldered forced entry fasteners at solid metal backing.
      b. All fasteners shall penetrate into structural support.
      c. Use furring nails and hook staples only as detailed at wood framed soffits.
   3. Lap sides not less than 1/2 -inch and ends not less than 1 -inch. Lap wire fabric not less than one mesh at sides and ends or 1 -inch, whichever is greater. Lap rib lath at sides by nesting outside ribs. Stagger ends to differing supports and lap.
   4. Where solid backing is not provided, securely tie ends of lapped sheets not occurring over supports with minimum 18-gauge tie wire.
   5. Reinforce internal and external corners with lath.
      a. Continuously reinforce internal angles with corner mesh, return metal lath 3 -inches from corner to form the angle reinforcement; Fasten only at perimeter edges.
   6. Insert lath as far as possible into reentrant space of metal frames, and notch to pass around jamb anchors.

C. Horizontal Surfaces: Install as specified for vertical surfaces except attach ribbed lath to horizontal supports with wire ties or hook staples as described in CBC 2507.3 in addition to the methods described in Table 2507.2. Install as specifically detailed on drawings.

D. Backing Papers and Flexible Flashings: Install as specified in related Section 07 2500 and as detailed on the Drawings.

3.05 ACCESSORY INSTALLATION

A. Fasten accessories in place at both ends and at a maximum of 12 -inches on center along sides, and as required to prevent dislodging or misalignment by subsequent operations.

B. Install accessories to provide required depth of plaster and to bring plaster surface to required plane.

C. Set accessories straight, plumb, level and true to line.Shim as required to proper grounds. Align joints with concealed splices or tie plates. Trim or cope screeds and accessories to coordinate, lap or be lapped with flashings and work provided by other sections. Ensure all laps of accessories and flashings weather to exterior and away from flow direction of water behind the plaster.

D. Neatly miter or cope corners and intersections of accessories to fit exposed edges. Make tight hairline joints.

E. Butt and align accessory joints at ends and intersections and seal. Vertical accessories shall run continuous, interrupting horizontal accessories.

F. Continuously reinforce angles and fasten only at perimeter edges. Connect lengths of accessories as recommended by the manufacturer to assure a continuous line.

G. Extend accessories into niches and recesses, around interior and exterior wall corners, and around all sides of columns and similar building elements. Continue control joint patterns and molding alignments on walls of arcades, passages and all similar locations to match or extend those shown on exterior elevations, whether or not individual conditions are specifically shown, noted or elevated.
   1. Locations and extents indicated on drawings are the minimum required. If joints shown on the drawings are fewer, recommend joints as specified here and request confirmation of layout by Architect.

H. Weep Screeds - Foundation: Provide typically and as indicated.
   1. Install foundation weep screeds at all bottom of walls to receive lath and plaster.
   2. Place the bottom edge of the foundation weep screed not less than 1 -inch (25 mm) below the joint formed by the foundation and framing.
   3. The nose of the screed shall be placed not less than 4 -inches (102 mm) above raw earth.
   4. The nose of the screed shall be placed not less than 2 -inches (51 mm) above paved surfaces.
   5. The weather resistant barrier (Building Papers) and lath shall entirely cover the vertical attachment flange and terminate at the top edge of the nose or ground flange.

I. Beads and Reinforcements:
   1. Use single length of metal beads wherever length of run does not exceed longest standard stock length available.
   2. Provide casing beads at terminations of plaster finish and at the following locations. Butt and align ends. Secure rigidly in place:
      a. Where plaster abuts another material or dissimilar construction.
      b. At perimeter of openings where edges of plaster will not be concealed by other work
      c. Locations indicated and where an exposed plaster edge would occur otherwise.
   3. Corner Beads: Install for full length of outside corners, fastened at outer edges only.
   4. Cornerite Reinforcements: Install at inside corners, except where lath is carried around corners at least 3 -inches (75 mm).
   5. Strip Lath Reinforcement:
      a. Reinforce corners of openings diagonally with 9 -inch by 24 -inch strips of metal lath, tied to reinforcement.
      b. Place 4-inch wide strips of metal lath centered over junctions of dissimilar backing materials. Secure rigidly in place.

6. Stress Relief Joints: Space joints as indicated on Contract Drawings. Locations and extents indicated on drawings are the minimum required. If joints shown on the drawings are fewer than minimum required by this specification, recommend joints as specified here and request confirmation of layout by Architect.
   a. Coordinate joint placement to preserve visual alignment with other work acceptable to Architect.
   b. Cut and separate reinforcement behind expansion and control joints.
   c. Use double casing bead spaced 1/4-inch (6 mm) apart to form joint.

3.06 PLASTERING

A. General: Comply with ASTM C 926.
   1. Do not deviate more than plus or minus 1/4 inch in 10 feet (6 mm in 3 m) from a true plane in finished plaster surfaces when measured by a 10-foot (3-m) straightedge placed on surface.
   2. Finish plaster flush with metal frames and other built-in metal items or accessories that act as a plaster ground unless otherwise indicated. Where casing bead does not terminate plaster at metal frame, cut base coat free from metal frame before plaster sets and groove finish coat at junctures with metal.
   3. Provide plaster surfaces that are ready to receive field-applied finishes indicated.

B. Apply plaster in accordance with manufacturer's instructions, and ICC-ES Report.

C. Three-Coat Application Over Metal Lath per manufacturer unstructions, or for field-mixed plaster:
   1. Apply first coat to a nominal thickness of 3/8 inch. Apply plaster scratch coat to embed lath completely so that no lath is visible. Scratch or score vertical surfaces horizontally at even intervals for mechanical key.
   2. Apply second coat to a nominal thickness of 3/8 inch once the first coat is sufficiently rigid to accept the application without being disturbed. Apply evenly, using a rod, darby or other straightedge, bring surface t to a true, even plane, flush with plaster grounds.
   3. Float surface with a wood or hard rubber float to promote densification and ensure a surface with adequate "tooth" receptive to bonding of the finish coat.
   4. Apply finish coat to a nominal thickness of 1/8 inch per manufacturer instructions.

D. Curing: Base requires adequate moisture to allow continuous hydration of the cement.
   1. Minimum four (4) days of moist curing shall be provided.
   2. Provide additional moist curing to conform to code requirements, manufacturer recommendations, local practices and climatic conditions and as otherwise required to provide acceptable substrate for finish coat.
   3. Base coat shall be allowed to cure for a minimum of 7 days prior to coating with primer and textured finish.

E. Reinforced Leveling Coat:
   1. Ensure that the surface of the wall is cured, clean, dry and free of efflorescence, oil or other contaminants that would impair adhesion.
   2. Apply polymer-modified base coat mixture in continuous layer approximately 1/16 -1/8 inch thick.
   3. Apply a layer of Reinforcing Mesh into the wet mixture and trowel smooth until mesh is fully embedded. Lap adjoing pieces of mesh 2-1/2 inches minimum and as described in the manufacturer's written instructions and technical bulletins.
   4. Cure for a minimum of 24 hours, until dry, or longer as required by weather conditions.

F. Primer Application:

1. Ensure that the surface of the wall is cured, clean, dry and free of efflorescence, oil or other contaminants that would impair adhesion.
2. Primer color shall closely match that of the selected finish.
3. Stir to a smooth homogeneous consistency and apply to the wall using a roller, brush or airless spray equipment. Refer to manufacturer's published data sheet for more complete instructions.
4. Allow to completely dry.

G. Finish Application:
1. Ensure that the surface of the wall is clean, dry and free of any contaminants that may impair the adhesion of surface finish.
2. Spray or trowel apply textured finish to dried primer.
3. Apply finish to natural breaks to avoid visible cold joints.
4. Always work the shady side of the wall or provide temporary shading to avoid application in direct sunlight.
5. Apply in accordance with manufacturer directions for the specific finish and texture being used.

H. Concealed Exterior Plaster: Where plaster application is used as a base for adhered finishes, omit finish coat.

I. Concealed Interior Plaster:
1. Where plaster application is concealed behind built-in cabinets, similar furnishings, and equipment, apply finish coat.
2. Where plaster application is concealed above suspended ceilings and in similar locations, omit finish coat.
3. Where tile or other finishes are adhered to plaster, verify that plaster work specified complies with requirements for setting materials.
4. Where plaster application is used as a base for adhesive application of tile and similar finishes, omit finish coat.

3.07 PLASTER REPAIRS

A. Repair or replace work to eliminate cracks, dents, blisters, buckles, crazing and check cracking, dry outs, efflorescence, sweat outs, and similar defects and where bond to substrate has failed.

B. Remove and replace material that is stained, damaged or that does not match specified finishes. Provide new matching finish as specified, without evidence of replacement.

3.08 CLEANING AND PROTECTION

A. Clean installed surfaces in accordance with manufacturer's instructions; do not clean surfaces with products not specified in manufacturer's instructions. Clean as work progresses, remove residue without delay.

B. Protect metal surfaces and plumbing fixtures. Flush surfaces with clean water before and after cleaning.

C. Protect finished work from damage until acceptance by Owner.

END OF SECTION 09 2513

SECTION 09 6500
RESILIENT FLOORING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Resilient base and edge trim.

B. Installation accessories.

1.02 RELATED REQUIREMENTS

A. Section 01 6116 - Volatile Organic Compound (VOC) Content Restrictions.

B. Section 01 8113 - Sustainable Design Requirements.

C. Pertinent sections specifying Concrete Floor Preparation, Concrete Floor Moisture Content & pH Testing and Water Vapor Emission Control Coating (Moisture Mitigation System).

1.03 REFERENCE STANDARDS

A. ASTM E648 - Standard Test Method for Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source.

B. ASTM F1066 - Standard Specification for Vinyl Composition Floor Tile.

C. ASTM F1303 - Standard Specification for Sheet Vinyl Floor Covering with Backing.

D. ASTM F1344 - Standard Specification for Rubber Floor Tile.

E. ASTM F1861 - Standard Specification for Resilient Wall Base.

F. California Code of Regulations, Title 24, Part 2, California Building Code (CBC), International Building Code.

G. California Code of Regulations, Title 24, Part 11 California Green Building Standards Code, “CAL-Green”.

H. NFPA 253 - Standard Method of Test for Critical Radiant Flux of Floor Covering Systems Using a Radiant Heat Energy Source.

1.04 SUBMITTALS

A. See Section 01 3300 - Submittals, for submittal procedures.

B. Provide complete submittals at the same time as submittals for work in related sections to permit review of complete and integrated systems and assemblies.

C. Product Data: Provide data on specified products, describing physical and performance characteristics; including sizes, patterns and colors available; and installation instructions.

D. CAL-GREEN Submittals:
   1. Product Data – VOC Limits: For adhesives sealants, fillers, primers and coatings, documentation including printed statement of VOC contents, comply with limits specified in related section.
   2. Product Data – Resilient Flooring: Documentation from an independent testing agency indicating compliance with the FloorScore Standard, or evidence of listing on the RFCI FloorScore database, or evidence of listing on the CHPS Product Registry.

E. Shop Drawings: Indicate seaming plan for sheet goods. Indicate floor pattern layout and color selections for each field and accent color. Request floor patterns from Architect where no patterns are indicated.

F. Selection Samples: Submit manufacturer's complete set of color samples for Architect's initial selection.

G. Verification Samples: Submit two samples, 8 inches by 10 inches in size illustrating color and pattern for each resilient flooring product specified.

H. Maintenance Data: Include maintenance procedures, recommended maintenance materials, and suggested schedule for cleaning, stripping, and re-waxing.

1.05 QUALITY ASSURANCE

A. Installer Qualifications: Company specializing in installing specified flooring with minimum five (5) years documented experience.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Upon receipt, immediately remove packaging and check materials for damage and the correct style, color, quantity and run numbers.

B. Store all materials off of the floor in an acclimatized, weather-tight space. Maintain temperature and humidity within manufacturer recommended limits.

C. Protect roll materials from damage by storing on end.

1.07 FIELD CONDITIONS

A. Store materials for not less than 48 hours prior to installation in area of installation at a temperature of 70 degrees F to achieve temperature stability. Thereafter, maintain conditions above 55 degrees F.

1.08 EXTRA MATERIALS

A. See Section 01 6000 - Product Requirements, for additional provisions.

B. Provide 5% floor area of flooring, 10 lineal feet of base, materials of each type and color specified.

PART 2 PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

A. VOC Limits for adhesives, sealants, fillers, primers and coatings . Comply with limits specified in related section.

B. Resilient Flooring VOC Emission Limits: Comply with CAL-GREEN 5.504.4.6; products must be listed on one of the following databases.
   1. Collaborative for High Performance Schools (CHPS) 2009 CA Criteria and Low Emitting Materials List (Product Registry); www.chps.net.
   2. Resilient Floor Covering Institute (RFCI) FloorScore Program, database of certified products; www.scsglobalservices.com/services/floorscore.

C. Flooring along the accessible route shall be stable, firm, and slip-resistant per CBC 11B-302.1.

D. Critical Radiant Flux (CRF): Minimum 0.45 watt per square centimeter, when tested in accordance with ASTM E 648 or NFPA 253.

2.02 SHEET FLOORING

2.03 RESILIENT BASE

A. Base: Type TP, rubber, thermoplastic; top set Style A - Straight at Carpet flooring, Style B - Coved at resilient flooring.:
   1. Manufacturers:
      a. Burke-Mannington Flooring; www.https://www.manningtoncommercial.com/burke/.
      b. Johnsonite, a Tarkett Company: www.johnsonite.com.
      c. Roppe Corp: www.roppe.com.
      d. Substitutions: See Section 01 6000 - Product Requirements.
   2. Critical Radiant Flux (CRF): Minimum 0.45 watt per square centimeter, when tested in accordance with ASTM E 648 or NFPA 253.
   3. Height: As indicated; 4 or 6 inch.
   4. Thickness: 0.125 inch.
   5. Finish: Satin.
   6. Length: Roll.
   7. Color: To be selected by Architect from manufacturer's full range.
   8. Accessories: Premolded external corners and internal corners.

2.04 WATER VAPOR EMISSION CONTROL COATING

A. Type specified in Section 07 2633.

2.05 ACCESSORIES

A. Primers, Adhesives, and Seam Sealer: Waterproof; types recommended by flooring manufacturer.

B. Moldings, Transition and Edge Strips: Rubber.
   1. Types as indicated or required for specific applications.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that wall surfaces are smooth and flat within the tolerances specified for that type of work, are dust-free, and are ready to receive resilient base.

B. Verify that required floor-mounted utilities are in correct location.

3.02 Installation - General

A. Starting installation constitutes acceptance of sub-floor conditions.

B. Install in accordance with manufacturer's written instructions.

C. Adhesive-Applied Installation:
   1. Spread only enough adhesive to permit installation of materials before initial set.
   2. Fit joints and butt seams tightly.
   3. Set flooring in place, press with heavy roller to attain full adhesion.

D. Where type of floor finish, pattern, or color are different on opposite sides of door, terminate flooring under centerline of door.

E. Install edge strips at unprotected or exposed edges, where flooring terminates, and where indicated.

1. Metal Strips: Attach to substrate before installation of flooring using stainless steel screws.
2. Resilient Strips: Attach to substrate using adhesive.

F. Scribe flooring to walls, columns, cabinets, floor outlets, and other appurtenances to produce tight joints.

3.03 Installation - Resilient Base

A. Fit joints tightly and make vertical. Maintain minimum dimension of 18 inches between joints.

B. Miter internal corners. At external corners, use premolded units. At exposed ends, use premolded units.

C. Install base on solid backing. Bond tightly to wall and floor surfaces.

D. Scribe and fit to door frames and other interruptions.

3.04 CLEANING

A. Remove excess adhesive from floor, base, and wall surfaces without damage.

B. Clean in accordance with manufacturer's written instructions.

C. Clean, seal, and wax resilient flooring in accordance with manufacturer's instructions using manufacturer recommended products.

3.05 PROTECTION AND ADJUSTING OF FINISHED WORK

A. Prohibit traffic on resilient flooring for 48 hours after installation.

B. Protect flooring during construction period in accordance with resilient flooring manufacturer's directions.
1. Protect resilient flooring against damage from rolling loads for initial period following installation by covering with plywood or hardboard. Use dollies to move stationary equipment or furnishings across floors.
2. Cover resilient flooring with undyed, untreated building paper until inspection for substantial completion.

C. Adjusting: Following Owner's move-in, replace resilient flooring indicated as damaged by move-in operation, up to five percent of completed floor area.

END OF SECTION 09 6500

SECTION 09 7723
WALL PANELS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Fabric-Wrapped Tackboard Paneling, factory fabricated.

B. Trim and installation accessories.

1.02 RELATED SECTIONS

A. Section 01 6116 - Volatile Organic Compound (VOC) Content Restrictions.

B. Section 01 8113 - Sustainable Design Requirements.

C. Sections specifying products serving as substrates for wall panels.

D. Section 09 7200 - Wall Covering: Wall Covering Fabrics for custom wrapped wall panels.

E. Pertinent sections of other Divisions specifying work penetrating wall panels.

F. California Code of Regulations, Title 24, Part 2, California Building Code (CBC), International Building Code.

G. California Code of Regulations, Title 24, Part 11, California Green Building Standards Code, "CAL-Green".

1.03 REFERENCES

A. ASTM E 84 - Standard Test Method for Surface Burning Characteristics of Building Materials.

1.04 SUBMITTALS

A. See Section 01 3300 - Submittals, for submittal procedures.

B. Product Data: Provide manufacturer's standard details and catalog data demonstrating compliance with referenced standards. Provide installation instructions.

C. CAL-GREEN Submittals:
   1. Product Data – VOC Limits: For adhesives sealants, fillers, primers and coatings, documentation including printed statement of VOC contents, comply with limits specified in related section..

D. Shop Drawings: Indicate wall elevations showing joint layout and items penetrating panels, such as switches, thermostats, fire alarm stations and similar items. Provide at same size, scale and using same Room Identification as contract drawings.

E. Samples:
   1. Submit 6 inch square samples of each surface and color required.
   2. Submit 6 inch long samples of each trim profile and trim color required.

F. Manufacturer's Installation Instructions: Indicate special procedures.

G. Test Reports: For substrate boards, indicate conformance to specified reqirements and referenced standards.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Store products indoors and protect from moisture, construction traffic, and damage.

B. Store panels flat on clean, dry surface. Do not stand on edge or stack on fresh concrete or other surfaces that emit moisture.

C. Store panels for at least 24 hours at temperature and humidity conditions approximating the average environment of the finished room.

1.06 MOCK-UP

A. Provide mock-up, 3 panel drops wide, minimum, including an inside and outside corner, full height, illustrating installed wall covering.

B. Locate where directed.

C. Replace unacceptable panels as directed. Retain accepted panels as the standard of comparison for the Work.

D. Mock-up may remain as part of the Work.

1.07 AMBIENT CONDITIONS

A. Do not apply materials when surface and ambient temperatures are outside the temperature ranges required by the adhesive or wall panel product manufacturer.

B. Maintain these conditions 72 hours before, during, and after installation of adhesive and wall covering.

C. Provide lighting level of 80 ft candles measured mid-height at substrate surfaces for installation and viewing of mock-ups.

D. Ventilation: Provide continuous ventilation during installation and for not less than the time recommended by the wall covering manufacturer for full drying or curing.

1.08 EXTRA MATERIALS

A. See Section 01 6000 - Product Requirements, for additional provisions.

B. Supply five percent of installed area of each material and color for Owner 's use in maintenance of project.

PART 2 PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

A. VOC Limits for adhesives, sealants, fillers, primers and coatings . Comply with limits specified in related section.

B. Produce hairline joints at all locations.

C. Produce wrapped fabric installation which is uniformly flat with no ridges, "mole trail" or folds.

2.02 PRE-FINISHED INTERIOR PANEL SYSTEM

A. Fiber Reinforced Laminates: Panolam Industries International, Inc., One Corporate Drive, Suite 725, Shelton, CT 06484. Tel: 203-925-1556. Web: www.panolam.com. Panel Surfacing shall comply with the following:
   1. Thickness: 0.075 inches.
   2. Color and Finish: As selected by architect from manufacturer’s full range of Nevamar or Pionite colors and designs.
   3. Surface Burning Characteristics: US Standard UL-723/ASTM E 84 Class A; Canadian Standard ULC-S102 Class A for Surface Burning Characteristics of Building Materials.

4. Indoor Air Quality: GREENGUARD Gold Certification.
5. Chemical resistant compliant with SEFA 8 requirements.
6. Wear Resistance (Cycles) NEMA 3.13: 3500 typical.
7. Flexural Strength ASTM D790: 20,148 psi typical.
8. Molding Profiles: Outside corners flat, outside corners round, division bars, inside corners, standard end caps.
9. Adhesive: Construction Adhesive compatible with substrates as approved by panel manufacturer.

B. High Pressure Laminate mounted on Panels: Panels have a "vertical grade" decorative laminate face on a wood fiber substrate. Panels are 3/4" thick, square cut. All edges are sealed black.

C. Trim: All trim shall be heavy weight extruded aluminum 6063-T5 alloy prefinished at the factory, and as detailed by the architect.

2.03 FABRIC-WRAPPED TACKBOARD WALL PANELS

A. Fabric-Wrapped Tackboard Wall Panels: Mineral fiber substrate with factory-laminated fabric wall covering.
1. Fabric Wall Covering: Woven Polyethylene Type specified in Section 09 7200.
2. Panel Substrate: Pressed Mineral Fiberboard, 25 lb/cu. ft., ASTM E84 Class A Flame Spread.
a. Micore® 300 Mineral Fiber Board by USG.
b. Substitutions: See Section 01 6000 - Product Requirements.
3. Panel Thickness: 1/2 inch.
4. Sheet Sizes: Select from standard sizes available to minimize joints, 48 inch width standard.
5. Fire Hazard Classification per ASTM E84: Class II.
a. Flame Spread: <75.
b. Smoke Developed <150.
6. Panel Fabricator:
a. Working Walls Solutions by Egan; www.workingwalls.com.
b. Substitutions: See Section 01 6000 - Product Requirements.

B. Panel Trim: Provide extruded aluminum panel moldings in manufacturer standard configurations. Wrap moldings with fabric to match the panels.

2.04 ACCESSORIES

A. Fasteners: Non-staining, as recommended by manufacturer in writing.
1. Length to suit project conditions.

B. Adhesive: Structural construction adhesive as recommended by manufacturer, meeting or exceeding specifed fire code criteria.

C. Sealant: Color-matched sealant as recommended by manufacturer. Clear sealant not permitted.

2.05 FINISHES

A. Color(s) as selected by Architect from:
1. Manufacturer's full range of standard colors.

B. Multiple color selections will be required as shown on the Drawings. If none are shown, request from the Architect.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine substrates that will receive panels to ensure that surfaces are smooth, dry, true, and free of dirt, dust, oil, or grease.

B. Remove high spots. Fill low spots.

C. Verify that substrate construction is completed and approved.

D. Correct deficiencies in substrate before installing panels.

E. Allow panels to acclimate to the moisture and temperature in the room environment prior to installation, and in accordance with manufacturer's limitations.

3.02 INSTALLATION - TACKABLE PANELS

A. Fit fabric-wrapped tackboard panels and mechanically secure in place, free from damaged edges or other defects detrimental to appearance and function.

B. Securely fasten wall panels in vertical orientation in patterns and configurations indicated with adhesives and concealed screws at top and bottom of panels. Space fasteners as specified for panel materials in Section 09 2116.

C. Install in uniform plane matching flatness tolerance of completed substrates specified in other sections, free from twists, warps, stains, tears, dents, damaged edges or defects impairing appearance or function.

D. Razor-cut all panel edges, do not "score-and-break". Back-wrap and adhere fabric at all cut panel edges, no exposed panel substrate materials or substrates visible in finished work.

E. Install fabric-wrapped metal termination trim at edges where indicated and wherever acceptable back-wrapped self-edges cannot be made.

F. Sealants: Seal corner seams, ceiling and base junctures, around door frames and other openings, perimeters of fire protection cabinets and similar items, and between penetrating items and panel cut-outs with color-matched sealant.

3.03 INTERFACE WITH OTHER WORK

A. Cut panels neatly to allow penetrations for switches, thermostats, fire alarms and similar wall-mounted elements that may occur in the field of the panels. Trim out penetration openings using same techniques as for panel edges. Ensure openings are sized to permit hairline gaps to be sealed to the penetrating items, or otherwise sized to ensure gaps are completely covered by escutcheons or cover plates on the penetrating item.

3.04 ADJUST AND CLEAN

A. Remove scraps and debris from the site, and leave in a neat and clean condition.

B. Protect installed Work from subsequent construction operations.

END OF SECTION 09 7723

SECTION 09 9113
EXTERIOR PAINTING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Surface preparation.

B. Field application of paints.

C. Materials for backpriming woodwork.

D. Scope: Finish exterior surfaces exposed to weather or to view, unless fully factory-finished, including the following:
   1. Exposed surfaces of steel lintels and ledge angles.
   2. Mechanical and Electrical:
      a. As specifically described below.

1.02 RELATED REQUIREMENTS

A. Section 01 6116 - Volatile Organic Compound (VOC) Content Restrictions.

B. Pertinent sections of Division 05 specifying shop-primed and galvanized metal items.

C. Section 09 9123 - Interior Painting.

D. Pertinent sections specifying civil, mechanical and electrical work requiring painting.

E. Pertinent Division 32 Section specifying Painted Pavement Markings.

1.03 DEFINITIONS

A. Comply with ASTM D16 for interpretation of terms used in this section.

B. Concealed: Work not exposed to view or weather in the finished Work, including within or behind various construction elements or finishes.

C. Exposed: Not Concealed. Work exposed to view or weather in the finished Work, including behind louvers, grilles, registers and various other construction elements, and including exposed Work which may be located out of conventional occupant or public sightlines.

D. Finished Areas: Surfaces and locations visible to occupants or the public.

E. Utility Areas: Surfaces and locations such as custodial closets, mechanical rooms, electrical and data closets, low-slope roofs behind parapet or equipment screens, not accessible or visible to occupants or the public.

1.04 REFERENCE STANDARDS

A. ASTM D16 - Standard Terminology for Paint, Related Coatings, Materials, and Applications.

B. Manufacturer's recommendations and specifications, including installation instructions.

C. MPI (APSM) - Master Painters Institute Architectural Painting Specification Manual.

D. SSPC-SP 1 - Solvent Cleaning.

E. SSPC-SP 2 - Hand Tool Cleaning.

F. SSPC-SP 6 - Commercial Blast Cleaning.

G. SSPC-SP 13 - Surface Preparation of Concrete; (Reaffirmed 2015).

1.05 SUBMITTALS

A. See Section 01 3300 - Submittals, for submittal procedures.

B. Product Data: Provide complete list of products to be used, with the following information for each:
   1. Manufacturer's name, product name and/or catalog number, and general product category (e.g. "alkyd enamel").
   2. MPI product number (e.g. MPI #47).
   3. Cross-reference to specified paint system(s) product is to be used in; include description of each system.
   4. Manufacturer's installation instructions.
   5. If proposal of substitutions is allowed under submittal procedures, explanation of substitutions proposed.
   6. Resin Type.
   7. Total VOC Content in grams per liter.
   8. Solids Content By Volume SCBV (not solids by weight). All products shall be minimum 35% SCBV.
   9. Composition-By-Weight. Demonstrate composition by percentage related to total weight of all components.
   10. Film Thickness Per Coat, Wet and Dry.
   11. Prime Pigment: Demonstrate prime pigment by percentage related to total volume of all components.

C. Samples: Submit three paper "draw down" samples, 8-1/2 by 11 inches in size, illustrating range of colors available for each finishing product specified.
   1. Where sheen is specified, submit samples in only that sheen.
   2. Where sheen is not specified, discuss sheen options with Architect before preparing samples, to eliminate sheens definitely not required.
   3. Allow 30 days for approval process, after receipt of complete samples by Architect.
   4. Paint color submittals will not be considered until color submittals for major materials not to be painted, such as masonry, have been approved.

D. Certification: By manufacturer that paints and finishes comply with VOC limits specified.

E. Manufacturer's Instructions: Indicate special surface preparation procedures.

F. Maintenance Data: Submit data including finish schedule showing where each product/color/finish was used, product technical data sheets, material safety data sheets (MSDS), care and cleaning instructions, touch-up procedures, repair of painted and finished surfaces, and color samples of each color and finish used.

G. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
   1. See Section 01 6000 - Product Requirements, for additional provisions.
   2. Extra Paint and Finish Materials: 1 gallon of each color; from the same product run, store where directed.
   3. Label each container with color in addition to the manufacturer's label.

1.06 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the products specified, with minimum ten (10) years documented experience.

B. Applicator Qualifications: Company specializing in performing the type of work specified with minimum five (5) years experience and approved by manufacturer.

1.07 MOCK-UP

A. See Section 01 4000 - Quality Requirements, for general requirements for mock-up.

B. Provide panel, 8 feet long by 10 feet wide, illustrating paint color, texture, and finish.

C. Provide door and frame assembly illustrating paint color, texture, and finish.

D. Locate where directed by Architect.

E. Final color selections and acceptance will be made only after review of mock-ups under lighting conditions approximating finish conditions.

F. Mock-up may remain as part of the work.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Deliver products to site in sealed and labeled containers; inspect to verify acceptability.

B. Container Label: Include manufacturer's name, type of paint, brand name, lot number, brand code, coverage, surface preparation, drying time, cleanup requirements, color designation, and instructions for mixing and reducing.

C. Paint Materials: Store at minimum ambient temperature of 45 degrees F and a maximum of 90 degrees F, in ventilated area, and as required by manufacturer's instructions.

1.09 FIELD CONDITIONS

A. Do not apply materials when surface and ambient temperatures are outside the temperature ranges required by the paint product manufacturer.

B. Follow manufacturer's recommended procedures for producing best results, including testing of substrates, moisture in substrates, and humidity and temperature limitations.

C. Do not apply exterior paint and finishes during rain, high wind or snow, or when relative humidity is outside the humidity ranges required by the paint product manufacturer.
   1. Do not paint exterior materials when inclement weather is expected within the full drying time specified by the manufacturer.
   2. Painting may be continued during inclement weather if areas and surfaces to be painted are enclosed and heated and dry within temperature and humidity limits specified by paint manufacturer during application and drying periods.

D. Schedule work to avoid painting surfaces, when surfaces are exposed to direct sunlight.

E. Provide lighting level of 80 ft candles measured mid-height at substrate surface.

PART 2 PRODUCTS

2.01 DESIGN REQUIREMENTS

A. Design Intent: Paint all exposed surfaces of Work, whether or not the item or surface is specifically identified within the Contract Documents.
   1. The number of coats specified is the minimum to be applied. Provide paint finishes of even, uniform color, free from cloudy or mottled surfaces. Provide one additional coat if necessary where "deep colors" are selected.
   2. Non-scheduled items: Provide manufacturer's approved and recommended system as set forth in Manufacturer's "Specifications Architectural Finishes ".

2.02 MANUFACTURERS

A. Manufacturer's proprietary names or catalog numbers are indicated for covnenience in identifying products. Manufacturer's complete product catalog description and composition for indicated product names or numbers shall constitute requirements for each product specified. Products shall incorporate all attributes set forth in the manufacturer's catalog description for the specified item, except for such modifications thereto as may be indicated in the Contract Documents.

B. Provide paints and finishes from the same manufacturer to the greatest extent possible.
   1. In the event that a single manufacturer cannot provide specified products, minor exceptions will be permitted provided approval by Architect is obtained using the specified procedures for substitutions.
   2. Substitution of other products by the same manufacturer is preferred over substitution of products by a different manufacturer.
   3. Substitution of a different paint system using MPI-approved products by the same manufacturer will be considered.

C. Substitutions: See Section 01 6000 - Product Requirements.
   1. Provide product data documenting conformance to specified requirements and provide all specified information as listed above in SUBMITTALS article. Failure to include all information specified is grounds for rejection of substitution.

D. Paints:
   1. Base Manufacturer: Dunn Edwards Corporation, Los Angeles CA.
   2. Benjamin Moore & Co: www.benjaminmoore.com.
   3. Kelly-Moore; www.kellymoore.com.
   4. Sherwin-Williams Company: www.sherwin-williams.com/#sle.

2.03 PAINTS AND FINISHES - GENERAL

A. Paints and Finishes: Ready mixed, unless required to be a field-catalyzed paint.
   1. Provide paints and finishes of a soft paste consistency, capable of being readily and uniformly dispersed to a homogeneous coating, with good flow and brushing properties, and capable of drying or curing free of streaks or sags.
   2. Provide materials that are compatible with one another and the substrates indicated under conditions of service and application, as demonstrated by manufacturer based on testing and field experience.
   3. For opaque finishes, tint each coat including primer coat and intermediate coats, one-half shade lighter than succeeding coat, with final finish coat as base color.
   4. Supply each paint material in quantity required to complete entire project's work from a single production run.
   5. Do not reduce, thin, or dilute paint or finishes or add materials unless such procedure is specifically described in manufacturer's product instructions.

B. Volatile Organic Compound (VOC) Content: Comply with Section 01 6116.
   1. Provide products conforming with local, State and Federal government requirements limiting the amount of volatile organic compounds contained in the product, for its intended application. If specified product does not comply with current requirement, provide conforming product at no additional cost.

C. Chemical Content: The following compounds are prohibited:
   1. Intentionally added methylene chloride or perchloroethylene.
   2. Aromatic Compounds: In excess of 1.0 percent by weight of total aromatic compounds (hydrocarbon compounds containing one or more benzene rings).

3. Acrolein, acrylonitrile, antimony, benzene, butyl benzyl phthalate, cadmium, di (2-ethylhexyl) phthalate, di-n-butyl phthalate, di-n-octyl phthalate, 1,2-dichlorobenzene, diethyl phthalate, dimethyl phthalate, ethylbenzene, ethylene glycol, formaldehyde, hexavalent chromium, isophorone, lead, mercury, methyl ethyl ketone, methyl isobutyl ketone, methylene chloride, naphthalene, toluene (methylbenzene), 1,1,1-trichloroethane, vinyl chloride.

D. Flammability: Comply with applicable code for surface burning characteristics.

E. Sheens: Provide the sheens specified; where sheen is not specified, sheen will be selected later by Architect from the manufacturer's full line.
   1. Finish Sheen: The following designations are measured in percentage of reflectance when viewed at a 60 degree angle. Provide manufacturer's standard sheen most closely matching the characteristic of specified sheen.
      a. Flat: 0-5%.
      b. Velvet: 5-9%.
      c. Eggshell: 10-15%.
      d. Low Sheen: 20-25%.
      e. Semi-Gloss: 40-50%
      f. Gloss: 70-80%
      g. High Gloss: >85%

F. Colors: To be selected from manufacturer's full range of available colors.
   1. Selection to be made by Architect after award of contract.
   2. Allow for minimum of three colors for each system, unless otherwise indicated, without additional cost to Owner.
   3. Extend colors to surface edges; colors may change at any edge as directed by Architect.
   4. In finished areas, finish pipes, ducts, conduit, and equipment the same color as the wall/ceiling they are mounted on/under unless accent colors are denoted.

G. Fabricate paints and stains in accordance with the Color Schedule which will include both standard colors and special, non-standard colors.
   1. If deep colors are not available in a specified product, propose substitute formula for approval
   2. Tint undercoats slightly to approximate finish coat color

2.04 PAINT SYSTEMS - EXTERIOR - WOOD

A. Paint WE-OP-3L - Wood, Opaque, Latex, 3 Coat:
   1. Satin Acrylic: Two finish coats over a primer.
      a. Primer Coat (4.0 mils):
      b. Intermediate (1.5 mils):
      c. Final Coats (1.5 mils):
   2. Dunn-Edwards Products: If any of the products below are discontinued, submit alternate products approved by the Manufacturer in writing.
      a. D-E EZ-Prime Premium EZPR00 Exterior Wood Primer.
      b. D-E SPARTASHIELD SSHL10, flat, 2 coats.
      c. D-E SPARTASHIELD SSHL30, eggshell, 2 coats.
      d. D-E SPARTASHIELD SSHL50, semi-gloss, 2 coats.
   3. Kelly-Moore Products: If any of the products below are discontinued, submit alternate products approved by the Manufacturer in writing.
      a. KM premium Exterior Wood Primer, manufacturer’s recommended type to suit conditions.
      b. KM 1240 ACRY-SHIELD, flat, 2 coats.

c. KM 1245 ACRY-SHIELD, eggshell, 2 coats.
d. KM 1250 ACRY-SHIELD, semi-gloss, 2 coats.

B. Paint WE-STR-2S - Redwood or Cedar, Semi-Transparent Color Stain, 2 Coat.
1. Two coats color stain.
2. Dunn-Edwards: If any of the products below are discontinued, submit alternate products approved by the Manufacturer in writing.
a. Okon Inc., Weather Pro WP 3-5, apply wet-on-wet, product will repel itself if second coat is attempted on dry finish. Tint to match Architect selected color.
3. Kelly-Moore: If any of the products below are discontinued, submit alternate products approved by the Manufacturer in writing.
a. Storm Category 2 Dual Dispersion 2254X

C. Paint WE-TR-V - Wood, Transparent, Varnish, No Stain, One Coat Sealer:
1. Dunn-Edwards: If any of the products below are discontinued, submit alternate products approved by the Manufacturer in writing.
a. Cabot Spar Varnish #18040 Series.
2. Kelly-Moore: If any of the products below are discontinued, submit alternate products approved by the Manufacturer in writing.
a. Storm Category 1 Clear Topcoat 11550.

D. Paint WE-TR-VS - Wood, Transparent, Varnish, Stain, 2 Coats:
1. Filler coat (for open grained wood only).
2. One coat stain (optional, as selected by Architect).
3. One coat sealer.
4. Dunn-Edwards: If any of the products below are discontinued, submit alternate products approved by the Manufacturer in writing.
a. Okon Weather-Pro.
b. Okon Multi-Surface Water-Repellent Sealer.
5. Kelly-Moore:
a. Storm Category 2 22595 or 2254X
b. Storm Category 1 Clear Topcoat 11550

2.05 PAINT SYSTEMS - EXTERIOR - CONCRETE, MASONRY, PLASTER

A. New Exterior Plaster: Acrylic finish per Section 09 2513 - Acrylic Modified Portland Cement Plastering.

B. Paint CE-OP-3L - Masonry/Concrete, Opaque, Latex, 3 Coat:
1. One coat of block filler:
2. Two coats of latex enamel. Sheen as selected by Architect.
3. Dunn-Edwards: If any of the products below are discontinued, submit alternate products approved by the Manufacturer in writing.
a. Smooth BLOCFIL Premium SBPR00.
b. SPARTASHIELD SSHL50, semi-gloss or as required for selected sheen.
4. Kelly-Moore: If any of the products below are discontinued, submit alternate products approved by the Manufacturer in writing.
a. 521 FILL & PRIME.
b. 1250 ACRY-SHIELD, semi-gloss, or as required for selected sheen.

C. Paint GE-OP-3L - Gypsum Board or Plaster, Opaque, Latex, 3 Coat:
1. One coat of urethane acrylic primer sealer.
2. Two coats of latex enamel, sheen as selected by Architect.
3. Dunn-Edwards: If any of the products below are discontinued, submit alternate products approved by the Manufacturer in writing.

a. SUPER-LOC Premium SLPR00.
b. SPARTASHIELD SSHL30. or as required for selected sheen.

4. Kelly-Moore: If any of the products below are discontinued, submit alternate products approved by the Manufacturer in writing.
   a. Kel Bond 295 Uniprime.
   b. 1245 ACRY-SHIELD or as required for selected sheen.

D. Paint FC-OP-3L - Fiber Cement Siding or Paneling, Opaque, Latex, 3 Coat:
1. Factory Pre-Primed Surfaces: Spot prime concrete sealer;
2. Unprimed Surfaces: One coat of concrete sealer;
3. Two coats of latex. Sheen as selected by Architect.
4. Dunn-Edwards: If any of the products below are discontinued, submit alternate products approved by the Manufacturer in writing.
   a. EFF-STOP Premium ESPR00.
   b. SPARTASHIELD SSHL 10, 30, 50, or as required for selected sheen.
5. Kelly-Moore: If any of the products below are discontinued, submit alternate products approved by the Manufacturer in writing.
   a. 247 ACRY-SHIELD.
   b. 1240, 1245, 1250 ACRY-SHIELD or as required for selected sheen.

2.06 PAINT SYSTEMS - EXTERIOR - METAL

A. Paint ME-OP-3A - Ferrous Metals, Primed or Unprimed, Alkyd, 3 Coat:
1. One coat of alkyd primer.
2. Two coats of alkyd enamel, or as required to achieve specified sheen and appearance.
3. Dunn-Edwards: If any of the products below are discontinued, submit alternate products approved by the Manufacturer in writing.
   a. D-E BLOC-RUST BRPR00-1-WH for light finish colors; D-E BLOC-RUST BRPR00-1-RO for dark finish colors –OR- D-E ULTRASHIELD Interior/Exterior DTM Gray Primer (ULDM00-0-GR).
   b. D-E ARISTOSHIELD Semi-Gloss ASHL50 semi-gloss or ASHL60 Gloss, or as required for selected sheen.
4. Kelly-Moore: If any of the products below are discontinued, submit alternate products approved by the Manufacturer in writing.
   a. Rust-Oleum CV740, Alkyd Rust-Preventative White Primer for light finish colors; Rust-Oleum CV740, Alkyd Rust-Preventative Red Primer for dark finish colors.
   b. 1998 or 1999 Epic Water Urethane Modified Alkyd Semi-Gloss or Gloss, 2 coats, or as required for selected sheen.

B. Paint MgE-OP-3A - Galvanized Metals, Alkyd, 3 Coat:
1. Pretreatment, reduce to minimum level for finish coat adhesion]. One coat .
2. Prime Coat:
3. Two coats of alkyd enamel, Gloss Sheen at exterior handrails and guardrails, Semi-gloss all other locations.
4. Dunn-Edwards Products: If any of the products below are discontinued, submit alternate products approved by the Manufacturer in writing.
   a. Krud Kutter Metal Clean and Etch
   b. D-E ULTRASHIELD ULGM00 Galvanized Metal corrosion inhibitive primer.
   c. D-E ARISTOSHIELD High-Gloss ASHL70 gloss ASHL50 Semi-gloss, 2 coats, or as required for selected sheen.
5. Kelly-Moore Products: If any of the products below are discontinued, submit alternate products approved by the Manufacturer in writing.
   a. Krud Kutter Metal Clean and Etch.

b. KM 5725 DTM Acrylic Primer/Finish.
c. KM 1999 Epic Water Urethane Modified Alkyd Gloss, 1998 Epic Semi-Gloss, 2 coats, or as required for selected sheen.

2.07 PRIMERS

A. Primers: As required or recommended by manufacturer of top coats; where the manufacturer offers options on primers for a particular substrate, use primer categorized as "best" by the manufacturer.
   1. If products specified are discontinued, submit alternate product approved by specified Manufacturer in writing.

2.08 ACCESSORY MATERIALS

A. Accessory Materials: Provide primers, sealers, cleaning agents, cleaning cloths, sanding materials, and clean-up materials as required for final completion of painted surfaces.

B. Patching Material: Compatible with substrates, recommended by coating manufacturer in writing for conditions indicated.

C. Sanding materials: 120-180 grit, for architectural woodwork, finish carpentry, wood doors, or other surfaces requiring touch-up.

D. Fastener Head Cover Material: Latex filler.

PART 3 EXECUTION

3.01 EXAMINATION

A. Do not begin application of paints and finishes until substrates have been properly prepared.

B. Verify that surfaces are ready to receive work as instructed by the product manufacturer.

C. Examine surfaces scheduled to be finished prior to commencement of work. Report any condition that may potentially effect proper application.

D. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

E. Test shop-applied primer for compatibility with subsequent cover materials.

F. Measure moisture content of surfaces using an electronic moisture meter. Do not apply finishes unless moisture content of surfaces are below the manufacturer-recommended maximums.

3.02 PROTECTION OF ADJACENT WORK

A. Protect surrounding elements from damage from painting procedures. Provide temporary facilities and barricades required. Additional requirements specified in Division 01.

B. Carefully remove and store removable items located in areas to be painted, including fixtures, fittings, finish hardware, and accessories; reinstall upon completion.

C. Separate areas to be protected from painting areas using means adequate to prevent damage.

D. Cover existing landscaping with tarpaulins or similar covers.

E. Mask immediately adjacent surfaces with material that will withstand cleaning and restoration procedures.

F. Close off adjacent occupied areas with dust proof and weatherproof partitions.

G. Protect roof membrane and flashings from damage with 1/2 inch plywood laid on roof surfaces over full extent of work area and traffic route.

H. When using cleaning methods that involve water or other liquids, install drainage devices to prevent runoff over adjacent surfaces unless those surfaces are impervious to damage from runoff.

3.03 PREPARATION

A. Clean surfaces thoroughly and correct defects prior to application.

B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

C. Remove or repair existing paints or finishes that exhibit surface defects.

D. Remove surface appurtenances, including electrical plates, hardware, light fixture trim, escutcheons, and fittings, prior to preparing surfaces for finishing.

E. Surfaces: Correct defects and clean surfaces which affect work of this section. Feather-edge patches to make finished edges inconspicuous.

F. Seal surfaces that might cause bleed through or staining of topcoat.

G. Remove mildew from impervious surfaces by scrubbing with solution of tetra-sodium phosphate and bleach. Rinse with clean water and allow surface to dry.

H. Provide barrier coats over incompatible primers, or remove and re-prime.

I. Spot prime shop primed materials in field as required to assure that all surfaces are primed before finished coats are applied. Prime coats specified in this Section shall be provided in addition to shop prime coats on materials supplied for field finish.

J. Verify compatibility of specified products with shop applied primer(s). In the event of incompatibility of products specified in the Section, recommend alternate compatible product for review.

K. Provide full number of coats specified for each coating system indicated. Where recommended alternate compatible primers or undercoats require fewer coats than specified products, provide additional finish coat so that specified number of coats is not reduced.

L. Concrete:
1. Remove release agents, curing compounds, efflorescence, and chalk. Do not coat surfaces if moisture content or alkalinity of surfaces to be coated exceeds that permitted in manufacturer's written instructions.
2. Prepare surface as recommended by top coat manufacturer and according to SSPC-SP 13.

M. Masonry:
1. Remove efflorescence and chalk. Do not coat surfaces if moisture content or alkalinity of surfaces or if alkalinity of mortar joints exceed that permitted in manufacturer's written instructions. Allow to dry.
2. Prepare surface as recommended by top coat manufacturer.

N. Galvanized Surfaces:
1. Remove surface contamination and oils and wash with solvent according to SSPC-SP 1.
2. Prepare surface according to SSPC-SP 2.

O. Ferrous Metal:
1. Solvent clean according to SSPC-SP 1.

2. Shop-Primed Surfaces: Sand and scrape to remove loose primer and rust. Feather edges to make touch-up patches inconspicuous. Clean surfaces with solvent. Prime bare steel surfaces. Re-prime entire shop-primed item.
3. Remove rust, loose mill scale, and other foreign substances using using methods recommended in writing by paint manufacturer and blast cleaning according to SSPC-SP 6 "Commercial Blast Cleaning". Protect from corrosion until coated.

P. Exterior Wood Surfaces to Receive Opaque Finish: Remove dust, grit, and foreign matter. Seal knots, pitch streaks, and sappy sections. Fill nail holes with tinted exterior calking compound after prime coat has been applied. Back prime concealed surfaces before installation.

Q. Glue-Laminated Beams: Prior to finishing, wash surfaces with solvent, remove grease and dirt.

R. Metal Doors to be Painted: Prime metal door top and bottom edge surfaces.

3.04 APPLICATION

A. Remove unfinished louvers, grilles, covers, and access panels on mechanical and electrical components and paint separately.

B. Exterior Wood to Receive Opaque Finish: If final painting must be delayed more than 2 weeks after installation of woodwork, apply primer within 2 weeks and final coating within 4 weeks.

C. Apply products in accordance with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual". In the event of conflict, manufacturer recommendations to prevail.

D. Where adjacent sealant is to be painted, do not apply finish coats until sealant is applied.

E. Do not apply finishes to surfaces that are not dry. Allow applied coats to dry before next coat is applied. Do not re-coat until;
1. Paint has dried until firm to the touch.
2. Paint does not deform or feel sticky under moderate thumb pressure.
3. Application of another coat of paint will not cause lifting or loss of adhesion of the undercoat.

F. Apply each coat to uniform appearance.

G. Dark Colors and Deep Clear Colors: Regardless of number of coats specified, apply additional coats until complete hide is achieved.

H. Sand wood and metal surfaces lightly between coats to achieve required finish.

I. Vacuum clean surfaces of loose particles. Use tack cloth to remove dust and particles just prior to applying next coat.

J. Make work uniform without sags, runs, skips or brush marks. Make all edges sharp including interior intersections and transitions between split finishes.

K. Backprime all concealed surfaces of finish carpentry, architectural woodwork, wood doors and unclad wood windows.

L. Reinstall electrical cover plates, hardware, light fixture trim, escutcheons, and fittings removed prior to finishing.

3.05 FIELD QUALITY CONTROL

A. See Section 01 4000 - Quality Requirements, for general requirements for field inspection.

3.06 CLEANING

A. Collect waste material that could constitute a fire hazard, place in closed metal containers, and remove daily from site.

B. Upon completion of work, clean window glass and other paint-spattered surfaces.

3.07 PROTECTION

A. Protect finishes until completion of project.

B. Touch-up damaged finishes after Substantial Completion.
   1. Remove spatters, spots, runs, sags, blemishes and other defects without marring adjacent unpainted surfaces.
   2. Repaint defective surfaces.

C. Provide "Wet Paint" signs as required to protect newly-painted finishes.

D. Adjusting: Following owner's move-in and occupancy at a time acceptable to the Owner, touch-up and adjust blemishes and other defects incurred by move-in operations and the actions of the Owner and their separate contractors. Limit: Two workers for two full days labor, per building.

3.08 SCHEDULE - SURFACES NOT REQUIRING PAINTING BY THIS SECTION

A. Do Not Paint or Finish the Following Items:
   1. Items factory-finished except those specifically noted in this section to be finished; materials and products having factory-applied primers are not considered factory finished.
   2. Equipment, ductwork, conduit and electrical items, with factory finishes suitable for exterior exposure, where mounted on low-slope roofs which are concealed from public or occupant view behind parapet walls or equipment screens.
   3. Items indicated to receive other finishes.
   4. Items indicated to remain unfinished.
   5. Fire rating labels, equipment serial number and capacity labels, and operating parts of equipment.
   6. Stainless steel, anodized aluminum, bronze, terne coated stainless steel, zinc, and lead items.
   7. Non-metallic roofing and flashing.
   8. Marble, granite, slate, and other natural stones.
   9. Ceramic and other types of tiles.
   10. Pre-finished wall, ceiling, roof and floor materials or coverings, unless specifically scheduled for field painting, including, but not limited to:
      a. Factory-finished Metal Panel Cladding, Fascia and Soffit Panels.
      b. Factory-finished Fiber Cement Panel Cladding.
      c. Factory-finished Metal Roof Panels and associated factory-finish flashing.
   11. Floors, unless specifically indicated.
   12. Acrylic-Modified Cement Plaster Finish.
   13. Brick, glass unit masonry, architectural concrete, cast stone, integrally colored plaster and stucco unless specifically indicated.
   14. Glass.
   15. Concealed pipes, ducts, and conduits.

3.09 SCHEDULE - SURFACES TO BE FINISHED

A. General: Paint the surfaces described below under Schedule - Paint Systems. All surfaces exposed to weather, or visible to the eye, unless specifically excluded by the Article titled "Do Not Paint or Finish the Following Items". If a coating system is not specified for a particular surface or substrate, provide a three-coat finish system recommended by the paint or coating manufacturer for that surface or substrate. Include all preparation necessary as appropriate for a similar substrate listed in the Article titled "PREPARATION", or preparation for that substrate as recommended by the paint or coating manufacturer.

B. Mechanical and Electrical: Use paint systems defined for the materials to be finished.
   1. Paint all factory-finished equipment (electrical panels, load centers, and similar elements) exposed to public or occupant view or to weather, including on roofs.
   2. Paint all conduit, insulated and exposed pipes, boxes, hangers, brackets, collars and supports, mechanical equipment, electrical equipment, and exposed ducts occurring in finished areas to match background surfaces.
   3. Paint shop-primed items occurring in finished areas.
   4. Remove unfinished louvers, grilles, covers, and access panels on mechanical and electrical components and paint separately.
   5. Paint dampers exposed behind louvers, grilles, to match face panels.
   6. Finish equipment, piping, conduit, and exposed duct work throughout in colors according to the color schedule.
   7. Reinstall electrical cover plates, hardware, light fixture trim, escutcheons, and fittings removed prior to finishing.

C. Paint behind moveable equipment and furniture.

D. Finish top, bottom, and side edges of exterior doors the same as exposed faces.

E. Paint access doors, fire hose and extinguisher cabinets, panelboards, conduits and exposed plumbing piping.

F. Paint reveal moldings, expansion joints, and handrails.

G. Paint tube column and miscellaneous connections.

H. Provide split finishes for painted doors and interior windows where different connected room colors are selected.

I. Paint continuous surfaces with the same paint system. Do not change systems at elevation breaks.

J. Touch-up factory paint finishes where damaged.

3.10 SCHEDULE - PAINT SYSTEMS

A. Concrete: Finish only surfaces exposed to view which are indicated to receive paint.
   1. Exterior: Flat sheen.

B. Plaster: Finish all surfaces exposed to view, except plaster with acrylic-modified finish per Section 09 2513..
   1. Exterior Walls and surfaces, including soffits, (Stucco): GE-OP-3L

C. Wood: Finish all surfaces exposed to view.
   1. Exterior trim, beams, soffits and frames: WE-OP-3L.
      a. Semi-gloss sheen.

D. New Wood Doors: Factory-finished

E. Steel Doors and Frames: Finish all surfaces exposed to view and to weather, including door tops and bottoms. Select prime coats compatible with finish color selections.
   1. Semi-gloss sheen.

F. Metal Fabrications: Finish all surfaces exposed to view and concealed, before installation.. Select prime coats compatible with finish color selections.
   1. Exterior - Handrails and Guardrails: Gloss sheen.
   2. Exterior - All Other Surfaces: Semi-gloss sheen.

G. Galvanized Steel and Shop-Primed Metal Items: Exterior and Interior; Finish all surfaces exposed to view and to weather, including plaster joints and accessories, exposed portions of roof deck systems.
   1. Exterior - Handrails and Guardrails: Gloss sheen.
   2. Exterior - All Other Surfaces: Semi-gloss sheen.

H. Miscellaneous metals, conduits, non-factory-finished access panels: As specified for either unprimed or shop primed metals, modified as required to make sheen match adjacent surfaces. Finish the following items:
   1. Exposed portions of metal roof deck assemblies.
   2. Exposed surfaces of lintels.
   3. Exposed surfaces of steel stairs, ladders, fences, gates and railings.
   4. Mechanical and electrical equipment as specified in this section.

I. Exterior Pavement Markings: As specified in related Division 32 section.

3.11 SCHEDULE - COLORS

A. Building and Structure Exteriors: Allow individual Schedule with separate color selections for each Building:
   1. Walls; Field color as selected.
   2. Ceilings/soffits; as selected.
   3. Wainscot; as selected, allow for deep tones.
   4. Accent walls; as selected, allow for deep tones.
   5. Paint access doors and panels same as walls/wainscots.
   6. Wood Trim; as selected, allow for deep tones.
   7. Accent members; as selected, allow for deep tones.
   8. Doors and Frames; as selected, allow for deep tones and split finishes exterior/interior.
   9. Guardrails, handrails; as selected.
   10. Fences, gates; as selected.
   11. Rainwater leaders; as selected to match walls or gutters.
   12. Mechanical and electrical units and ductwork; match adjacent surface or as selected.

B. Site Work:
   1. Vehicle Barriers, Bollards and Gates: Paint OSHA "Hi-Visibility" Yellow.
   2. Domestic, Fire and Irrigation Water Service Piping and Valves: Paint above-ground portions selected color.
   3. Playground Equipment: Paint vertical posts of permanent basketball goals, volleyball net posts, tetherball poles OSHA "Hi-Visibility" Yellow.

END OF SECTION 09 9113

SECTION 09 9123
INTERIOR PAINTING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Surface preparation.

B. Field application of paints.

C. Materials for backpriming woodwork.

D. Scope: Finish interior surfaces exposed to view, unless fully factory-finished and unless otherwise indicated.
   1. Both sides and edges of plywood backboards for electrical and telecom equipment before installing equipment.
   2. Prime surfaces to receive wall coverings.
   3. Mechanical and Electrical:
      a. In finished areas, paint insulated and exposed pipes, conduit, boxes, insulated and exposed ducts, hangers, brackets, collars and supports, mechanical equipment, and electrical equipment, unless otherwise indicated.
      b. In finished areas, paint shop-primed items.
      c. Paint interior surfaces of air ducts that are visible through grilles and louvers with one coat of flat black paint to visible surfaces.
      d. Paint dampers exposed behind louvers, grilles, and convector and baseboard cabinets to match face panels.

1.02 RELATED REQUIREMENTS

A. Section 01 6116 - Volatile Organic Compound (VOC) Content Restrictions.

B. Pertinent sections of Division 05 specifying shop-primed and galvanized metal items.

C. Section 09 7200 - Wall Coverings.

1.03 DEFINITIONS

A. Comply with ASTM D16 for interpretation of terms used in this section.

1.04 REFERENCE STANDARDS

A. 40 CFR 59, Subpart D - National Volatile Organic Compound Emission Standards for Architectural Coatings; U.S. Environmental Protection Agency.

B. ASTM D16 - Standard Terminology for Paint, Related Coatings, Materials, and Applications.

C. Manufacturer's recommendations and specifications, including installation instructions.

D. MPI (APSM) - Master Painters Institute Architectural Painting Specification Manual.

E. SSPC-SP 1 - Solvent Cleaning.

F. SSPC-SP 2 - Hand Tool Cleaning.

G. SSPC-SP 6 - Commercial Blast Cleaning.

H. SSPC-SP 13 - Surface Preparation of Concrete; (Reaffirmed 2015).

1.05 SUBMITTALS

A. See Section 01 3300 - Submittals, for submittal procedures.

B. Product Data: Provide complete list of products to be used, with the following information for each:
   1. Manufacturer's name, product name and/or catalog number, and general product category (e.g. "alkyd enamel").
   2. MPI product number (e.g. MPI #47).
   3. Cross-reference to specified paint system(s) product is to be used in; include description of each system.
   4. Manufacturer's installation instructions.
   5. If proposal of substitutions is allowed under submittal procedures, explanation of substitutions proposed.
   6. Resin Type.
   7. Total VOC Content in grams per liter.
   8. Solids Content By Volume SCBV (not solids by weight). All products shall be minimum 35% SCBV.
   9. Composition-By-Weight. Demonstrate composition by percentage related to total weight of all components.
   10. Film Thickness Per Coat, Wet and Dry.
   11. Prime Pigment: Demonstrate prime pigment by percentage related to total volume of all components.

C. Samples: Submit three paper "draw down" samples, 8-1/2 by 11 inches in size, illustrating range of colors available for each finishing product specified.
   1. Where sheen is specified, submit samples in only that sheen.
   2. Where sheen is not specified, discuss sheen options with Architect before preparing samples, to eliminate sheens definitely not required.
   3. Allow 30 days for approval process, after receipt of complete samples by Architect.
   4. Paint color submittals will not be considered until color submittals for major materials not to be painted, such as factory finished metals, wood cabinets, wood doors, and wall coverings and tile, have been approved.

D. Certification: By manufacturer that paints and finishes comply with VOC limits specified.

E. Manufacturer's Instructions: Indicate special surface preparation procedures.

F. Maintenance Data: Submit data including finish schedule showing where each product/color/finish was used, product technical data sheets, material safety data sheets (MSDS), care and cleaning instructions, touch-up procedures, repair of painted and finished surfaces, and color samples of each color and finish used.

G. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
   1. See Section 01 6000 - Product Requirements, for additional provisions.
   2. Extra Paint and Finish Materials: 1 gallon of each color; from the same product run, store where directed.
   3. Label each container with color in addition to the manufacturer's label.

1.06 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the products specified, with minimum ten (10) years documented experience.

B. Applicator Qualifications: Company specializing in performing the type of work specified with minimum five (5) years experience and approved by manufacturer.

1.07 MOCK-UP

A. See Section 01 4000 - Quality Requirements, for general requirements for mock-up.

B. Provide panel, 8 feet long by 10 feet wide, illustrating paint color, texture, and finish.

C. Provide door and frame assembly illustrating paint color, texture, and finish.

D. Locate where directed by Architect.

E. Final color selections and acceptance will be made only after review of mock-ups under lighting conditions approximating finish conditions.

F. Mock-up may remain as part of the work.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Deliver products to site in sealed and labeled containers; inspect to verify acceptability.

B. Container Label: Include manufacturer's name, type of paint, brand name, lot number, brand code, coverage, surface preparation, drying time, cleanup requirements, color designation, and instructions for mixing and reducing.

C. Paint Materials: Store at minimum ambient temperature of 45 degrees F and a maximum of 90 degrees F, in ventilated area, and as required by manufacturer's instructions.

1.09 FIELD CONDITIONS

A. Do not apply materials when surface and ambient temperatures are outside the temperature ranges required by the paint product manufacturer.

B. Follow manufacturer's recommended procedures for producing best results, including testing of substrates, moisture in substrates, and humidity and temperature limitations.

C. Provide lighting level of 80 ft candles measured mid-height at substrate surface.

PART 2 PRODUCTS

2.01 DESIGN REQUIREMENTS

A. Design Intent: Paint all exposed surfaces of Work, whether or not the item or surface is specifically identified within the Contract Documents.
   1. The number of coats specified is the minimum to be applied. Provide paint finishes of even, uniform color, free from cloudy or mottled surfaces. Provide one additional coat if necessary where "deep colors" are selected.
   2. Non-scheduled items: Provide manufacturer's approved and recommended system as set forth in Manufacturer's "Specifications Architectural Finishes ".

2.02 MANUFACTURERS

A. Provide paints and finishes used in any individual system from the same manufacturer; no exceptions.

B. Paints:
   1. Benjamin Moore & Co: www.benjaminmoore.com.
   2. Dunn Edwards; www.dunnedwards.com.
   3. Kelly-Moore: www.kellymoore.com.
   4. Sherwin-Williams Company: www.sherwin-williams.com/#sle.

C. Primer Sealers: Same manufacturer as top coats.

D. Substitutions: See Section 01 6000 - Product Requirements.

2.03 PAINTS AND FINISHES - GENERAL

A. Paints and Finishes: Ready mixed, unless intended to be a field-catalyzed paint.
   1. Provide paints and finishes of a soft paste consistency, capable of being readily and uniformly dispersed to a homogeneous coating, with good flow and brushing properties, and capable of drying or curing free of streaks or sags.
   2. Provide materials that are compatible with one another and the substrates indicated under conditions of service and application, as demonstrated by manufacturer based on testing and field experience.
   3. For opaque finishes, tint each coat including primer coat and intermediate coats, one-half shade lighter than succeeding coat, with final finish coat as base color.
   4. Supply each paint material in quantity required to complete entire project's work from a single production run.
   5. Do not reduce, thin, or dilute paint or finishes or add materials unless such procedure is specifically described in manufacturer's product instructions.

B. Volatile Organic Compound (VOC) Content: Comply with Section 01 6116.

C. Flammability: Comply with applicable code for surface burning characteristics.

D. Sheens: Provide the sheens specified; where sheen is not specified, sheen will be selected later by Architect from the manufacturer's full line.

E. Colors: To be selected from manufacturer's full range of available colors.
   1. Selection to be made by Architect after award of contract.
   2. Allow for minimum of three colors for each system, unless otherwise indicated, without additional cost to Owner.
   3. Extend colors to surface edges; colors may change at any edge as directed by Architect.
   4. In finished areas, finish pipes, ducts, conduit, and equipment the same color as the wall/ceiling they are mounted on/under.
   5. In utility areas, finish equipment, piping, conduit, and exposed duct work in colors according to the color coding scheme indicated.

2.04 PAINT SYSTEMS - INTERIOR - CONCRETE AND MASONRY

A. Paint CI-OP-3L - Concrete/Masonry, Opaque, Latex, 3 Coat:
   1. One coat of block filler.
   2. Two coats of latex enamel; sheen selected by Architect.
   3. If any of the products below are discontinued, submit alternate products approved by the Manufacturer in writing.
   4. Dunn Edwards Products:
      a. Smooth BLOCFIL Premium SBPR00.
      b. SUPREMA SPMA50 Series.
   5. Kelly Moore Products:
      a. CMU: KM 521 FILL & PRIME Acrylic Block Filler.
      b. Concrete: KM 971 Acryplex Low VOC Interior Interior PVA Primer/Sealer.
      c. KM 1650 ACRY-PLEX Interior 100% Acrylic Enamel Series.

2.05 PAINT SYSTEMS - INTERIOR - METALS

A. Paint MI-OP-3A - Ferrous Metals, Primed or Unprimed, Alkyd, 3 or 4 Coat:
   1. One coat of alkyd primer:
   2. Two (or more) coats of Alkyd Enamel, as required to achieve specified appearance. Provide sheen as specified and number of coats as required to achieve specified

appearance; Gloss (Handrails and Guardrails), Semi-gloss (All other surfaces). Sheen selected by Architect.

3. If any of the products below are discontinued, submit alternate products approved by the Manufacturer in writing.
4. Dunn Edwards Products:
   a. BLOC-RUST Premium BRPR00 Red or White Oxide, as required for finish color selection.
   b. One coat or as required to achieve specified appearance, ARISTOSHIELD Series High-Gloss ASHL70 Water-Oil Hybrid Int/Ext, or as required for specified sheen.
5. Kelly-Moore Products:
   a. Rust-Oleum CV740, Alkyd Metal Primer.
   b. Two coats, 1999 Epic Water Urethane Modified Alkyd Gloss Enamel or as required for specified sheen.

B. Paint MI-OP-3L - Ferrous Metals, Primed or Unprimed, Latex, 3 Coat: Surfaces 8 feet or more above finish floor, trusses, metal roof deck, ductwork.
1. One coat of alkyd primer:
2. 2 coats of latex enamel; sheen as selected by Architect.
3. If any of the products below are discontinued, submit alternate products approved by the Manufacturer in writing.
4. Dunn Edwards:
   a. BLOC-RUST Premium Red or White Oxide, as required for finish color selection.
   b. EVERSHIELD EVSH60 100% Acrylic Gloss Enamel Series or SPARTAWALL SWLL50, as required for specified sheen.
5. Kelly-Moore Products:
   a. Rust-Oleum CV740 Alkyd Metal Primer.
   b. KM 1680 Series DURA-POXY + 100% Acrylic Enamel or 1650 ACRY-PLEX Low VOC Interior 100% Acrylic Semi-Gloss Enamel as required for specified sheen.

C. Paint MgI-OP-3A - Galvanized Metals, Alkyd, 3 Coat:
1. Pretreatment: reduce to minimum level for finish coat adhesion.
2. One coat alkyd metal primer.
3. Two coats of alkyd enamel, sheen as selected by Architect.
4. If any of the products below are discontinued, submit alternate products approved by the Manufacturer in writing.
5. Dunn-Edwards Products:
   a. DE Krud Kutter Metal Clean and Etch.
   b. DE ULTRASHIELD Galvanized Metal Primer ULGM00.
   c. DE ARISTOSHIELD ASHL70 Water-Oil Hybrid Int/Ext Series, High-Gloss or as selected by Architect.
6. Kelly Moore Products:
   a. Krud Kutter Metal Clean and Etch.
   b. KM 5725 DTM Primer / Finish.
   c. KM1998 / 1999 Epic Water Urethane Modified Alkyd Gloss Enamel.

D. Paint MgI-OP-3L - Galvanized Metals, Latex, 3 Coats: Surfaces 8 feet or more above finished floor, metal roof deck, ductwork, etc.
1. Pretreatment: Solvent wash to remove oily residue, ensure finish coat adhesion.
2. One Coat Galvanized Primer.
3. Two Coats Latex Enamel; sheen as selected by Architect
4. If any of the products below are discontinued, submit alternate products approved by the Manufacturer in writing.
5. Dunn-Edwards Products:

a. Pretreatment as recommended by topcoat manufacturer.
b. DE ULTRASHIELD Galvanized Metal Primer ULGM00.
c. DE SPARTASHIELD SSHL60 Series 100% Acrylic Enamel, as required for specified sheen.

6. Kelly Moore Products:
a. Pretreatment as recommended by topcoat manufacturer.
b. KM 5725 DTM Acrylic Primer / Finish.
c. KM : 1680 DURA-POXY + 100% Acrylic Gloss Enamel, as required for specified sheen.

2.06 PAINT SYSTEMS - INTERIOR - WOOD

A. Paint WI-OP-3L - Wood, Opaque, Latex, Low-VOC 3 Coat: Cedar, redwood, architectural glue-laminated beams, typical interior wood trim with opaque finish. Provide number of coats necessary for stain resistance and uniform color.
1. One coat of latex primer sealer.
2. Two coats of latex enamel; . Sheen selected by Architect.
3. Dunn-Edwards Products:
a. DE INTER-KOTE Wood Primer IKPR00.
b. DE SPARTAWALL 100 % Acrylic Semi-Gloss SWLL50 Series.
4. Kelly-Moore Products:
a. KM 973 Acryplex Low VOC Interior Enamel Undercoat.
b. KM 1050 Series Premium Professional Low VOC Interior Acrylic Latex.

B. Paint WI-OP-3L - Wood, Opaque, Latex, 3 Coat: Typical exposed interior beams above 8'-0".
1. One coat of latex primer sealer.
2. Two coats of latex enamel. Sheen selected by Architect.
3. If any of the products below are discontinued, submit alternate products approved by the Manufacturer in writing.
4. Dunn-Edwards Products:
a. Dunn-Edwards: INTER-KOTE Premium IKPR00.
b. Dunn-Edwards: SPARTAWALL SWLL30.
5. Kelly-Moore Products:
a. Kelly-Moore: 973 Acry-Plex Zero VOC Interior Undercoat .
b. Kelly-Moore: "KM 1010 Premium Professional Zero VOC Eggshell Enamel".

C. Wood to Receive Transparent Finishes: Finish as specified in related Section 09 9300.

2.07 PAINT SYSTEMS - INTERIOR - GYPSUM AND PLASTER

A. Paint GI-OP-3E - Gypsum Board, Plaster, Epoxy, 3 Coat:
1. One coat of synthetic resin primer sealer, quick dry, pigmented.
2. Two coats of two-component acrylic epoxy enamel; Semi-gloss sheen, or as selected by Architect.
3. If any of the products below are discontinued, submit alternate products approved by the Manufacturer in writing.
4. Dunn Edwards Products:
a. DE Vinylastic W101.
b. DE Rustoleum S-50.
5. Kelly Moore Products:
a. KM MonoChem Aqua Prime Primer
b. KM MonoChem 200 WB Epoxy Coating

B. Paint GI-OP-3A-L Gypsum Board/Plaster, Acrylic, Low-VOC, 3 Coat:

1. One coat of low odor/low-VOC vinyl acrylic primer sealer: pigmented.
2. Two coats of low odor / low-VOC acrylic, sheen as selected by Architect.
3. Note: Surfaces that prepared to a Level 5 Finish, using the Level 5 Primer/Prep Coat as specified in Section 09 2116 “Gypsum Board Assemblies", may omit primer coat specified above when topcoat manufacturer confirms in writing that this primer is compatible with the finish coats as specified.
4. If any of the products below are discontinued, submit alternate products approved by the Manufacturer in writing.
5. Dunn-Edwards Products:
   a. DE VINYLASTIC Premium VNPR00.
   b. DE SPARTAWALL 100 % Acrylic Semi-Gloss SWLL50 Series as required for specified sheen.
6. Kelly Moore Products:
   a. KM 971 Acry-Plex Low VOC Interior PVA Primer/Sealer.
   b. KM 1010 Premium Professional Interior 100% Acrylic Enamel Series, as required for specified sheen.

C. Paint GI-P-1A - Gypsum Board/Plaster, Alkyd Primer, 1 Coat: Preparation for application of Wall Covering.
1. One coat of primer sealer.
2. If any of the products below are discontinued, submit alternate products approved by the Manufacturer in writing.
3. Dunn-Edwards Products:
   a. DE ZINSSER Shieldz Universal Wallcovering Primer.
4. Kelly Moore Products:
   a. KM 265 Water-Oil Hybrid Int/Ext Primer Undercoat.

2.08 PRIMERS

A. Primers: As required or recommended by manufacturer of top coats; where the manufacturer offers options on primers for a particular substrate, use primer categorized as "best" by the manufacturer.
1. If products specified are discontinued, submit alternate product approved by specified Manufacturer in writing.

2.09 ACCESSORY MATERIALS

A. Accessory Materials: Provide primers, sealers, cleaning agents, cleaning cloths, sanding materials, and clean-up materials as required for final completion of painted surfaces.

B. Sanding materials: 120-180 grit, for architectural woodwork, finish carpentry, wood doors, or other surfaces requiring touch-up.

C. Patching Material: Latex filler.

D. Fastener Head Cover Material: Latex filler.

PART 3 EXECUTION

3.01 EXAMINATION

A. Do not begin application of paints and finishes until substrates have been properly prepared.

B. Verify that surfaces are ready to receive work as instructed by the product manufacturer.

C. Examine surfaces scheduled to be finished prior to commencement of work. Report any condition that may potentially effect proper application.

D. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

E. Test shop-applied primer for compatibility with subsequent cover materials.

F. Measure moisture content of surfaces using an electronic moisture meter. Do not apply finishes unless moisture content of surfaces are below the manufacturer-recommended maximums.

3.02 PROTECTION OF ADJACENT WORK

A. Protect surrounding elements from damage from painting procedures. Provide temporary facilities and barricades required. Additional requirements specified in Division 01.

B. Carefully remove and store removable items located in areas to be painted, including fixtures, fittings, finish hardware, and accessories; reinstall upon completion.

C. Separate areas to be protected from painting areas using means adequate to prevent damage.

D. Cover existing interior planters and landscaping with tarpaulins or similar covers.

E. Mask immediately adjacent surfaces with material that will withstand cleaning and restoration procedures.

3.03 PREPARATION

A. Clean surfaces thoroughly and correct defects prior to application.

B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

C. Remove or repair existing paints or finishes that exhibit surface defects.

D. Remove or mask surface appurtenances, including electrical plates, hardware, light fixture trim, escutcheons, and fittings, prior to preparing surfaces or finishing.

E. Seal surfaces that might cause bleed through or staining of topcoat.

F. Remove mildew from impervious surfaces by scrubbing with solution of tetra-sodium phosphate and bleach. Rinse with clean water and allow surface to dry.

G. Concrete:
   1. Remove release agents, curing compounds, efflorescence, and chalk. Do not coat surfaces if moisture content or alkalinity of surfaces to be coated exceeds that permitted in manufacturer's written instructions.
   2. Prepare surface as recommended by top coat manufacturer and according to SSPC-SP 13.

H. Masonry:
   1. Remove efflorescence and chalk. Do not coat surfaces if moisture content or alkalinity of surfaces or if alkalinity of mortar joints exceed that permitted in manufacturer's written instructions. Allow to dry.
   2. Prepare surface as recommended by top coat manufacturer.

I. Concrete Floors and Traffic Surfaces: Remove contamination, acid etch, and rinse floors with clear water. Verify required acid-alkali balance is achieved. Allow to dry.

J. Gypsum Board: Fill minor defects with filler compound. Spot prime defects after repair.

K. Plaster: Fill hairline cracks, small holes, and imperfections with latex patching plaster. Make smooth and flush with adjacent surfaces. Wash and neutralize high alkali surfaces.

L. Tackable Substrates for Wall Coverings: Prepare as for gypsum board.

M. Galvanized Surfaces:
1. Remove surface contamination and oils and wash with solvent according to SSPC-SP 1.
2. Prepare surface according to SSPC-SP 2.

N. Ferrous Metal:
1. Solvent clean according to SSPC-SP 1.
2. Shop-Primed Surfaces: Sand and scrape to remove loose primer and rust. Feather edges to make touch-up patches inconspicuous. Clean surfaces with solvent. Prime bare steel surfaces. Re-prime entire shop-primed item.
3. Remove rust, loose mill scale, and other foreign substances using using methods recommended in writing by paint manufacturer and blast cleaning according to SSPC-SP 6 "Commercial Blast Cleaning". Protect from corrosion until coated.

O. Wood Surfaces to Receive Opaque Finish: Wipe off dust and grit prior to priming. Seal knots, pitch streaks, and sappy sections with sealer. Fill nail holes and cracks after primer has dried; sand between coats. Back prime concealed surfaces before installation.

P. Glue-Laminated Beams: Prior to finishing, wash surfaces with solvent, remove grease and dirt.

Q. Metal Doors to be Painted: Prime metal door top and bottom edge surfaces.

3.04 PREPARATION - EXISTING SURFACES

A. General: As specified above and as follows below.

B. Remove or repair existing coatings that exhibit surface defects. Feather-edge patches to make finished edges inconspicuous.

C. Existing Cement Plaster Surfaces to be Painted: Remove dirt, loose mortar, scale, salt or alkali powder, and other foreign matter. Remove oil and grease with a solution of tri-sodium phosphate; rinse well and allow to dry. Surfaces to be clean, dry, free of dirt, dust, grease, oil, mildew, efflorescence and other contaminants affecting paint adhesion or performance. Completely remove all loose, peeling or checked paints by power-washing, scraping or other methods. Spot-prime and point-up cracks, voids or other surface fissures by methods recommended by paint manufacturer. Spot-prime again following patching. Remove stains caused by weathering of corroding metals with a solution of sodium metasilicate after thoroughly wetting with water. Allow to dry.

D. Existing Gypsum Board Surfaces to be Painted: Remove dirt, loose texturing, scale, salt or alkali powder, and other foreign matter. Remove oil and grease with a solution of tri-sodium phosphate; rinse well and allow to dry. Surfaces to be clean, dry, free of dirt, dust, grease, oil, mildew, efflorescence and other contaminants affecting paint adhesion or performance. Completely remove all loose, peeling or checked paints by sanding, scraping or other methods. Fill all holes and defects with suitable patching or spackling material compatible with the substrate material, allow to completely dry and sand to approximate existing adjacent textures. Spot prime patched areas.

E. Existing Metal Surfaces With Existing Coatings to be Recoated; sheet metal flashings and trim, hollow metal doors, frames, columns and similar items. Sand and scrape to remove existing finishes, loose primer and rust. Clean surfaces with solvent. Prime bare metal surfaces. Feather edges to make touch-up patches inconspicuous.

F. Existing Wood to Receive Opaque Finish: Completely remove all loose, peeling chalking, flaking or peeling paint by pressure-washing, scraping, wire brushing, sanding or other

appropriate methods which will not damage existing substrates or adjacent finishes. Dull glossy surfaces to provide roughened surface for proper adhesion. Remove all loose sealant and glazing compounds. Feather back rough paint edges and weathered wood material by sanding. Spot prime all areas before and after application of new sealants, patching or glazing materials. Remove dust, grit, and foreign matter. Seal knots, pitch streaks, and sappy sections. Fill nail holes with tinted exterior sealant compound after prime coat has been applied. Remove mildew growth as recommended by paint manufacturer.

G. Existing Metal Doors to be Painted Sand, patch, clean with solvent. Prime metal door top and bottom edge surfaces. Finish otherwise as for Existing Metal SurfacesWith Existing Coatings to be Recoated.

3.05 APPLICATION

A. Remove unfinished louvers, grilles, covers, and access panels on mechanical and electrical components and paint separately.

B. Apply products in accordance with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual".

C. Where adjacent sealant is to be painted, do not apply finish coats until sealant is applied.

D. Do not apply finishes to surfaces that are not dry. Allow applied coats to dry before next coat is applied.

E. Apply each coat to uniform appearance in thicknesses specified by manufacturer.

F. Dark Colors and Deep Clear Colors: Regardless of number of coats specified, apply as many coats as necessary for complete hide.

G. Sand wood and metal surfaces lightly between coats to achieve required finish.

H. Vacuum clean surfaces of loose particles. Use tack cloth to remove dust and particles just prior to applying next coat.

I. Wood to Receive Transparent Finishes: Tint fillers to match wood. Work fillers into the grain before set. Wipe excess from surface.

J. Reinstall electrical cover plates, hardware, light fixture trim, escutcheons, and fittings removed prior to finishing.

3.06 FIELD QUALITY CONTROL

A. See Section 01 4000 - Quality Requirements, for general requirements for field inspection.

3.07 CLEANING

A. Collect waste material that could constitute a fire hazard, place in closed metal containers, and remove daily from site.

3.08 PROTECTION

A. Protect finishes until completion of project.

B. Touch-up damaged finishes after Substantial Completion.

3.09 SCHEDULE - SURFACES NOT REQUIRING PAINTING BY THIS SECTION

A. Do Not Paint or Finish the Following Items:

1. Items factory-finished except those specifically noted in this section to be finished; materials and products having factory-applied primers are not considered factory finished.
2. Equipment, ductwork, conduit and electrical items, with factory finishes suitable for interior exposure, where concealed from public or occupant view in custodial or utility spaces.
3. Items indicated to receive other finishes.
4. Items indicated to remain unfinished.
5. Fire rating labels, equipment serial number and capacity labels, and operating parts of equipment.
6. Stainless steel, anodized aluminum, bronze, terne coated stainless steel, zinc, and lead items.
7. Marble, granite, slate, and other natural stones.
8. Ceramic and other types of tiles.
9. Pre-finished wall, ceiling, roof and floor materials or coverings, unless specifically scheduled for field painting, including, but not limited to:
10. Floors, unless specifically indicated.
11. Brick, glass unit masonry, architectural concrete, cast stone, integrally colored plaster and stucco unless specifically indicated.
12. Glass.
13. Concealed pipes, ducts, and conduits.

3.10 SCHEDULE - SURFACES TO BE FINISHED

A. General: Paint the surfaces described below under Schedule - Paint Systems. All surfaces exposed to interior atmosphere, or visible to the eye, unless specifically excluded by the Article titled "Do Not Paint or Finish the Following Items". If a coating system is not specified for a particular surface or substrate, provide a three-coat finish system recommended by the paint or coating manufacturer for that surface or substrate. Include all preparation necessary as appropriate for a similar substrate listed in the Article titled "PREPARATION", or preparation for that substrate as recommended by the paint or coating manufacturer.

B. Mechanical and Electrical: Use paint systems defined for the materials to be finished.
   1. Paint all conduit, insulated and exposed pipes, boxes, hangers, brackets, collars and supports, mechanical equipment, electrical equipment, and exposed ducts occurring in finished areas to match background surfaces, unless otherwise indicated.
   2. Paint shop-primed items occurring in finished areas.
   3. Paint interior surfaces of air ducts that are visible through grilles and louvers with one coat of flat black paint to visible surfaces.
   4. Paint dampers exposed behind louvers, grilles, to match face panels.

C. Paint behind moveable equipment and furniture.

D. Finish top, bottom, and side edges of interior doors the same as exposed faces.

E. Paint access doors, fire hose and extinguisher cabinets, panelboards, conduits and exposed plumbing piping.

F. Paint exposed metal decks.

G. Paint reveal moldings, expansion joints, and handrails.

H. Paint tube column and miscellaneous connections.

I. Provide split finishes for painted doors and interior windows where different connected room colors are selected.

J. Paint continuous surfaces with the same paint system. Do not change systems at elevation breaks.

K. Touch-up factory paint finishes where damaged.

L. Paint both sides and edges of plywood backboards for electrical and telephone equipment before installing equipment.

3.11 SCHEDULE - INTERIOR PAINT SYSTEMS - CONCRETE AND MASONRY

A. Gypsum Board: Finish all surfaces exposed to view, GI-OP-3A..
   1. Interior Ceilings and Bulkheads: Flat sheen.
   2. Interior Walls: Semi-gloss Sheen at Toilet Rooms, Custodians, Storage Room, Food Service.
   3. Interior Walls: Eggshell at Classrooms, Corridors, Administrative Offices and Work Rooms.

B. Wood: Finish all surfaces exposed to view.
   1. Interior Opaque Finish: WI-OP-3L
      a. Trim and frames: Semi-gloss sheen.
      b. Beams: Low Sheen.

C. New Wood Doors: Factory-finished.

D. Steel Doors and Frames: Finish all surfaces exposed to view and to weather, including door tops and bottoms. Select prime coats compatible with finish color selections. MI-OP-3A.
   1. Semi-gloss sheen.

E. Metal Fabrications, Galvanized Steel and Shop-Primed Metal Items: Finish all surfaces exposed to view and concealed, before installation, including exposed portions of metal roof or floor deck assemblies.. Select prime coats compatible with finish color selections. MI-OP-3A for surfaces under 8 feet above floor. MI-OP-3L for surfaces over 8 feet above floor.
   1. Interior - Handrails and exposed spiral seamed ductwork: Gloss sheen.
   2. Interior - All Other Surfaces: Semi-gloss sheen.

F. Exposed Interior Steel with Intumescent Mastic Fireproofing: Finish all surfaces MI-IT-3A, Gloss.

G. Miscellaneous metals, conduits, non-factory-finished access panels: As specified for either unprimed or shop primed metals, modified as required to make sheen match adjacent surfaces.
   1. Finish the following items:
      a. Exposed portions of metal roof and floor deck assemblies.
      b. Exposed surfaces of lintels.
      c. Exposed surfaces of steel stairs, ladders, fences, gates and railings.
      d. Mechanical equipment.
      e. Electrical equipment.

H. Wall and Substrate Surfaces Under Wall Covering: GI-P-1A.

3.12 SCHEDULE - COLORS

A. Interiors, allow individual schedule for each Building:
   1. Walls; Field color as selected.
   2. Ceilings/soffits; as selected, allow for deep tones.
   3. Wainscot; as selected, allow for deep tones.
   4. Accent walls; as selected, allow for deep tones.

5. Paint access doors and panels same as walls and wainscots.
6. Wood Trim; as selected, allow for deep tones.
7. Accent members; as selected, allow for deep tones.
8. Doors and Frames; as selected, allow for deep tones and split finishes exterior/interior.
9. Doors and Frames for Utility or staff access only, as selected; match walls/wainscot.
10. Guardrails, handrails; as selected.
11. Exposed trusses or structural members; as selected, allow for deep tones.
12. Exposed ductwork; as selected, allow for deep tones.
13. Mechanical or other equipment exposed to view; as selected or match wall/wainscot as directed.

END OF SECTION 09 9123

SECTION 09 9300
STAINING AND TRANSPARENT FINISHING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Surface preparation.

B. Field application of stains and transparent finishes.

1.02 RELATED REQUIREMENTS

A. Section 01 6116 - Volatile Organic Compound (VOC) Content Restrictions.

1.03 DEFINITIONS

A. Comply with ASTM D16 for interpretation of terms used in this section.

1.04 REFERENCE STANDARDS

A. 40 CFR 59, Subpart D - National Volatile Organic Compound Emission Standards for Architectural Coatings; U.S. Environmental Protection Agency.

B. ASTM D16 - Standard Terminology for Paint, Related Coatings, Materials, and Applications.

C. ASTM D4442 - Standard Test Methods for Direct Moisture Content Measurement of Wood and Wood-Base Materials.

D. MPI (APSM) - Master Painters Institute Architectural Painting Specification Manual.

E. SCAQMD 1113 - South Coast Air Quality Management District Rule No.1113.

1.05 SUBMITTALS

A. See Section 01 3300- Submittals for submittal procedures.

B. Product Data: Provide complete list of products to be used, with the following information for each:
   1. Manufacturer's name, product name and/or catalog number, and general product category.
   2. Manufacturer's installation instructions.
   3. If proposal of substitutions is allowed under submittal procedures, explanation of substitutions proposed.

C. Samples: Submit two samples, illustrating selected colors and sheens for each system with specified coats cascaded. Submit on actual wood substrate to be finished, ____by____ inch in size.

D. Certification: By manufacturer that stains and transparent finishes comply with VOC limits specified.

E. Manufacturer's Instructions: Indicate special surface preparation procedures.

F. Maintenance Data: Submit data including finish schedule showing where each product/color/finish was used, product technical data sheets, safety data sheets (SDS), care and cleaning instructions, touch-up procedures, and color samples of each color and finish used.

G. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
   1. See Section 01 6000 - Product Requirements, for additional provisions.

2. Extra Stain and Transparent Finish Materials: 1 gallon of each color and type; from the same product run, store where directed.
3. Label each container with color and type in addition to the manufacturer's label.

1.06 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the products specified, with minimum ten years documented experience.

B. Applicator Qualifications: Company specializing in performing the type of work specified with minimum five years experience and approved by manufacturer.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Deliver products to site in sealed and labeled containers; inspect to verify acceptability.

B. Container Label: Include manufacturer's name, type of stain or transparent finish, brand name, lot number, brand code, coverage, surface preparation, drying time, cleanup requirements, color designation, and instructions for mixing and reducing.

C. Stain and Transparent Finish Materials: Store at minimum ambient temperature of 45 degrees F and a maximum of 90 degrees F, in ventilated area, and as required by manufacturer's instructions.

1.08 FIELD CONDITIONS

A. Do not apply materials when surface and ambient temperatures are outside the temperature ranges required by manufacturer of stains and transparent finishes.

B. Follow manufacturer's recommended procedures for producing best results, including testing of substrates, moisture in substrates, and humidity and temperature limitations.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. VOC limits for adhesives, sealants, fillers, primers, and coatings. Comply with limits specified in related section.

B. Material Compatibility:
1. Provide materials for use within each finish system that are compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
2. For each coat in a finish system, provide products recommended in writing by manufacturers of topcoat for use in finish system and on substrate indicated.

C. Single Source Responsibility: Provide products from a single manufacturer for entire Project.

D. Products: Subject to compliance with requirements, provide one of the products listed in other Part 2 articles for the category indicated.

E. If products in this schedule are discontinued or unavailable, submit latest alternate products by the same manufacturer, with letter signed by manufacturer’s representative describing the reason for change.

F. Transparent Finishes:
1. Sherwin-Williams Company: www.sherwin-williams.com/#sle.
2. Dunn-Edwards: OKON manufactured by Zinsser Brands/Rust-Oleum Corporation; www.zinsser.com , distributed by Dunn Edwards Paints.

G. Stains:
1. Sherwin-Williams Company: www.sherwin-williams.com/#sle.
2. Dunn-Edwards: OKON manufactured by Zinsser Brands/Rust-Oleum Corporation; www.zinsser.com , distributed by Dunn Edwards Paints.
3. CABOT Semi-Transparent Exterior Stain; web: www.cabotstain.com

H. Substitutions: See Section 01 6000 - Product Requirements.

2.02 Stains and Transparent FINISHES - GENERAL

A. Finishes:
1. Provide finishes capable of being readily and uniformly dispersed to a homogeneous coating, with good flow and brushing properties, and capable of drying or curing free of streaks or sags.
2. Provide materials that are compatible with one another and the substrates indicated under conditions of service and application, as demonstrated by manufacturer based on testing and field experience.
3. Supply each finish material in quantity required to complete entire project's work from a single production run.
4. Do not reduce, thin, or dilute finishes or add materials unless such procedure is specifically described in manufacturer's product instructions.

B. Volatile Organic Compound (VOC) Content:
1. Provide stains and transparent finishes that comply with the most stringent requirements specified in the following:
a. 40 CFR 59, Subpart D--National Volatile Organic Compound Emission Standards for Architectural Coatings.
b. SCAQMD 1113 Rule.
2. Determination of VOC Content: Testing and calculation in accordance with 40 CFR 59, Subpart D (EPA Method 24), exclusive of colorants added to a tint base and water added at project site; or other method acceptable to authorities having jurisdiction.

C. Flammability: Comply with applicable code for surface burning characteristics.

D. Sheens: Provide the sheens specified; where sheen is not specified, sheen will be selected later by Architect from the manufacturer's full line.

E. Colors: To be selected from manufacturer's full range of available colors.
1. Selection to be made by Architect after award of contract.
2. Extend colors to surface edges; colors may change at any edge as directed by Architect.

2.03 Exterior STAIN AND TRANSPARENT FINISH SYSTEMS

A. Natural (Transparent Tone) Wood Stain: 2 coats (wet-on-wet application).
1. PPG Architectural Finishes, Inc Products:
a. 565 Series CWF-UV5 Premium Clear Wood Finish.

B. Colored Stain, Semi-Transparent Wood Finish: 2 coats (wet-on-wet application)
1. PPG Architectural Finishes, Inc Products:
a. FLOOD 832 South Coast Semi-Transparent Stain.
2. Dunn-Edwards Products.
a. OKON Weather Pro manufactured by Zinsser Brands/Rust-Oleum Corporation; tel: (732) 469-8100, web: www.zinsser.com , distributed by Dunn Edwards Paints.
3. Cabot Products.
a. CABOT Translucent Exterior Finish; web: www.cabotstain.com .

C. Finish on Wood:
1. 1 coat(s) stain.
2. 1 coat(s) sealer.
3. 2 coat(s) varnish.
4. Stain: Exterior Solid Stain for Wood, Water Based; _____.
   a. Products:
      1) PPG Paints ProLuxe Premium Solid Wood Finish, SIK710 Series, Matte. (MPI #16)
      2) Sherwin-Williams WoodScapes Acrylic Solid Color Stain. (MPI #16)
      3) Substitutions: Section 01 6000 - Product Requirements.
5. Top Coat(s): Exterior Clear Water Based Varnish with UV Inhibitor.
   a. Products:
      1) PPG Paints Deft Interior/Exterior Water-Based Polyurethane, DFT259, Satin.
      2) PPG Paints Deft Interior/Exterior Water-Based Polyurethane, DFT258, Semi-Gloss
      3) PPG Paints Deft Interior/Exterior Water-Based Polyurethane, DFT257, Gloss.
      4) Substitutions: Section 01 6000 - Product Requirements.
6. Top Coat Sheen: As inidcated on Drawings.

2.04 Interior STAIN AND TRANSPARENT FINISH SYSTEMS

A. Finish on Wood - Vertical Surfaces:
1. 1 coat(s) stain.
2. 1 coat(s) sealer.
3. 2 coat(s) varnish.
4. Stain: Semi-Transparent Stain for Wood, Water Based.
   a. Products:
      1) PPG Paints Deft Interior Water-Based Wood Stain, DFT300 Series. (MPI #186)
5. Stain: Clear Stain for Wood, Water Based.
   a. Products:
      1) PPG Paints Deft Interior Clear Water-Based Wood Stain, DFT300 Series. (MPI #186)
6. Sealer: Alkyd, Sanding Sealer, Clear; MPI #102.
   a. Products:
7. Top Coat(s): Clear Water Based Varnish.
   a. Products:
      1) PPG Paints Deft Interior/Exterior Water-Based Polyurethane, DFT259, Satin.
      2) PPG Paints Deft Interior/Exterior Water-Based Polyurethane, DFT 258, Semi-Gloss.
      3) PPG Paints Deft Interior/Exterior Water-Based Polyurethane, DFT257, Gloss. (MPI #129)
8. Top Coat Sheen: As indicated on Drawings.

2.05 ACCESSORY MATERIALS

A. Accessory Materials: Cleaning agents, cleaning cloths, sanding materials, and clean-up materials as required for final completion of finished surfaces.

B. Wood Filler Paste: MPI #91, or similar, compatible with the water repellent wood stain.
1. VOC Content: E Range of E2.
2. Match color of wood species.
3. Shop-applied products as recommended by staining manufacturer

C. Patching Material: Latex filler.

D. Fastener Head Cover Material: Latex filler.

PART 3 EXECUTION

3.01 EXAMINATION

A. Do not begin application of stains and finishes until substrates have been properly prepared.

B. Verify that surfaces are ready to receive work as instructed by the product manufacturer.

C. Examine surfaces scheduled to be finished prior to commencement of work. Report any condition that may potentially effect proper application.

D. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

E. Measure moisture content of surfaces using an electronic moisture meter. Do not apply finishes unless moisture content of surfaces are below the following maximums:
1. Wood: 15 percent, measured in accordance with ASTM D4442.

3.02 PREPARATION

A. Clean surfaces thoroughly and correct defects prior to application.

B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

C. Remove or repair existing finishes that exhibit surface defects.

D. Remove or mask surface appurtenances, including electrical plates, hardware, light fixture trim, escutcheons, and fittings, prior to preparing surfaces or finishing.

E. Seal surfaces that might cause bleed through or staining of topcoat.

F. Wood Surfaces to Receive Opaque Finish: Wipe off dust and grit prior to priming. Seal knots, pitch streaks, and sappy sections with sealer. Fill nail holes and cracks after primer has dried; sand between coats. Back prime concealed surfaces before installation.

G. Wood Surfaces to Receive Transparent Finish: Wipe off dust and grit prior to sealing, seal knots, pitch streaks, and sappy sections with sealer. Fill nail holes and cracks after sealer has dried; sand lightly between coats. Prime concealed surfaces with gloss varnish reduced 25 percent with thinner.

H. Wood Doors to be Field-Finished: Seal wood door top and bottom edge surfaces with clear sealer.

3.03 APPLICATION

A. Apply products in accordance with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual".

B. Do not apply finishes to surfaces that are not dry. Allow applied coats to dry before next coat is applied.

C. Apply each coat to uniform appearance in thicknesses specified by manufacturer.

D. Sand wood surfaces lightly between coats to achieve required finish.

E. Vacuum clean surfaces of loose particles. Use tack cloth to remove dust and particles just prior to applying next coat.

F. Wood to Receive Transparent Finishes: Tint fillers to match wood. Work fillers into the grain before set. Wipe excess from surface.

G. Reinstall items removed prior to finishing.

3.04 CLEANING

A. Collect waste material that could constitute a fire hazard, place in closed metal containers, and remove daily from site.

3.05 PROTECTION

A. Protect finishes until completion of project.

B. Touch-up damaged finishes after Substantial Completion.

END OF SECTION 09 9300

SECTION 10 1100
VISUAL DISPLAY UNITS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Markerboards.
   1. Fixed Type.
   2. Accessories.

1.02 RELATED REQUIREMENTS

A. Section 01 6116 - Volatile Organic Compound (VOC) Content Restrictions.

B. Section 01 8113 - Sustainable Design Requirements.

C. Section 06 1000 - Rough Carpentry: Blocking and supports.

D. Section 06 4100 - Architectural Woodwork: Reference standards for installation of sliding visual display boards into custom cabinets.

1.03 REFERENCE STANDARDS

A. ANSI A135.4 - American National Standard for Basic Hardboard.

B. ANSI A208.1 - American National Standard for Particleboard.

C. ASTM A424/A424M - Standard Specification for Steel, Sheet, for Porcelain Enameling.

D. California Code of Regulations, Title 24, Part 2, California Building Code (CBC), International Building Code.

E. California Code of Regulations, Title 24, Part 11, California Green Building Standards Code, “CAL-Green”.

F. GREENGUARD Environmental Institute: GREENGUARD Indoor Air Quality Certified.

G. Porcelain Enamel Institute: PEI-1002 Manual and Performance Specifications for Porcelain Enamel Writing Surfaces.

1.04 SUBMITTALS

A. See Section 01 3300 - Submittals, for submittal procedures.

B. Product Data: Provide manufacturer's data on chalkboard, markerboard, tackboard, tackboard surface covering, trim, and accessories.

C. CAL-GREEN Submittals:
   1. Product Data – VOC Limits: For adhesives, sealants, fillers, primers and coatings, documentation including printed statement of VOC contents, comply with limits specified in related section.
   2. Composite Wood Formaldehyde Limits: Provide certification that all products meet current CARB Airborne Toxic Control Measure (ATCM) for Composite Wood Formaldehyde Limits by Mandatory Compliance Dates as specified in related section.

D. Shop Drawings: Indicate wall elevations, dimensions, joint locations, special anchor details.

E. Samples: Submit color charts for selection of color and texture of chalkboard, markerboard, tackboard, tackboard surface covering, and trim.

F. Test Reports: Show compliance to specified surface burning characteristics requirements.

G. Manufacturer's printed installation instructions.

H. Maintenance Data: Include data on regular cleaning, stain removal, and maintenance precautions.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

1.06 FIELD CONDITIONS

A. Field measure prior to preparation of shop drawings and fabrication, to ensure proper fit.

B. Do not begin installation of visual display boards until environmental conditions approximate normal occupied conditions.

1.07 WARRANTY

A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.

B. Submit manufacturer's "Life of the Building" warranty, stating that under normal usage and maintenance, and when installed in accordance with manufacturer's instructions and recommendations, porcelain enamel steel chalkboards and markerboards are guaranteed for the life of the building.
   1. Warranty shall cover replacement of defective boards but not the cost of removal or reinstallation.

PART 2 PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

A. VOC Limits for adhesives, sealants, fillers, primers and coatings . Comply with limits specified in related section.

B. Composite Wood products must meet current CARB Airborne Toxic Control Measure (ATCM) for Composite Wood Formaldehyde Limits by Mandatory Compliance Dates as specified in Section 01 6116.

2.02 MANUFACTURERS

A. Visual Display Boards:
   1. AARCO Products, Inc.; web: www.aarcoproducts.com .
   2. Platinum Visual Systems as distributed by ABC School Equipment. www.pvsusa.com

2.03 VISUAL DISPLAY UNITS

A. Markerboards: Porcelain enamel on steel, laminated to core. Magnetic type.
   1. Steel Face Sheet Thickness: 24 gage, 0.0239 inch .
   2. Core: Particleboard, manufacturer's standard thickness, laminated to face sheet.
   3. Backing: Aluminum foil, laminated to core.
   4. Size: As indicated on drawings. If no size is shown, provide 48 inches by 96 inches.
   5. Frame: Extruded aluminum, with concealed fasteners.
   6. Frame Finish: Anodized, natural.
   7. Accessories: Provide chalk tray and map rail.

2.04 FABRICATION

A. Laminate facing sheet and backing sheet to core material under pressure, using manufacturer's recommended adhesive.

B. Provide factory-assembled visual display boards, except where sizes demand partial field assembly.
   1. Free of cups and bows, facing sheet and core continuous with no joints for entire length of board.

C. Assemble units in one piece without joints, wherever possible. Where required dimensions exceed maximum panel size available, provide 2 or more pieces of equal length, as indicated on approved shop drawings. Assemble to verify fit at factory, then disassemble for delivery and final assembly at project site.

D. Miter corners to neat hairline closure.

E. Combination Units and Units Made of More Than One Panel: Factory-assembled chalkboards, markerboards, and tackboards in a single frame, of materials specified above.
   1. Join panels of different construction with H-shaped extruded aluminum molding finished to match frame.
   2. Join panels of similar construction with butt joints, aligned and secured with steel spline concealed in edge of core.
   3. Configuration: As indicated on drawings.

2.05 MATERIALS

A. Porcelain Enameled Steel Sheet: ASTM A424/A424M, Type I, Commercial Steel, with fired-on vitreous finish.

B. Hardboard for Cores: ANSI A135.4, Class 1 - Tempered, S2S (smooth two sides).

C. Particleboard: ANSI A208.1; wood chips, set with waterproof resin binder, sanded faces.

D. Foil Backing: Aluminum foil sheet, 0.005 inch thick.

E. Adhesives: Type used by manufacturer.

2.06 ACCESSORIES

A. Map Rail: Extruded aluminum, manufacturer's standard profile, with cork insert and runners for accessories; 1 inch wide overall, full width of frame.

B. Temporary Protective Cover: Sheet polyethylene, 8 mil thick.

C. Cleaning Instruction Plate: Provide instructions for chalkboard cleaning on a metal plate fastened to perimeter frame near chalkrail.

D. Chalk Tray: Aluminum, manufacturer's standard profile, one piece full length of chalkboard, open ends, concealed fasteners, same finish as frame.

E. Mounting Brackets: Concealed.

PART 3 EXECUTION

3.01 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.

3.02 INSTALLATION

A. Install boards in accordance with manufacturer's instructions.

B. Install all grounds, clips, backing materials, adhesives, brackets, anchors, trim, and accessories necessary for a complete installation.

C. Secure units level and plumb. Align perimeter trim for visual continuity and in accordance with manufacturer's recommendations.

D. Butt Joints: Install with tight hairline joints.

E. Where sliding visual display boards are installed in custom cabinets, provide track stops as recommended by board manufacturer to prevent sliding boards from impacting cabinet frames and comply with Referenced Standards for cabinet work.

3.03 CLEANING

A. Verify that all accessories are installed as required for each unit.

B. Clean board surfaces in accordance with manufacturer's instructions.

C. Cover with protective cover, taped to frame.

D. Remove temporary protective cover at Date of Substantial Completion.

E. Protect completed work from damage until acceptance. Replace damaged work.

END OF SECTION 10 1100

SECTION 10 1400
SIGNAGE

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Room and door signs with raised tactile letters and braille.

B. Interior directional and informational signs with raised tactile letters and braille.

C. Vinyl Graphics.

1.02 RELATED REQUIREMENTS

A. Division 08: Pertinent sections specifying doors and glazing materials serving as the mounting surface for signage.

B. Division 09: Pertinent sections specifying wall finishes and substrates serving as the mounting surface for signage.

1.03 REFERENCE STANDARDS

A. 36 CFR 1191 - Americans with Disabilities Act (ADA) Accessibility Guidelines for Buildings and Facilities; Architectural Barriers Act (ABA) Accessibility Guidelines.

B. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design.

C. California Code of Regulations, Title 24, Part 2, California Building Code (CBC), International Building Code.

D. Standards for jurisdiction where project is located.

1.04 SUBMITTALS

A. See Section 01 3300 - Submittals for submittal procedures.

B. Product Data: Manufacturer's printed product literature for each type of sign, indicating sign styles, font, foreground and background colors, locations, overall dimensions of each sign.

C. 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 drawings, include the drawing room number on schedule.
   2. When content of signs is indicated to be determined later, 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.

D. Shop Drawings: Indicate sign styles, lettering font, foreground and background colors, locations, overall dimensions of each sign.
   1. Submit shop drawing at scaled size for each typical sign. Indicate: Proposed copy, letter height, spacing and location of lettering on the sign field, colors and materials of each element and lettering. Tabular listing of signage and copy alone is not acceptable.
   2. Submit tabular listing for each sign keyed to location indicated on drawings, including all text and adjacent space for Owner modification/confirmation of text.
   3. Provide all drawings and detail documents necessary to complete the project.

4. Where sizes for signs are impacted by dimensions of surfaces or locations on which they are to be installed, verify dimensions by field measurement. Indicate measurements and signage locations on shop drawings for approval prior to production.
5. Indicate for monument sign: Member and material profiles, sizes, connection attachments, reinforcing, anchorage, size and type of fasteners, and accessories. Include erection drawings, elevations, and details

E. Samples: Submit two samples of each type of sign, of size similar to that required for project, illustrating sign style, font, and method of attachment.

F. Selection Samples: Where colors are not specified, submit two sets of color selection charts or chips.

G. Manufacturer's Installation Instructions: Include installation templates and attachment devices.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum Five years of documented experience.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Package signs as required to prevent damage before installation.

B. Package room and door signs in sequential order of installation, labeled by floor or building.

PART 2 PRODUCTS

2.01 REGULATORY REQUIREMENTS

A. Conform to applicable code for requirements..
1. C.C.R., Title 24, Part 2. California Building Code, Sections 1009.8, 1009.9, 1023.8, 1023.9, 1023.10 and 11B-703 for requirements governing signage design, location and attributes.
2. Braille Symbols: Contracted Grade 2 Braille symbols shall be used per CBC 11B-703.3. Provide only domed Contracted Grade 2 Braille symbols with dimensions in accordance with Table 11B-703.3.1.
3. Signs shall be field-inspected per CBC 11B-703.1.1.2.

B. It is the sole responsibility of the signage contractor to obtain all permits required for signage contained in this project. Signage contractor to obtain, provide, produce and process all documentation, and pay all fees required for the permitting process.

2.02 MANUFACTURERS

A. Plaque Signs:
1. Advance Corporation / Braille-Tac Division; Product Braille-Tac Etched Magnesium (Chemsast): 8200 - 97th Street South, Cottage Grove, Minnesota 55016: Telephone 800-328-9451; www.advancecorp.com/brailletac
2. Substitutions: See Section 01 6000 - Product Requirements.

B. Vinyl Graphics:
1. 3M / Commercial Products Division; Product 3M Premium Grade Vinyl: 3M Center, Building 220-6W-06, Post Office Box 33220, St. Paul, Minnesota 55133-3220: Telephone 800-374-6772.
2. Substitutions: See Section 01 6000 - Product Requirements.

2.03 SIGNAGE APPLICATIONS

A. Accessibility Compliance: Signs are required to comply with ADA Standards and applicable building codes, unless otherwise indicated; in the event of conflicting requirements, comply with the most comprehensive and specific requirements.

B. Room and Door Signs: Provide a sign for every doorway, whether it has a door or not, not including corridors, lobbies, and similar open areas.
   1. Sign Type: Flat signs with engraved panel media as specified.
   2. Provide "tactile" signage, with letters raised minimum 1/32 inch and Grade II braille.
   3. Character Height: 1 inch.
   4. Sign Height: 3 inches, unless otherwise indicated.
   5. Service Rooms: Identify with room names and numbers to be determined later, not those indicated on drawings.

C. Interior Directional and Informational Signs:
   1. Sign Type: Same as room and door signs.
   2. Lift Signage: Pictograms and copy shown on Drawings.
   3. Room Occupancy Signage: All rooms with Occupant Load greater than 50. Verify actual numbers with Architect.
   4. Tactile Exit and Exit Route Signs: Raised letters and Braille as specified for Room and Door signs.
   5. Exit Stair and Exit Ramp Signs: Raised letters and Braille as specified for Room and Door signs.
   6. Assistive Listening Sign: Pictogram and copy shown on Drawings.
   7. Other sign types indicated on the Drawings.
   8. Wording of signs is scheduled on drawings.

D. Traffic and Regulatory Signs: Conform to requirements of local authority having jurisdiction and CalTrans Traffic Manual for the type of sign indicated.

2.04 PLAQUE SIGNS

A. Plaque Signs: One piece magnesium metal construction with raised character copy and braille with thermal-set, polyurethane finish. Tactile legends and Braille shall comply with Americans with Disabilities Act (ADA) , Califiornia Building Code (CBC) and requirements indicated for quantities, sizes, layouts, materials, finishes, color, etc. as specified in the Graphics Schedule and Drawings/Specifications.
   1. Exterior durability rating: 3 years minimum.
   2. Painted Finish:
      a. Weatherability: When tested in acordance with ASTM G 53, after 500 hours in a Weatherometer (equivilent to 3 years of esterior esposure) gloss retention of not less than 88.0 determined in accordance with ASTM D 523 as a 60 degree angle.
      b. Color Fade Resistance: Color shall not change more than 1.68 units determined in accordance with ASTM D 2244 and measured with a Hunter colormeter, Model D25.
      c. Durability: Sign finish shall show no effect after requested use of cleaners such as Graffiti Remover #1120 manufactured by Fine Organics Corp., Lodi, NJ.
   3. Colors: Custom, as selected by Architect.
   4. Total Thickness: 0.153 inches.
   5. Sign Edges: Square. Sign edges at geometric symbols shall be eased or chamfered in accordance with governing code.

B. Raised Characters:
   1. Comply with applicable provisions of ANSI/ICC A117.1, including Braille.

2. Character Color: As selected by Architect..
3. Character Font: As Indicated.
4. Character Stroke Width: As required by referenced codes, 1/8 inch.
5. Character Height: As indicated. If not shown, provide 1 inch.
6. Character Edges: Square.
7. Character Case: Upper case only.

2.05 VINYL GRAPHICS

A. Adhesive Vinyl Graphics of ISA for installation on glass or similar substrates.

B. Base Material: Premium Grade with an outdoor durability rating of five years.
1. Color: Provide as shown on Drawings. If no colors are indicated, provide International Blue with white pictograms..

2.06 ACCESSORIES

A. Concealed Screws: Stainless steel, galvanized steel, chrome plated, or other non-corroding metal.

B. Exposed Screws: Stainless steel.

C. Mounting Hardware: Vandal-proof screws, stainless steel, size recommended by manufacturer to suit applications and resist applied loads.

D. Adhesive: 3M Corporation, "VHB", applied in 5 mil thickness covering entire back of sign plaque without void or bubble.

E. Silicon Adhesive: Silglaze II #2801 GE Clear - Silicone Sealant / Adhesive.

F. Accessories and materials required for complete installation as indicated.

PART 3 EXECUTION

3.01 COORDINATION

A. For signs supported by or anchored to permanent construction such as building such as building fascias, advise installers about specific requirements for placement of anchorage devices and similar items to be used for attaching signs.

3.02 EXAMINATION

A. Confirm visibility of site signage and graphics in indicated locations. Do not install signs in locations where they will not be visible or where they will obstruct visibility of other related building elements, such as exit signage or life safety equipment provided under other contracts or sections. Request direction from Architect in the event of conflict with signage and building elements.

B. Verify that substrate surfaces are ready to receive work.

C. Clean substrates to receive adhered vinyl graphics or tape adhesive using means recommended by adhesive manufacturer that will not damage substrates. Remove contamination and materials that might impede film adhesion.

3.03 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Install signs after surfaces are finished, in locations indicated.

C. Install neatly, with horizontal edges level.

D. Locate signs and mount at heights indicated on drawings and in accordance with ADA Standards and ICC A117.1.

E. Install signage and graphics plumb, level and proportionally spaced or kerned as required for uniform appearance; centered on, or aligned with related building elements, measured from established lines and levels, accurately fitted, free from distortion or defects.

F. Fastening to In-Place Construction: Provide anchorage devices and fasteners where necessary for securing items to in-place construction; including threaded fasteners for concrete inserts, toggle bolts, through-bolts, lag bolts, wood screws, and other connectors as required.

G. Install vinyl graphics on clean substrates in accordance with vinyl manufacturer instructions, flat, smooth, free of defects, bubbles dust, blemishes and air pockets.

H. Plaque Mounting on Glazing: Install on glazing with double stick tape and silicone adhesive. Provide self-adhesive opaque plastic film, in matching or contrasting color as selected, to conceal reverse side of signs mounted on glazing. No exposed fasteners, adhesives or glazing tapes permitted. Film backer must be computer cut to match the shape of the plaque(s).

I. Plaque Mounting at all other interior locations: Provide double stick tape and silicone.

J. Plaque Mounting at all other exterior locations: Provide double stick tape and anchorage devices and fasteners as necessary for securing items to in-place construction; including threaded fasteners for concrete inserts, toggle bolts, through-bolts, lag bolts, wood screws, wedge anchors and other connectors as required.

3.04 ADJUSTING

A. Correct all damaged work by cleaning, repairing or replacing, and repainting, as acceptable to Architect.

B. Protect from damage until Substantial Completion; repair or replace damaged items.

3.05 SCHEDULES

A. Refer to Graphics Plans, Schedules and Details on the Drawings.

END OF SECTION 10 1400

SECTION 10 2600
WALL AND DOOR PROTECTION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Corner guards.

1.02 RELATED REQUIREMENTS

A. Pertinent Sections specifying Volatile Organic Compound (VOC) Content Restrictions.

B. Section 01 8113 - Sustainable Design Requirements.

C. Section 09 2216 - Non-Structural Metal Framing: Placement of supports in stud wall construction.

1.03 REFERENCE STANDARDS

A. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design.

B. California Code of Regulations, Title 24, Part 2, California Building Code (CBC), International Building Code.

C. California Code of Regulations, Title 24, Part 11, California Green Building Standards Code, "CAL-Green".

1.04 SUBMITTALS

A. General: Submit in accordance with Section 01 3300.

B. Product Data: Indicate physical dimensions, features, and anchorage details.

C. CAL-GREEN Submittals: Product Data – VOC Limits: For adhesives sealants, fillers, primers and coatings, documentation including printed statement of VOC contents, comply with limits specified in related section.

D. Shop Drawings: Include plans, elevation, sections, and attachment details.

E. Samples: Submit samples illustrating component design, configurations, joinery, color and finish.
   1. Submit two sections of corner guards, 24 inches long.

F. Maintenance Materials: Furnish the following for Owner's use in maintenance of project:
   1. See Section 01 6000 - Product Requirements, for additional provisions.
   2. Extra Stock Materials: One package(s) of minimum 96 inches long unit of each kind of corner guards.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Deliver wall and door protection items in original, undamaged protective packaging. Label items to designate installation locations.

B. Do not deliver products to project site until areas for storage and installation are fully enclosed, and interior temperature and humidity are in compliance with manufacturer's recommendations for each type of item.

C. Store products in either horizontal or vertical position, in compliance with manufacturer's instructions.

1.06 WARRANTY

A. Correct defective Work within a one year period after Date of Substantial Completion.

PART 2 PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

A. VOC Limits for adhesives, sealants, fillers, primers and coatings . Comply with limits specified in related section.

2.02 PRODUCT TYPES

A. Corner Guards - Surface Mounted:
   1. Material: Type 304 stainless steel, No. 4 finish, 16 gage.
   2. Width of Wings: 2 inches.
   3. Corner: Square.
   4. Length: One piece, 96 inches or to top of door.

B. Adhesives and Primers: As recommended by manufacturer.

2.03 FABRICATION

A. Fabricate components with tight joints, corners and seams.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that substrate surfaces for adhered items are clean and smooth.
   1. Test painted or wall covering surfaces for adhesion in inconspicuous area, as recommended by manufacturer. Follow adhesive manufacturer's recommendations for remedial measures at locations and/or application conditions where adhesion test's results are unsatisfactory.

B. Start of installation constitutes acceptance of project conditions.

3.02 INSTALLATION

A. Install components in accordance with manufacturer's instructions, level and plumb, secured rigidly in position to supporting construction.

B. Position corner guard 4 inches above finished floor to top of door frames.

3.03 TOLERANCES

A. Maximum Variation From Required Height: 1/4 inch.

3.04 CLEANING

A. Clean wall and door protection items of excess adhesive, dust, dirt, and other contaminants.

END OF SECTION 10 2600

SECTION 10 4400
FIRE PROTECTION SPECIALTIES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Fire extinguishers.

B. Fire extinguisher cabinets.

C. Accessories.

1.02 RELATED REQUIREMENTS

A. Pertinent Sections specifying Volatile Organic Compound (VOC) Content Restrictions.

B. Section 01 8113 - Sustainable Design Requirements.

C. Pertinent section specifying wood or metal blocking for attachment of products.

D. Pertinent sections specifying firestopping and acoustic barriers.

E. Section 09 9123 - Interior Painting: Field paint finish.

1.03 REFERENCE STANDARDS

A. ASTM E814 - Standard Test Method for Fire Tests of Through-Penetration Fire Stops.

B. FM (AG) - FM Approval Guide.

C. NFPA 10 - Standard for Portable Fire Extinguishers.

D. UL (DIR) - Online Certifications Directory.

E. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design; 2010.

F. California Code of Regulations, Title 24, Part 2, California Building Code (CBC), International Building Code.

G. California Code of Regulations, Title 24, Part 11, California Green Building Standards Code, "CAL-Green".

1.04 SUBMITTALS

A. See Section 01 3300 - Submittals, for submittal procedures

B. Provide complete submittals at the same time as submittals for work in related sections to permit review of complete and integrated systems and assemblies.

C. Product Data: Provide extinguisher operational features. Demonstrate compliance with specified attributes.

D. CAL-GREEN Submittals: Product Data – VOC Limits: For adhesives sealants, fillers, primers and coatings, documentation including printed statement of VOC contents, comply with limits specified in related section.

E. Shop Drawings: Indicate cabinet physical dimensions. mounting heights and locations.

F. Manufacturer's Installation Instructions: Indicate special criteria and wall opening coordination requirements.

G. Maintenance Data: Include test, refill or recharge schedules and re-certification requirements.

1.05 FIELD CONDITIONS

A. Do not install extinguishers when ambient temperature may cause freezing of extinguisher ingredients.

PART 2 PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

A. VOC Limits for adhesives, sealants, fillers, primers and coatings . Comply with limits specified in related section.

B. No part of the fire extinguisher cabinet shall protrude more than four inches from the plane of the wall.

2.02 MANUFACTURERS

A. Fire Extinguishers:
1. Larsen's Manufacturing Company, Minneapolis, MN, www.larsensmfg.com, is specified.
2. Ansul, a Tyco Business; Cleanguard: www.ansul.com/#sle.
3. J. L. Industries, Inc.; a division of Activar Construction Products Group.
4. Nystrom, Inc: www.nystrom.com/#sle.
5. Potter-Roemer Inc., Cerritos, CA, www.potterroemer.com.
6. Pyro-Chem, a Tyco Business: www.pyrochem.com/#sle.
7. Substitutions: See Section 01 6000 - Product Requirements.

B. Fire Extinguisher Cabinets and Accessories:
1. Ansul, a Tyco Business: www.ansul.com/#sle.
2. Larsen's Manufacturing Co: www.larsensmfg.com/#sle.
3. Nystrom, Inc: www.nystrom.com/#sle.
4. Potter-Roemer: www.potterroemer.com/#sle.
5. Pyro-Chem, a Tyco Business: www.pyrochem.com/#sle.
6. Substitutions: See Section 01 6000 - Product Requirements.

2.03 FIRE EXTINGUISHERS

A. Fire Extinguishers - General: Comply with product requirements of NFPA 10 and applicable codes, whichever is more stringent.
1. Provide extinguishers labeled by UL (DIR) or FM (AG) for purpose specified and as indicated.
2. Attach manufacturer's standard metal foil label to cylinder, with printing and graphics indicating information and instructions required by local authorities having jurisdiction. Include current certification tag

B. Multipurpose Dry Chemical Type Fire Extinguishers: Carbon steel tank, with pressure gauge.
1. Class: A:B:C type.
2. Size and classification as scheduled.
3. Finish: Baked polyester powder coat, red color.

C. Dry Chemical Type Fire Extinguishers: Stainless steel tank, with pressure gauge.
1. Class: K type.
2. Size and classification as scheduled.
3. Finish: Polished stainless steel.
4. Temperature range: Minus 20 degrees F to 120 degrees F.

2.04 FIRE EXTINGUISHER CABINETS

A. Fire Rating: Listed and labeled in accordance with ASTM E814 requirements for fire resistance rating of walls where being installed.

B. Cabinet Construction: Non-fire rated. Provide in non-rated wall construction only.
   1. Formed primed steel sheet; 0.036 inch thick base metal.

C. Fire Rated Cabinet Construction: One-hour fire rated. Provide in all one-hour rated wall construction.
   1. Steel; double wall or outer and inner boxes with 5/8 inch thick fire barrier material.

D. Cabinet Configuration: Recessed type. Larsen "Architectural Series" SS FS-2409-R1 or equal.
   1. Size to accommodate accessories.
   2. Trim: Flat rolled edge, with 2-1/2 inch wide face.
   3. Provide cabinet enclosure with right angle inside corners and seams, and with formed perimeter trim and door stiles.

E. Cabinet Configuration: Semi-recessed type. Larsen "Architectural Series" SS FS-2409-R3 or equal.
   1. Size to accommodate accessories.
   2. Projected Trim: Returned to wall surface, with 2-1/2 inch projection, and 2-1/2 inch wide face with rolled edge.
   3. Provide cabinet enclosure with right angle inside corners and seams, and with formed perimeter trim and door stiles.

F. Door: 0.036 inch metal thickness, reinforced for flatness and rigidity with nylon catch. Hinge doors for 180 degree opening with two butt hinge.

G. Door Glazing: Acrylic plastic, clear, 1/8 inch thick, flat shape and set in resilient channel glazing gasket.

H. Cabinet Mounting Hardware: Appropriate to cabinet, with pre-drilled holes for placement of anchors.

I. Weld, fill, and grind components smooth.

J. Finish of Cabinet Exterior Trim and Door: Primed for field paint finish.

K. Finish of Cabinet Interior: White colored enamel.

2.05 ACCESSORIES

A. Wall mounting bracket: Type specified in manufacturer's product literature for indicated tank size, with wall anchoring devices for indicated wall type.

B. Extinguisher Brackets: Formed steel, chrome-plated.

C. Lettering: “FIRE EXTINGUISHER” decal, or vinyl self-adhering, pre-spaced black lettering in accordance with authorities having jurisdiction (AHJ).

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify existing conditions before starting work.

B. Verify rough openings for cabinet are correctly sized and located.

3.02 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Coordinate size of fire protection cabinets to ensure that type and capacity of fire extinguishers indicated are accommodated.

C. Coordinate sizes and locations of fire protection cabinets with wall depths.

D. General: Install fire protection cabinets in locations and at mounting heights indicated or, if not indicated, at heights below acceptable to authorities having jurisdiction and as required by referenced accessibility regulations.
   1. Fire Protection Cabinets: Install cabinets such that the door handle and fire extinguisher
   2. handles are no higher than 40 -inches above finish floor.
   3. Verify cabinet projection dimensions and mount in accordance with ADA path-of-travel requirements including vertical clearances and control operation heights.

E. In fire-rated walls, coordinate cabinet installation to maintain fire rating of wall.

F. In acoustic-rated walls, coordinate cabinet installation to maintain STC rating of wall.

G. Secure rigidly in place.

H. Place extinguishers in cabinets.

3.03 COORDINATION WITH RELATED WORK

A. Coordinate with pertinent sections for installation of Acoustic Barrier materials outside cabinet assemblies to meet acoustic rating of wall assembly where cabinet is located. Coordinate to ensure Acoustic Barrier materials are concealed inside wall construction.

B. Coordinate with pertinent sections for installation of firestopping materials outside cabinet assemblies to meet fire rating of wall assembly where cabinet is located. Coordinate to ensure firestopping is concealed inside wall construction.

3.04 ADJUSTING AND CLEANING

A. Remove temporary protective coverings and strippable films, if any, as fire protection cabinets are installed unless otherwise indicated in manufacturers written installation instructions.

B. Adjust fire protection cabinet doors to operate easily without binding. Verify that integral locking devices operate properly.

C. On completion of fire protection cabinet installation, clean interior and exterior surfaces as recommended by manufacturer.

D. Touch up marred finishes, or replace fire protection specialties that cannot be restored to factory-finished appearance. Use only materials and procedures recommended or furnished by fire protection cabinet and mounting bracket manufacturers.

E. Replace fire protection specialties that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

3.05 SCHEDULES

A. Location: Classrooms and Administrative areas: Type 2A-10-BC, 10 lb. capacity.

END OF SECTION 10 4400

SECTION 12 3600
COUNTERTOPS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Countertops for architectural cabinet work.

B. Window Sill surfaces.

C. Sinks molded into countertops.

D. Epoxy resin sinks.

1.02 RELATED REQUIREMENTS

A. Section 01 6116 - Volatile Organic Compound (VOC) Content Restrictions.

B. Section 01 8113 - Sustainable Design Requirements.

C. Section 06 4100 - Architectural Wood Casework

D. Pertinent sections of other divisions specifying work penetrating countertops.

E. Pertinent sections of other divisions specifying assembly, installation, and connection of plumbing work, plumbing elements penetrating countertops or splashes.

F. Pertinent sections of other divisions specifying assembly, installation, and connection of electrical work, electrical elements penetrating countertops or splashes.

1.03 REFERENCE STANDARDS

A. ANSI A208.1 - American National Standard for Particleboard.

B. ANSI A208.2 - Medium Density Fiberboard (MDF) for Interior Applications.

C. ASTM D635 - Standard Test Method for Rate of Burning and/or Extent and Time of Burning of Plastics in a Horizontal Position.

D. AWI/AWMAC/WI (AWS) - Architectural Woodwork Standards.

E. AWMAC/WI (NAAWS) - North American Architectural Woodwork Standards, U.S. Version 3.0.

F. California Code of Regulations, Title 24, Part 2, California Building Code (CBC), International Building Code.

G. California Code of Regulations, Title 24, Part 11 California Green Building Standards Code, “CAL-Green”.

H. NEMA LD 3 - High-Pressure Decorative Laminates.

I. PS 1 - Structural Plywood.

J. WI (CCP) - Certified Compliance Program (CCP).

K. AWI/AWMAC/WI - Architectural Woodwork Standards (AWS)

1.04 SUBMITTALS

A. See Section 01 3300 - Submittals, for submittal procedures.

B. Provide complete submittals at the same time as submittals for work in related sections to permit review of complete and integrated systems and assemblies.

C. Product Data: Demonstrate compliance with specified attributes, provide Manufacturer's data sheets on each product to be used, including:
   1. Preparation instructions and recommendations.
   2. Storage and handling requirements and recommendations.
   3. Specimen warranty.

D. CAL-GREEN Submittals:
   1. Product Data – VOC Limits: For adhesives, sealants, fillers, primers and coatings, documentation including printed statement of VOC contents, comply with limits specified in related section.
   2. Composite Wood Formaldehyde Limits: Provide certification that all products meet current CARB Airborne Toxic Control Measure (ATCM) for Composite Wood Formaldehyde Limits by Mandatory Compliance Dates as specified in related section.

E. Shop Drawings: Complete details of materials and installation; combine with shop drawings of cabinets and casework specified in other sections.

F. Selection Samples: For each finish product specified, color chips representing manufacturer's full range of available colors and patterns.

G. Verification Samples: For each finish product specified, minimum size 6 inches square, representing actual product, color, and patterns.

H. Test Reports: Chemical resistance testing, showing compliance with specified requirements.

I. Certificate: Submit labels and certificates required by quality assurance and quality control programs.

J. Installation Instructions: Manufacturer's installation instructions and recommendations.

K. Maintenance Data: Manufacturer's instructions and recommendations for maintenance and repair of countertop surfaces.

1.05 QUALITY ASSURANCE

A. Installer Qualifications: Fabricator.

B. Quality Certification:
   1. Provide labels or certificates indicating that the installed work complies with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS) requirements for grade or grades specified.
   2. Provide designated labels on shop drawings as required by certification program.
   3. Provide designated labels on installed products as required by certification program.
   4. Submit certifications upon completion of installation that verifies this work is in compliance with specified requirements.
   5. Arrange and pay for inspections required for certification.
   6. Replace, repair, or rework all work for which certification is refused.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Store products in manufacturer's unopened packaging until ready for installation.

B. Store and dispose of solvent-based materials, and materials used with solvent-based materials, in accordance with requirements of local authorities having jurisdiction.

1.07 FIELD CONDITIONS

A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

PART 2 PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

A. VOC Limits for adhesives, sealants, fillers, primers and coatings . Comply with limits specified in related section.

B. Composite Wood products must meet current CARB Airborne Toxic Control Measure (ATCM) for Composite Wood Formaldehyde Limits by Mandatory Compliance Dates as specified in Section 01 6116.

2.02 COUNTERTOPS

A. Match Quality Standard of cabinets specified in Section 06 4100. Minimum Custom Grade, otherwise.

B. Epoxy Resin Countertops: Filled epoxy resin molded into homogenous, non-porous sheets; no surface coating and color and pattern consistent throughout thickness; with integral or adhesively seamed components.
   1. Manufacturers:
      a. Durcon, Inc.: www.durcon.com.
      b. Prime Industries, Inc.: www.piilab.com.
      c. Substitutions: See Section 01 6000 - Product Requirements.
   2. Flat Surface Thickness: 1 inch, nominal.
   3. Chemical-Resistance: Provide products that resist the following chemicals with not more than Moderate Effect when tested in accordance with NEMA LD 3:
   4. Flammability: Self-extinguishing, when tested in accordance with ASTM D635.
   5. Surface Finish: Smooth, non-glare.
   6. Color: Black.
   7. Exposed Edge Shape in Sink Areas: Built-up marine edge 1/4 inch higher than counter by 1 inch wide.
   8. Drip Edge: Drip groove 1/8 inch wide and deep, located 1/2 inch back from edge on underside of all exposed edges.
   9. Back and End Splashes: Same material, same thickness; separate for field attachment.
   10. Sinks: Same material, same color; integrally molded with counter; bottom sloped to outlet; molded outlets; drain outlet located in back corner.
      a. Sides and Ends: 1/2 inch minimum thickness.
      b. Bottoms: 5/8 inch minimum thickness.
      c. Interior Corners: 1 inch minimum radius.
      d. Clamping collars for 1-1/2 or 2 inch diameter waste pipe, for sealed but not permanent connection.
      e. Steel channel supports front to back on each side, fastened to underside of top to support twice full sink weight.
   11. Associated Window Sills: Same material.
      a. Thickness: 3/4 inch.
   12. Fabricate in accordance with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS), Section 11 - Countertops, Custom Grade.

2.03 MATERIALS

A. Wood-Based Components:
   1. Wood fabricated from old growth timber is not permitted.

B. Plywood for Supporting Substrate: PS 1 Exterior Grade, A-C veneer grade, minimum 5-ply; minimum 3/4 inch thick; join lengths using metal splines.

C. Particleboard for Supporting Substrate: ANSI A208.1 Grade 2-M-2, 45 pcf minimum density; minimum 3/4 inch thick; join lengths using metal splines.

D. Medium Density Fiberboard for Supporting Substrate: ANSI A208.2.
   1. Type specified in Section 06 4100.

E. Adhesives: Chemical resistant waterproof adhesive as recommended by manufacturer of materials being joined.

F. Countertop Support Brackets: Provide at locations where countertop span is not supported by base cabinet, maximum 36 inches on center.
   1. Steel, welded construction, powder coat finish, color selected by Architect.
   2. Support Arms: Match countertop depth, 2 inch flanges, extended arm predrilled for bolting to wall studs or other support.
   3. A&M Hardware, Inc. 2.0 inch Surface Mounted Brackets: www.AandMhardware.com.
   4. Substitutions: See Section 01 6000 - Product Requirements.

G. Joint Sealant: Mildew-resistant silicone sealant, color-matched to countertop, clear at stainless steel.

2.04 FABRICATION

A. Fabricate in accordance with standards governing fabrication quality that are specified in Section 06 4100.

B. Fabricate tops and splashes in the largest sections practicable, with top surface of joints flush.
   1. Join lengths of tops using best method recommended by manufacturer.
   2. Fabricate to overhang fronts and ends of cabinets 1 inch except where top butts against cabinet or wall.
   3. Prepare all cutouts accurately to size; replace tops having improperly dimensioned or unnecessary cutouts or fixture holes.
   4. Locate openings accurately and use templates or roughing-in diagrams to provide accurate size and shape.
   5. Smooth edges of cutoffs and, where located in countertops and similar exposures, seal edges of cutouts with a water resistant coating.

C. Provide back/end splash wherever counter edge abuts vertical surface unless otherwise indicated.
   1. Secure to countertop with concealed fasteners and with contact surfaces set in waterproof glue.
   2. Height: 4 inches, unless otherwise indicated.

D. Epoxy and Solid Surfacing: Fabricate tops up to 144 inches long in one piece; join pieces with adhesive sealant in accordance with manufacturer's recommendations and instructions.

E. Fabricate window sills in one piece up to 144 inches long, join pieces as specified for countertops.

PART 3 EXECUTION

3.01 EXAMINATION

A. Do not begin installation until substrates have been properly prepared.

B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

C. Verify that wall surfaces have been finished and mechanical and electrical services and outlets are installed in proper locations.

3.02 PREPARATION

A. Clean surfaces thoroughly prior to installation.

B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.03 INSTALLATION

A. Install concealed support brackets before wall finishes are applied. Install at spacings indicated on Drawings, except if none are shown, install at maximum 36 inches on center.

B. Securely attach countertops to cabinets or concealed brackets using concealed fasteners. Make flat surfaces level; shim where required.

C. Attach solid surface countertops using compatible adhesive.

D. Seal joint between back/end splashes and vertical surfaces.

3.04 TOLERANCES

A. Variation From Horizontal: 1/8 inch in 10 feet, maximum.

B. Offset From Wall, Countertops: 1/8 inch maximum; 1/16 inch minimum.

C. Field Joints: 1/8 inch wide, maximum.

3.05 CLEANING

A. Clean countertops surfaces thoroughly.

3.06 PROTECTION

A. Protect installed products until completion of project.

B. Touch-up, repair or replace damaged products before Date of Substantial Completion.

END OF SECTION 12 3600

SECTION 22 0000

PLUMBING

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. The Bidding Requirements and Contract Forms, including General Conditions and Supplemental General Conditions, and Division 01 Sections apply to all work herein.

1.02 SUMMARY

A. Section includes: Furnishing, fabrication, and installation of complete plumbing systems as indicated on the Drawings. Plumbing work includes, but is not necessarily limited to, the following items:
   1. A complete system of soil, drain, waste, vent, and sanitary sewer piping and structures, including provisions for mechanical equipment drainage; and connection of same to existing soil, drain, vent and sanitary sewers, located approximately as indicated on the Drawings
   2. Cold water distribution system, complete, from points of contact with site domestic water systems, located approximately as indicated on the Drawings, to all plumbing fixtures, mechanical equipment, building specialties, and Owner supplied equipment scheduled for service on the Drawings.
   3. Hot water distribution system, complete, from serving water heaters and/or points of connection with site domestic water, located approximately as indicated on the Drawings, to all plumbing fixtures and mechanical equipment scheduled for service on the Drawings.
   4. Natural gas piping system, complete from point of connection with site gas piping and terminating in stopcocks adjacent to all gas-fired equipment noted on Drawings. All gas-fired equipment shall be equipped with a gas pressure regulator and shut off valve as hereinafter specified.
   5. Rough-in and connection of all plumbing fixtures and trim as scheduled on the Drawings and as furnished by Owner, inclusive of setting of fixtures and connections to drainage and water supply systems.
   6. Pipe wrapping and insulation.
   7. Flashing of all plumbing pipe penetrations through exterior walls, roofs, and foundations.
   8. Excavation and backfill as required for the work of this Section in conformity with Division 31 of these Specifications.
   9. Final connection of water to equipment furnished under other Sections.
   10. Condensate drainage piping and connections from points of attachment to equipment to indirect waste locations, as noted on the Drawings.
   11. Protection of all piping specified herein and/or shown on the Drawings, from freezing. Buried piping shall be a minimum of 12" below the local frost line. If ambient design temperature is 30°F or less, all pipes in unconditioned spaces shall be insulated.
   12. Testing and adjusting of all piping systems and equipment herein specified.
   13. Sterilization of domestic water systems.

B. All work shall be coordinated with water, gas, sanitary sewer, and other services on the site. The locations of points of connection to the site services shall be confirmed prior to commencement of any and all work required under this Section.

C. The Contractor shall provide all supervision, labor, materials, transportation, equipment, hauling and services necessary for a complete and operational system, unless otherwise noted. Anything accepted as standard trade practice reasonably incidental to the completion of the

plumbing systems, such as offsets, fittings, etc., even though not specifically shown on Drawings or indicated in Specifications, shall be furnished without additional cost to the Owner. The Contractor shall understand that the work herein described shall be complete in every detail, notwithstanding every item necessarily involved is not particularly mentioned, and the Contractor shall be held to provide all labor and material necessary for the entire completion of the work.

1.03 RELATED WORK SPECIFIED IN OTHER SECTIONS

A. Joint Sealants: Section 07 9200

B. Firestopping: Section 07-8400

C. Sheet Metal Flashing and Trim: Section 07 6200.

D. Basic Electrical Requirements: Section 26 0500

E. Basic Electrical Materials and Methods: Section 26 2700.

F. Finish Painting: Section 09 9123 Interior Painting

1.04 QUALITY ASSURANCE

A. Regulatory compliance: All work performed under this Section shall comply with the latest currently adopted editions of all codes and regulations and all requirements of all Authorities having Jurisdiction.

B. Codes and Standards: Conform to the latest edition of all applicable codes and standards stated herein and as described in Division 01 of the Specifications, including the following:
1. California Mechanical Code
2. California Plumbing Code
3. California Building Code
4. California Fire Code
5. California Green Building Code
6. California Electric Code
7. California Code of Regulations, including Titles 8, 17, 19, 20, 21, 22 and 24
8. Comply with all ADA and California Title 24 requirements for disabled access.
9. NSF/ANSI 61 Standard, Drinking Water System Components - Health Effects for fixture materials that will be in contact with potable water.
10. AB 1953, Amendments to Section 116875 of the Health and Safety Code relating to lead plumbing.

C. Minimum requirements: The requirements of these are the minimum that will be allowed unless such requirements are exceeded by applicable codes or regulations, in which the regulatory codes or regulation requirements shall govern.

D. When the Contract Documents call for materials or construction of a higher standard than is required by the above, the Contract Document requirements shall take precedence over the requirements of the said laws, rules, and/or regulations, accepting that nothing in the Contract Documents shall be interpreted as permitting work in violation of said laws, rules, and/or regulations. The Contractor for this work shall furnish any additional materials and/or labor as may be required for compliance with these laws, rules, and/or regulations though such materials and/or labor are not specifically set forth in the Contract Documents, with no additional charges to Owner.

E. Seismic construction and restraints shall be in accordance with the requirements of the California Building Code and Title 17 and Title 24 of the California Code of Regulations. All equipment mounts, isolators, and hanging systems must meet DSA approval requirements.

F. Comply with the Safety Orders issued by Cal-OSHA and any other regulations of the State of California and any districts having jurisdictional authority.

1.05 SUBMITTALS

A. All submittals shall be submitted under the provisions of Division 01 and the following.
   1. Product Data: for each type of product.
      a. Submit cut sheets for each plumbing fixture. Include selected fixture and trim, fittings, accessories, appliances, appurtenances, equipment, and supports and indicate materials and finishes, dimensions, construction details, and flow control rates for each fixture indicated.
      b. Submit manufacturer's product data for all plumbing piping, fittings, materials, and equipment.
   2. Shop Drawings:
      a. Prepare complete consolidated and coordinated layout drawings for all new systems, and for existing systems that are in the same areas. Shop drawings shall be prepared using AutoCAD 2014 or newer and shall be drawn at a minimum ¼" = 1' - 0" scale. Sections, details, and diagrams shall be to required scales for specified areas. Include diagrams for all piping, and power, signal and control wiring.
      b. Complete and detailed shop drawings shall be maintained throughout the coordination and construction phase, indicating all equipment and trades' work clearly. All equipment including piping, etc. shall clearly identify both top and bottom elevations as well as distances from equipment to established building lines. Coordinate with other trades and field conditions and show dimensions and details including building construction and access for servicing.
      c. Use of contract documents for shop drawings is not acceptable.
      d. Submit shop drawings to Architect for approval prior to fabrication or installation of any work. Do not install equipment or piping until layout drawings have been approved. Any work installed without prior shop drawing approval shall be removed at the Contractor's expense.
   3. Welding Procedures
      a. Before any welding is performed, the contractor shall submit to the Architect, copies of any welding procedure specifications and their supporting procedure qualification records for review and acceptance. Copies of welder qualification records shall be made available for review to the owner or his representative at the construction site.
      b. Welding certificates
   4. As-Built Drawings
      a. A complete set of Contract Drawings shall be maintained at the work site, and all changes in the work shall be recorded on this set on a daily basis. In addition to changes made during course of work, show the following:
         1) Exact location, type and function of concealed valves and controllers.
         2) Exact size, elevations and location of underground and under floor piping.
      b. Submit to Architect for approval.
   5. Operation & Maintenance Data
      a. Contractor shall provide all operating and maintenance instructions provided by the manufacturer, describing proper operation and maintenance of any equipment and devices installed. Operating and maintenance instructions shall cover

maintenance, adjustment, and operation of each piece of apparatus, including preventative maintenance schedule and procedures.

b. Contractor shall also provide a parts list of all equipment and component parts for all equipment under this Section. The equipment list shall include manufacturer's name, model number, and local representative, service facilities and normal channel of supply for each item.

c. Copies of manufacturer's guarantees/warranties for each system shall be included in the O&M data.

d. Also include the following:
   1) Manufacturer's certified shop drawings, and lubrication charts and data. Mark each sheet with equipment identification number and actual installed condition or system and location of installation. Specifically identify which options are provided.
   2) Recommend preventative maintenance schedule and procedures.
   3) Provide copy of valve schedules for each piping system.
   4) Provide copy of equipment label schedule.

e. Submit data to the Architect for approval. Final acceptance of the work will not be made until a satisfactory submission of this material is received and approved by the Architect.

1.06 ACCURACY OF DATA

A. The data given herein and on the Drawings are as exact as could be reasonably secured, but absolute accuracy is not guaranteed. Exact locations, distances, elevations, etc. will be governed by shop drawings, the building itself, and actual field conditions.

1.07 UTILITY CONNECTIONS

A. Provide all services within the building to a point five feet outside of building. Arrange for all utility connections, determine their exact requirements, and pay all costs incurred unless indicated otherwise.

B. Send proper notices, make necessary arrangements, and perform other services required for care and maintenance of all utilities and assume all responsibility concerning same. Observe all rules and regulations of the respective utilities in executing the work.

1.08 DAMAGE BY LEAKS

A. Contractor shall be responsible for any damage to work of other Contractors that is caused by leaks in any temporary or permanent piping systems due to pipe rupture, disconnected pipes or fittings, or by overflow of equipment.

1.09 COOPERATION WITH OTHER TRADES

A. Cooperate fully with other trades doing work on the project as may be necessary for the proper completion of the project. Refer to the Structural, Plumbing, and Electrical Drawings for details of the building structure and equipment installation that will tend to overlap, conflict with, or require coordination with the work of this Section, and schedule this work accordingly.

B. Priority of right of way in space shall be as follows, in decreasing order of authority:
   1. Electrical lights, electrical panels and drain piping.
   2. Ductwork.
   3. Fire protection piping, domestic hot water, domestic cold water and condenser water piping.

C. Any work done without regard for other trades shall be moved, replaced, or redone as required, without extra charges to Owner.

1.10 WARRANTIES

A. In accordance with Division 01 and as follows:
   1. Furnish Manufacturer's standard Warranties in excess of one year. Provide a copy of all warranties with the O&M data.
   2. Provide new materials, equipment, apparatus and labor to replace that determined to be defective or faulty.

1.11 LICENSING REQUIREMENTS

A. All plumbing systems shall be installed by a C-36 Plumbing Contractor. Plumbing systems include: waste removal and connection of on-site waste disposal systems; piping, storage tanks, and venting for supply of gases and liquids for any purpose; all gas appliances, flues, and gas connections; water and gas piping from the owner's side of utility meter to the structure or fixed works; installation of any type of equipment to heat water or fluids to a suitable temperature; and maintenance and replacement of the items described above, including health and safety devices.

PART 2 - PRODUCTS

2.01 PRODUCTS CRITERIA

A. Only specified materials shall be utilized in the work of this Section unless substitutions have been approved in accordance with the General Conditions and Division 01 Sections of these Specifications.

B. All materials, appliances, and equipment shall be new and best of their respective kinds, free from defects, and of the latest design.

C. Multiple Units: When two or more units of materials or equipment of the same type or class are required, these units shall be products of one manufacturer.

D. All fixtures, materials, and equipment equal in quality and utility to these herein mentioned will be accepted. When specific names are used in describing fixtures, materials, and equipment they are mentioned as standards only, but this implies no right on the part of the Contractor to use other fixtures, materials and equipment, or methods, unless approved as equal in quality and utility by the Architect. The decision of the Architect shall govern as to what fixtures, materials, and equipment are equals to those mentioned, but the burden of proof as to the quality of any proposed fixtures, materials, or equipment shall be upon the Contractor. If any tests are necessary to determine the quality of proposed fixtures, materials, or equipment, an unbiased laboratory shall make such tests at the expense of the Contractor. The chosen laboratory shall be satisfactory to the Architect.

2.02 PIPE, FITTINGS

A. General
   1. Tracer wire shall be installed with all non-metallic piping below grade. Tracer wire shall be solid core copper, 14 gauge minimum, laid continuously along pipes. Wire shall be "ty-wrapped" to pipe at eight feet on center. Tracer wire shall terminate in concrete access boxes at the beginning and terminal ends of the buried pipe.
   2. All accessible pipe 2" and smaller shall be threaded. Fittings for threaded pipe shall be 150-lb. malleable iron, screwed and banded.
   3. Vent piping shall have vandal resistant mushroom vent caps.

4. At penetrations through building walls, provide "Link Seal" around pipe.

B. Below Grade Soil, Waste, Drain, and Vent Piping
1. Below grade piping shall be of standard weight, no-hub cast iron soil pipe and fittings and shall conform to the requirements of CISPI Standard 301 and ASTM A 888 (latest editions). All pipe and fittings shall be manufactured in the United States and shall be marked with the collective trademark of the Cast Iron Soil Pipe Institute® and listed by NSF® International. Approved manufacturers: AB&I, Charlotte, Tyler Pipe.
2. Joints for hubless pipe and fittings conform to the manufacturer's installation instructions and local code requirements.
3. Hubless couplings shall be composed of stainless steel shields, clamp assemblies and elastomeric sealing sleeve conforming to CISPI Standard 310, latest edition. Heavy/Medium duty no-hub couplings shall conform to the requirements of ASTM 1540. Hubless coupling gaskets shall conform to ASTM C564. Couplings 1-1/2" through 4" shall have 4 bands.
   a. Piping 2" and smaller: Heavy/Medium duty no-hub couplings. Anaco/Husky "HD 2000", Ideal-Tridon Heavy Duty "HD", Charlotte Heavy Duty "MD" or Mission "Heavyweight.
   b. Piping 2 ½" or larger: Heavy/Super Duty type: Husky SD 4000 or Charlotte Heavy Duty "HD".
   c. Couplings shall be installed in accordance with manufacturer's installation instructions and local code requirements and shall be tightened using a calibrated torque wrench. The clamps shall be tightened between 115 and 125-inch pounds.

C. If the soil is found to be corrosive, below Grade Ground Waste, Drain, and Vent Pipe shall be:
1. PVC Pipe and Fittings: Charlotte Pipe or equal
   a. Solid wall Schedule 40 PVC pipe meeting the requirements of ASTM D 2665, drain, waste and vent. Pipe shall be manufactured from virgin rigid PVC vinyl compounds with a cell class of 12454 as identified in ASTM D 1784. PVC Schedule 40 pipe shall be IPS conforming to ASTM D 1785 and ASTM D 2665. Fabricated PVC DWV fittings shall conform to ASTM F 1866. All pipe and fittings shall be manufactured in the United States. All systems shall utilize a separate waste and vent system. Pipe and fittings shall conform to NSF International Standard 14. Charlotte Pipe or equal

D. Above Grade Soil, Waste, Drain, and Vent Piping:
1. Above grade piping shall be of standard weight, no-hub cast iron soil pipe and fittings conforming to the requirements of CISPI Standard 301 and ASTM A 888 (latest editions). All pipe and fittings shall be manufactured in the United States and shall be marked with the collective trademark of the Cast Iron Soil Pipe Institute® and listed by NSF® International. Approved manufacturers: AB&I, Charlotte and Tyler Pipe.
2. Hubless couplings shall be composed of stainless-steel shields, clamp assemblies and elastomeric sealing sleeve conforming to CISPI Standard 310, latest edition. Heavy/Medium duty no-hub couplings shall conform to the requirements of ASTM 1540. Hubless coupling gaskets shall conform to ASTM C564. Couplings 1-1/2" through 4" shall have 4 bands.
   a. Piping 2" and smaller: Standard no-hub couplings. Anaco "No Hub", Tyler Pipe "Standard", or Mission "Standard".
   b. Piping 2½" and larger: Anaco/Husky "HD 2000", Ideal-Tridon Heavy Duty "HD", Charlotte Heavy Duty "MD" or Mission "Heavyweight".
   c. Couplings shall be installed in accordance with manufacturer's installation instructions and local code requirements. The clamps shall be tightened using a calibrated torque wrench.

3. At the option of this Contractor, all soil, waste, and vent piping above ground may be DWV copper, with wrought copper fittings, with "Stay-Safe 50" lead free solder or equal, and a suitable non-corrosive flux.

E. Hot & Cold Water Piping:
1. All above grade domestic water piping shall be Type L, hard temper, copper pipe, ASTM B 88, with cast copper alloy solder joint pressure fittings, ASME / ANSI B 16.18.
2. All below grade domestic water piping shall be Type K, hard temper copper pipe, ASTM B 88, with cast bronze threaded fittings, ASME/ANSI B 16.15.
3. All joints shall be made up with lead free solder. A suitable non-corrosive flux shall be used at all joints.
4. All pipe shall be NSF 61 Certified and bear the NSF Certification mark.
5. Pipes below grade inside buildings shall be soft drawn, Type L or K copper with no joints below slabs. Pipes shall be sleeved with 20-mil plastic sheathing.

F. Natural Gas Pipe Above Grade:
1. Above grade piping shall be Schedule 40, black steel. ASTM A53, electric resistance welded or seamless, Grade B. Name or brand of manufacturer shall be required markings on each length.
   a. All concealed pipe and all pipe 2½" and larger shall be welded. Fittings for welded pipe shall be seamless steel, weld neck.
   b. All accessible pipe 2" and smaller shall be threaded. Fittings for threaded pipe shall be 150-lb. malleable iron, screwed and banded.
2. Piping exposed to weather: Schedule 40 galvanized steel pipe and fittings. All exposed threads shall be primed with one coat of rust inhibiting paint.

G. Below Grade Natural Gas Pipe:
1. Below grade gas piping shall be Performance Pipe, "DriscoPlex 6500" PE 2708 medium density polyethylene pipe (MDPE) and fittings for underground gas distribution systems or approved equal.
2. The pipe and fitting manufacturer shall be ISO Certified in accordance with the current edition of ISO 9001 and a documented quality management system that defines product specifications and manufacturing and quality assurance procedures that assure conformance with customer and applicable regulatory requirements.
3. A licensed and bonded Contractor shall perform all underground gas distribution piping construction work. The Contractor shall secure all necessary permits before commencing construction.
4. MDPE materials used for the manufacture of polyethylene pipe and fittings shall be PE 2708 (PE2406) medium density polyethylene meeting cell classification 234373E per ASTM D 3350; and shall be Listed in Plastic Pipe Institute TR-4 with standard grade HDB ratings of 1600 psi at 73°F and 1000 psi at 140°F. All MDPE pipe and fittings materials shall be yellow in color.
5. Include tracer wire (yellow insulated No. 18 AWG).
6. Polyethylene Pipe
   a. Pipe shall be manufactured and tested in accordance with ASTM D 2513 incorporated by reference in 49 CFR Part 192.
   b. Pipe should be marked with a 1-Dimension bar code and a 16-Digit alpha numeric code that identifies the manufacturer, production run number, date of manufacture, pipe type and material grade per ASTM F 2897.
7. Polyethylene Fittings.
   a. Polyethylene fittings shall be manufactured and tested in accordance with ASTM D 2513 incorporated by reference in 49 CFR Part 192.

b. Fittings should be marked with a 2-Dimension Data Matrix code that identifies the manufacturer, production run number, date of manufacture, fitting type and material grade per ASTM F 2897

8. Compliance Tests.
   a. The manufacturer shall certify the inspection and testing of the materials and products. In case of conflict with manufacturer's certifications, the contractor, project engineer or operator may request retesting by the manufacturer or have retests performed by an outside testing service. All retesting shall be at the requestor's expense and shall be performed in accordance with the specifications.
9. Heat Fusion Joining:
   a. Butt, socket, and saddle fusion joints in polyethylene gas piping shall be made using procedures that have been qualified and approved by the Operator in accordance with Title 49, CFR, and Part 192.283.
   b. In accordance with CFR. 49, part 192, Section 192.285, the operator shall ensure that all persons making heat fusion joints have been qualified to make joints in accordance with the operator's approved qualified fusion procedures. The operator shall maintain records of qualified personnel and shall certify that qualification training was received not more than 12 months before commencing construction. The contractor shall ensure that all persons making heat fusion joints are qualified in accordance with this section.
   c. The manufacturer shall offer qualified fusion procedures and training materials for the use of the operator.
   d. Butt Fusion of Unlike Wall Thickness. Butt fusion shall be performed between pipe ends or pipe ends and fitting outlets that have the same outside diameter and are not different in wall thickness by more than one standard DR, for example, SDR 9 (9.3, 9.33) to SDR 11 (11.5) or SDR 11 (11.5) to SDR 13.5. Transitions between unlike wall thickness greater than one SDR shall be made with a transition nipple (a short length of the heavier wall pipe with one end machined to the lighter wall) or by mechanical means or electrofusion. Standard DR's for polyethylene pipe are 7.3, 9, 11, 13.5, 17 and 21.
10. Joining by Other Means:
   a. Polyethylene gas pipe and fittings may be joined together or to other materials by transition fittings, fully restrained mechanical couplings or electrofusion. These devices shall be designed for joining polyethylene to another material and shall be approved by the operator for use in his gas distribution system. When joining by other means, the installation instructions of the joining device manufacturer shall be observed.
   b. When mechanical OD compression couplings are used, polyethylene gas pipe shall be reinforced with a stiffener in the pipe bore. Stiffeners shall be properly sized for the diameter and wall thickness of polyethylene pipe being joined. For service pipe connections, the stiffener length shall match the pipe end penetration depth into the coupling.

H. Condensate drainage and indirect waste piping: Mueller Streamline, Cerro Flow or equal.
1. 1 ½ inches and larger shall be type DWV copper tube, ASTM B 306 with wrought copper or cast brass fittings
2. 1 ¼ inches and smaller shall be type M, hard temper copper, ASTM B 88 with standard pressure fittings.
   a. Drainage fittings shall be cast copper, ASME B 16.23 or wrought copper, ASME B 16.29, solder-joint fittings.
   b. Solder shall be ASTM B 32, lead free with ASTM B 813, water-flushable flux.

2.03 VALVES, SPECIALTIES

A. General Requirements
1. All valves, except pressure reducing and control valves, shall be the same size as the pipe to which they are installed.
2. All valves of a particular type and size range shall be the product of one manufacturer.
3. Valve body materials shall be compatible with piping system materials.
4. Provide a union immediately downstream from each valve, unless the valve is flanged.
5. All valves shall be installed with the stem 45 degrees above horizontal, if possible. In no case shall the stem be installed below horizontal.
6. Where insulation is indicated, install extended stem valves arranged in proper manner to receive insulation.
7. All valves shall be provided with reusable strap-on insulation covers. All exposed valves in finished areas shall be chrome plated.

B. Ball Valves
1. Threaded: NIBCO T-685-80-LF, Watts LFB-6080, or KITZ 858, lead-free, bronze alloy, 2-piece body, full port, blowout proof stem; MSS SP-110; NSF/ANSI-61-8 and NSF/ANSI-372 compliant; 600 PSI non-shock cold working pressure.

C. Lift Check Valves (vertical): NIBCO T-480-Y-LF or KITZ 836; bronze body, inline lift type, Teflon seat, and discs, spring actuated, 125 lb.

D. Swing Check Valves (horizontal): NIBCO T-413-Y-LF, Stockham B-345, or KITZ 822T; bronze body, Y-pattern swing-type, rated 200 PSI non-shock CWP. Body, bonnet, and disc hanger shall be of lead-free dezincification-resistant material and TFE seat disc. Valve ends shall be threaded type. Valves shall be 3rd party certified to Annex G of NSF/ANSI 61.

E. Butterfly valves: NIBCO LD/WD 2000 series, 200 psi; Valves to be manufactured in accordance with MSS SP-67. Body to have 2" extended neck for insulation and to be shock resistant ductile iron. Valves to have aluminum bronze disc and molded in or cartridge seat of EPDM rubber. Stem shall be 400 series stainless steel. Top and bottom stem bushings of dissimilar material are required with a positive stem retention mechanism. Sizes 2" to 6" shall be lever operated with 10 position throttling plate.

F. Gas Shut-off Valves:
1. At building service: Homestead Fig. 601, pressure Class 125 lubricated plug valve, cast iron, lever handle, 200 lb., leak and hydro tested. Install Pacific Seismic earthquake sensitive valve, 300 series, seismic actuated automatic shut off valve at meter (or entrance to building if not new construction). Brace per manufacturer's instructions.
2. At connection to gas equipment: Jomar T-203, Apollo GB series, or approved equal gas ball valves, 2-piece design, threaded connection; FKM o-rings; 1/8-inch side tap; leakproof stem; removable plug. Provide with AGA certified stainless steel flex connection, 12 inch maximum. Brass Craft Safety+PLUS with excess flow valve or equal.

G. Gas Pressure Regulators: Pietro Fiorentini "Governor" series, standard model; ANSI Z21.80 compliant or equal Maxitrol. Regulators shall be sized for full gas capacity of equipment as scheduled on the Drawings. Inlet and outlet pressure shall be field verified. Regulators installed indoors shall have relief opening piped to outdoors. Size relief pipe in accordance with ANSI Z223.1 "National Fuel Gas Code".

H. Gas Service Line Risers: Elster Perfection anodeless service line risers and transition fittings or equal.

I. Water Pressure Regulating Valves: Zurn Wilkins 500XLYSBR series or approved equal. Cast bronze valve body, stem and & plunger; stainless steel fasteners, strainer screen and seat. Meets NSF61. Install where pressure to building exceeds 70 psi.

J. Flexible connectors:
1. Water Pipe: Brass Craft, MetraFlex, or equal braided flex connectors

K. Thermostatic Mixing Valves: Point-of-Use Valves (for lavatories & sinks)
1. Watts LFMMV series or approved equal. The mixing valve shall be installed on the hot water supply to fixture. The valve shall be ASSE 1017, ASSE 1069, ASSE 1070 and IAPMO cUPC listed. It shall have a lead-free cast copper silicon alloy body. The valve shall include integral filter washers and check valves and an adjustment cap with locking feature.

L. Backflow Preventers (Where shown on the Drawings or required by local code): Provide drain to termination where applicable.
1. Atmospheric type: Watts LF288A, Zurn 35XL, or equal, cast silicon copper alloy, cast brass, or cast bronze body, ASSE Listed 1001, CSA Certified, AND Certified to NSF/ANSI 372. Maximum working pressure: 125 PSI; maximum water temperature 180°F.
2. Reduced Pressure type: (main cold water line):
a. ½ inch to 2 inches: Watts LF909 or Zurn 975-XL2 series, or equal

M. Balancing Valves: Griswold "Isolator R" series or equal. Forged brass body, brass end connections, EDPM O-ring seals, nickel plated brass ball; 304 stainless steel cartridge.

N. Strainers: Watts LF777SI, wye pattern, lead free, cast strainers, with closure plug. NSF Certified to NSF 61, Annex G.

2.04 EXPANSION LOOPS

A. Metraflex "Gas Metraloop" or approved equal flexible hose expansion loops. The corrugated hose shall be stainless steel type 321 in accordance with ASTM A240. The braid shall be 304 stainless steel.

B. Fittings
1. Carbon steel shall be standard weight / Schedule 40 ASTM A 234 WPB
a. End fittings shall match fittings material.
1) Weld end in accordance with ASME B16.9.
2. Stainless steel shall be Schedule 40 S Type 304 stainless in accordance with ASTM A240
a. End fittings shall match fittings material.
2) Weld end in accordance with ASME B16.9.

B. Provide flexible hose expansion loop(s) as indicated on the Drawings or as required to accommodate any thermal expansion, contraction, building settlement, or seismic movement of the piping system.

A. Flexible hose expansion loops shall be manufactured complete with two parallel sections of corrugated metal hose, compatible braid, 180 deg return bend, with inlet and outlet connections. Field fabricated loops shall not be acceptable.

C. Flexible loops shall be capable of movement in the ±X, ±Y, and ±Z planes.

B. Flexible hose expansion loops shall impart no thrust loads to system support, anchors or building structure.

D. All flexible hose expansion loops shall be manufactured in accordance with the documented manufacturers weld procedure specifications in accordance with ASME Section IX.

C.

2.05 UNIONS

A. Steel pipe unions shall be malleable iron, brass to iron seat, ground joint, black or galvanized to match pipe 150 lb., ground joint, Anvil Figure 3463 or equal.

B. Copper pipe unions shall be:
   1. 2" and smaller: ground joint
   2. 2 ½" or larger: flanged face or grooved ends

C. Dielectric unions shall have minimum of 600 volts on a dry line with no flashover., be rated at 250 psi and shall conform to ANSI B16.39, including hydrostatic strength, air pressure testing. Watts 3000 series or equal.
   1. Provide insulated flanges for flanged piping system connection to dissimiliar metals. Flange fittings shall be rated at 175psi and conform to ANSI B16.42 (iron) and ANSI B16.24 (bronze).

2.06 DIELECTRIC FITTINGS

A. Precision Plumbing Products, "Clear Flow" series, threaded dielectric fittings, sizes 19100P thru 19195P or approved equal.

B. Dielectric fittings shall have zinc electroplated steel casing, and NSF/FDA listed lining. Fittings shall meet the requirements of ASTM standard F1545 for continuous use at temperatures up to 225°F (- +5°F), for pressures up to 300 psi, and shall achieve a dielectric waterway in all potable water applications.

2.07 HOSE BIBBS

A. HB-2 Exterior Wall Hydrant: Acorn "Lumaloy" recessed hose box, #8104-SSLF or equal. One-piece cast construction, fabricated from Lumaloy with plain finish. Frame and door shall have prime coat finish. Door shall have a recessed cam latch operable with a loose key by others. Valve shall be a replaceable cartridge type with vandal-resistant lockshield bonnet, removable loose key wheel handle and screwdriver operated stop. Stainless steel option, lead-free.
   1. Note: After the hydrant box has been properly set, additional caulking of all inside joints is

2.08 THERMOMETERS

A. Trerice "Bottom Connect" bimetal thermometer, model B854 or equal. 5" dial size, 300 stainless steel case, and stem, ¼" diameter stem, bimetallic coil, bottom connection, ½ NPT, double strength glass window, aluminum dial face with white background and black and blue graduations and markings.

2.09 PRESSURE GAUGES

A. Trerice model 600CB, 4 ½" dial size, cast aluminum case, adjustable pointer, clear glass window, aluminum dial face with white background and black graduations and markings. Maximum temperature 212ºF.

2.10 ACCESS DOORS

A. Where construction is not inherently accessible, provide adequately sized and conveniently located access doors in ceilings, walls, and furring for access to controls and for servicing valves, equipment, etc.
   1. Fire Rated walls: Fully gasketed Elmdor FR-CL, B labeled, 1½ hour rating, 16 gage galvanized steel with prime coat finish, concealed hinge, recessed exterior latch and interior latch release slide with locking cover; cylinder lock, Minimum size shall be 12" x 12". Provide larger sizes where required.

2. Drywall, masonry or tiled walls: Elmdor DW-SS, Type 304 stainless steel, rounded safety corners, concealed pivoting rod hinge, screwdriver-operated cam lock. Minimum size shall be 12" x 12". Provide larger sizes where required. Locking fully gasketed cover panel.

B. Doors shall be delivered to the General Contractor for installation.

2.11 PIPE INSULATION

A. Insulate all hot water supply piping, all hot water return piping, all tempered water supply piping and all tempered water return piping with Owens Corning "Fiberglas" pipe insulation with SSL II Positive Closure System with ASJ Max" or approved equal.

B. Pipe covering shall have factory applied All Service Jackets (ASJ). Jackets shall have a pressure sensitive closure system. Adhesives or staples shall not be required to seal the jacket and butt strips.

C. All insulation shall have composite (insulation, jacket, tape seal, and adhesive used to adhere the jacket to the insulation) Fire and Smoke Hazard ratings as tested under Procedure ASTM E 84 and NFPA 255 or UL 723, not exceeding: Flame Spread - 25, Smoke Developed - 50. PVC fitting covers, jacketing and accessories such as adhesives, mastics, cements and cloth for fittings should have the same component ratings.

D. Fittings, valves and flanges shall be covered with Proto "LoSmoke" PVC jacketing and "Insulated Pipe Shields" brand pipe supports or approved equal. Insulation for all exposed piping and all piping in crawl spaces shall be covered with PVC jacketing. PVC jackets shall be 20 mils thick and shall be bonded with adhesive. In crawl spaces, Knauf Earthwool RediKlad 1000° pipe covering shall serve as an acceptable alternate to standard pipe covering and PVC.

E. **All** piping exposed to the weather shall be insulated and finished with aluminum jacketing with a laminated moisture retarder. Aluminum jacketing shall be overlapped 2 to 3 inches and held in place with stainless steel bands to form a weather tight system. Elbows and tees shall be fitted with matching aluminum fitting covers. Other fittings in metal-jacketed systems shall be finished with conventional weather-resistant insulating materials with painted aluminum finish.

F. Inserts shall be installed at outside hangers. Inserts between the pipe and pipe hangers shall consist of rigid pipe insulation of thickness equal to the adjoining insulation. Inserts shall not be less than 10" long for pipe sizes up to 2 ½" and not less than 12" long for pipes larger than 2 ½".

G. Metal shields shall be applied between hangers or supports and the pipe insulation. Shields shall be formed to fit the insulation and shall extend up to the centerline of the pipe and the length specified for hanger inserts.

H. Insulation thickness shall conform to Title 24, Part 6 requirements as indicated in the following table:

FLUID TEMPERATURE RANGE (°F)	CONDUCTIVITY RANGE (in Btu-inch per hour per square foot per °F)	INSULATION MEAN RATING TEMPERATURE (°F)	NOMINAL PIPE DIAMETER (in inches)				
			1 and less	1 to <1.5	1.5 to < 4	4 to < 8	8 and lrgr
			INSULATION THICKNESS (inches)				
Space Heating, Hot Water Systems (steam, steam condensate and hot water) and Service Water Heating Systems							
201-250	0.27-0.30	150	2.5	2.5	2.5	3.0	3.0
141-200	0.25-0.29	125	1.5	1.5	2.0	2.0	2.0
105-140	0.22-0.28	100	1.0	1.5	1.5	1.5	1.5

I. All domestic water piping below grade shall be insulated with Trymer-2000XP or approved equal. Pipes shall be sleeved with 30 mil PVC jacket, with glued joints.

J. Adhesives: Aramacell "Armaflex 520", Knauf Insulation "Expert" tapes or approved equal.

2.12 SLEEVES, WALL PLATES

A. Pipe openings through walls, floors or ceilings: Escutcheons sized sufficient to cover openings. Brass material, chrome plated finish; set screw or spring to secure to pipe: ProFlo "PFSE" split escutcheons or standard type or approved equal.

B. Pipes through, under footings: 18 gauge iron sleeves two diameters larger than pipe, cast in concrete, annular space filled with mastic or plastic bituminous cement. Provide "Link Seal" sleeve sealing system for slab on grade or exterior wall penetrations

C. Pipes through floors, interior concrete walls, and through fire rated walls and smoke stop partitions: 18 gauge iron sleeves, two diameters larger than pipe. Extend sleeves 1 inch above finished floor; annular space filled with 3M Brand Fire Barrier CP-25 caulk or equal.

2.13 FLOOR DRAINS

A. FD-1: Jay R Smith Figure 2230Y, no-hub outlet floor drain with 12" round top and "Safe-Set" slotted sediment bucket, 3" deep. Drain shall have Duco cast iron body and flashing collar with cast iron ADA grate, trap primer connection.

2.14 TRAP PRIMERS

A. Trap primers shall be installed for all floor drains as follows:
   1. Trap primers shall be Precision Plumbing Products model PR-500 (automatic) or P2-500 (adjustable), Mifab M2-5000-NPB, or equal. Trap Primers shall be pressure drop activated and be of all brass construction including a brass body with ½" male NPS inlet and ½" female NPT discharge. Internal components shall consist of a #60 stainless steel debris screen, brass piston and brass discharge jet. Lubricated O-rings shall be EPDM E70. Adjustable model shall have stainless steel adjustment screw.
   2. Trap primers shall be installed on fresh cold-water lines of 1 ½" diameter or less and shall be located where they will be subjected to frequent pressure drops of at least 10 psi. Install with shut off valve and access doors in Janitor's closets, Mechanical Rooms and other areas not served by, or in close proximity to, flushometer valve operated water closets.

B. Working pressure shall be 20 to 80 psig.

2.15 CLEANOUTS

A. Cleanouts in membrane dampproofed floors shall have flashing flange and membrane clamps. Plugs shall be bronze, with cast iron body ferrule for cast iron pipe.

B. Floor Cleanouts (FCO): Jay R. Smith figure 4020, with "Twis-to-Floor" adjustable tops, or approved equal. Duco cast iron cleanout. Provide with vandal-proof top (-U) and flange with flashing clamp (-F-C) variations.

C. Grade (COTG): Zurn Z-1474-N with internal cleanout or equal Jay R Smith. Cleanout housing to be dura-coated cast iron body with integral anchor flange and scoriated cover with lifting device, or equal. Cleanouts in un-paved areas shall be set in 18" x 18" x 4" concrete pads.

D. Wall Cleanouts (WCO):
1. Jay R. Smith Figure 4422C, or approved equal, caulk ferrule cleanouts with access covers. Countersunk plug with shallow cover and screw.
2. Cleanout tee: Jay R. Smith Figure 4532S, or approved equal, with taper thread - bronze plug cover and screw.

2.16 HANGERS, SUPPORTS

A. Pipe clamps:
1. Jet Stream International or approved equal, BC series beam clamps, zinc electroplated,
2. Oatey or approved equal, suspension clamps and standard pipe clamps.
3. Cooper B-Line "BVT" series - Vibra clamp for copper piping or approved equal.
4. Eaton "B-Line" series, B3180FL flush mount pipe straps B3180 for all pipe over shield or direct, B2400 standard pipe straps or approved equal.
5. Riser clamps: pHd Mfg. Figure 550, 551, & 553 for vertical pipe runs, or approved equal.
6. Beam clamp retaining straps: Tolco Figure 69 or approved equal, pre-galvanized steel.
7. Beam clamps: top beam hook: Cooper B-Line Figure B3042 (Tolco Figure 61); side beam clamp: Figure B3045 (Tolco Figure 335), or approved equal

B. Upper attachments (side beam): Cooper B-Line or approved equal, Figure B3060 angle clip, Figure 51 bracket.

C. Clevis hangers: pHd manufacturing, Figure 451F standard clevis hangers for non-insulated stationary pipelines or approved equal. Carbon steel, electro galvanized with felt lining.

D. Copper tubing pipe hangers: Cooper B-Line Figure B3690F, felt lined J-hanger; Oatey "Holdrite" copper plated steel pipe support bracket or approved equal.

E. Anchors:
1. Hilti HDI, HDI-L, HDI+ and HDI-L+ drop-in anchor 3.3.11
2. Hilti "KWIK Bolt TZ" expansion anchor 3.3.5, for seismic and cracked concrete.
3. or approved equal.

F. Threaded Rods and Accessories
1. All thread rods: Tolco Figure 100, full length, electro-galvanized finish
2. Coach screw rods: B-Line B3213, steel, or approved equal.
3. Steel spot insert nut, Figure 310N, carbon steel, or approved equal.
4. Rod stiffener with break-off bolt head, Tolco Figure 98B or approved equal.
5. Hanger rod stiffener, steel, Tolco Figure SC228 or approved equal.
6. Tie bolts: Tolco Figure B3214 or approved equal.

G. Channel: Tolco A-12 or approved equal.

H. Rod Couplings:

1. Tolco Figure 70 steel rod couplings and Figure 70R steel reducing rod couplings, or approved equal

I. Concrete Inserts:
1. Tolco Figure 310N steel spot insert nut, carbon steel, or approved equal,
2. Tolco Figure 309N concrete insert nut, ductile iron, or approved equal,

J. Seismic Restraints
1. Adjustable sway brace attachment to steel: Tolco Figure 800 or approved equal.
2. Universal sway brace attachment: Tolco Figure 828; Tolco Figure 980 (3/8" -16 to ¾" -19 rods). And Figure 981 - Fast Attach, or approved equal.
3. Sway brace multi-fastener adapter: Tolco Figure 906 or approved equal.
4. Cable sway brace attachment: Tolco Figure 990, 990H, and 991 fast attach, or approved equal
5. Mechanical fast clamp: Tolco Figure 985 or approved equal
6. Brace cable: Tolco Figure BRC cable - pre-stretched 7 x 19 galvanized aircraft cable.

K. Pipe isolation: LSP products "Acousto-Plumb" system or approved equal.

L. Water heater equipment platform: Holdrite wall mounted “Quick Stand” suspended platform, #30-SWHP-WM with #QS-50 “Quick Strap” restraint straps.

M. Expansion tank mounting brackets: Holdrite “Quick Strap” #QS-U mounting straps.

2.17 FIXTURES

A. The quantity and location of fixtures shall be taken from the Architectural and Plumbing drawings. Provide adequate supports and all standard trim normally furnished for fixtures. All enamel shall be acid resisting. Traps, unless otherwise noted shall be 17 gauge brass tubing, chrome plated when exposed.

B. Submit catalog cut-sheets on all fixtures.

C. Except as otherwise shown, provide ¼" steel backing plates, 36" wide by 12" high minimum size, secured to a minimum of three studs by welding, or with ¼" x 2½" lag screws for all wall hung fixtures for which no other means of support is specified.

D. Stops and supplies: Provide stops for all fixtures. Unless otherwise specified, stops exposed at lavatories and similar fixtures shall be Brass Craft #OR1720A C; copper faucet supply kit, multi-turn FIP angle stop, stainless steel escutcheon, zinc die cast loose key, brass, chrome plated lock shield and loose key stem, and copper riser. Chrome plated. No lead.

E. All fixtures shall be standard white color, except as noted.

F. All fixtures shall meet or exceed the requirements of the California Administrative Code, Title 24, Part 5.

G. All plumbing fixtures providing domestic water shall comply with AB 1953, lead free. This includes, but is not limited to, lavatory faucets, sink faucets, shower valves, emergency showers, hose bibs, and drinking fountains.

1. <u>P-5 CLASSROOM SINK (ADA)</u>
   a. Fixture: Just Mfg. ARB-ADA-2451-A-GR-T, “Institutional Group”, ADA compliant art room sink, 18 gauge type 304 stainless steel, self-rimming top mount with stainless steel mounting channels. (3) holes on 4” centers, 5 ½” deep, drain location center rear. Faucet & drain included
   b. Faucet: J-1174-KS, concealed mixing faucet, ledgemount, cast brass body, swiveling gooseneck spout with 7-3/8" clearance, replaceable seats, brass

quarter turn quick compression stem units, replaceable reinforced nitrile rubber packing and Buna-N seat washer; 1.5 gpm

c. Drain: Just J-35-SSF flat strainer and 1 ½" tailpiece, 4" long
d. P-trap: Zurn Z8702LCB-PC or equal; chrome plated; cast body; less cleanout
e. Insulators: TrueBro Lav Guard #102 E-Z series; one p-trap cover, two angle valves and covers

2. P-5A FREESTANDING SINK
   a. Fixture: West Star Industries, Premier Line sink, model SP-1-2525, custom size with overall dimensions of 30" x 30"; 12-inches deep, 14 gauge type 304 stainless steel work top, 1 5/8 inch diameter stainless steel legs with adjustable feet, 10-inch backsplash, cross braced, stainless steel basket drain
   b. Faucet: Fisher Industries, model 13218, 8-inchc centers, lever handles, 16-inch gooseneck spout, 2.2 gpm
   c. P-trap: Zurn Z8702LCB-PC or equal; chrome plated; cast body; less cleanout

2.18 ELECTRIC WATER HEATER, TANKLESS

A. Tankless electric water heaters shall be a Chronomite Laboratories, "Instant Flow C-Micro - Low Activation" series, model CM-20L/208, as scheduled on the Drawings or approved equal.

B. The tankless heater shall have vandal resistant cast aluminum alloy housing with Celcon plastic waterway and Nichrome heating coils. Temperature shall be controlled by digital microprocessor.

C. Minimum operating/activation flow rate: .20 gpm.

D. Faucet flow controls shall be supplied with each unit.

2.19 IDENTIFICATION OF SYSTEMS

A. Pipe labeling shall be in compliance with ANSI/ASME A13.1 2015 "Scheme for the identification of Piping Systems" and ANSI Z535.1 2017 "Safety Color Code". All piping shall be identified.

B. Pipe Labels: Seton or equal. Preprinted, color-coded, with lettering indicating service and arrow showing flow direction.
   1. "Setmark" cylindrically coiled printed plastic sheets that snap around pipes with outside diameter up to 5.875"; or
   2. "Roll Form" self-adhesive pipe markers made of pressure -sensitive vinyl, over-laminated for added protection, and perforated to enable arrow flow direction.
      a. Pipe Label Contents: Include identification of piping service using same designations or abbreviations as used on Drawings, pipe size, and an arrow indicating flow direction.
      b. Flow-Direction Arrows: Integral with piping system service lettering to accommodate both directions or as separate unit on each pipe label to indicate flow direction.
      c. Label Sizes (per ANSI A13.1 / ASME A13.1-2015 Standards):
         i For pipes or covering with outside diameter ¾ to 1¼ inches, minimum length of label: 8 inches, minimum height of letters: ½ inch.
         ii For pipes or covering with outside diameter 1½ to 2 inches, minimum length of label: 8 inches, minimum height of letters: ¾ inch.
         iii For pipes or covering with outside diameter 2 ½ to 6 inches , minimum length of label: 12 inches, minimum height of letters: 1¼ inch.

C. Pipe Label Color Schedule: (per ANSI A13.1 / ASME A13.1-2015 Standards)

1. Potable Water Piping:
   a. Background Color: Green.
   b. Letter Color: White.

D. Valve Tags: Seton or equal stamped brass valve tags.
1. For identification and Owner's maintenance records, all valves shall be numbered and identified with brass tags stamped with service abbreviation and sequential number, and pre-drilled holes for attachment hardware, in accordance with Drawings and service performed. Control valves shall be also marked whether normally open (N.O.) or normally closed (N.S.).
2. Minimum size letters: ¼-inch; numbers ½-inch. Minimum tag size: 1 ½-inch diameter.
3. Fasteners: Attach to stem or body of valve so that tag is visible but doesn't interfere with the valve operation. Use Brass wire-link chain or beaded chain.
4. Valve Schedule: For each piping system, on 8 ½" x 11" bond paper, tabulate valve number, piping system, system abbreviation (as shown on valve tag), location of valve (room or space), and normal-operating position (open, closed, or modulating). The schedule shall be, shall be framed and posted in mechanical rooms and a copy provided in the maintenance manual.

E. Underground Warning Tape: Seton or equal.
1. Detectable underground pipe marking warning tape on all pipes buried beneath the ground. Identify water lines, pipe lines, gas lines, steam lines, and sewer lines. The tape shall be resistant to alkaline, acids, and other destructive agents usually found in soil. The tape shall be self-adhesive, 5-mil with aluminum backing, 3" width for 12" to 18" depth, APWA colors.

2.20 EXPANSION LOOPS

A. Metraflex "Gas Metraloop" or approved equal flexible hose expansion loops. The corrugated hose shall be stainless steel type 321 in accordance with ASTM A240. The braid shall be 304 stainless steel.

B. Fittings
1. Carbon steel shall be standard weight / Schedule 40 ASTM A 234 WPB
   a. End fittings shall match fittings material.
   b. Weld end in accordance with ASME B16.9.
2. Stainless steel shall be Schedule 40 S Type 304 stainless in accordance with ASTM A240
   a. End fittings shall match fittings material.
   b. Weld end in accordance with ASME B16.9.

C. Provide flexible hose expansion loop(s) as indicated on the Drawings or as required to accommodate any thermal expansion, contraction, building settlement, or seismic movement of the piping system.

D. Flexible hose expansion loops shall be manufactured complete with two parallel sections of corrugated metal hose, compatible braid, 180 deg return bend, with inlet and outlet connections. Field fabricated loops shall not be acceptable.

E. Flexible loops shall be capable of movement in the ±X, ±Y, and ±Z planes.

F. Flexible hose expansion loops shall impart no thrust loads to system support, anchors or building structure.

G. All flexible hose expansion loops shall be manufactured in accordance with the documented manufacturers weld procedure specifications in accordance with ASME Section IX.

PART 3 - EXECUTION

3.01 INSTALLATION, GENERAL

A. Prior to commencing the work of this Section, Contractor shall inspect the installed work of other trades and verify that their work is sufficiently complete to permit the start of work under this Section and that the finished work will be in complete accordance with the original design. In the event of discrepancy, the Contractor shall immediately notify the Architect and proceed as directed

B. The Contractor shall be held responsible for all existing conditions, whether or not accurately described. No allowance shall subsequently be made on the Contractor's behalf for any error, omission, or extra expense that is due to failure or neglect on the Contractor's part to make such examination and notification.

C. Contractor shall have examined the site, compared it with the Contract Documents, and be satisfied with the conditions under which the work is to be performed. In the event of discrepancy, the Contractor shall notify the Architect and shall proceed as directed.

D. Apply and install all items in accordance with the manufacturer's written instructions. Refer conflicts between the manufacturer's instructions and the contract drawings and specifications to the Architect for resolution.

E. Make all necessary provisions to prevent the transmission of vibration to the building structure and the passage of noise from the equipment rooms to other rooms. Provisions shall include: vibration isolators for motor driven equipment; flexible pipe connections to motor driven equipment; resilient mounting for piping; sealing off pipe and duct penetrations of walls, floors and ceilings of equipment rooms.

F. Provide all necessary cutting in connection with the work of this Section. No structural members shall be drilled, bored, or notched in a manner that will impair their structural capacity. All penetrations of concrete or masonry shall be made with core drills. No cutting shall be done without the approval of the Architect or DSA. Cutting or boring of joists or other structural members shall be done only when alternative routing is impossible and only upon written approval of the Architect.

3.02 VERIFICATION OF EXISTING CONDITIONS AND DEMOLITION

A. Before installation of any new work, verify the location, size and other conditions at all points of connection to services or other existing piping, and at all locations where new work will cross or pass near existing piping, electrical, or other facilities.

B. Information shown relative to existing services is based upon available records and data during preparation of the Drawings, but shall be verified. Contractor shall make reasonable deviations found necessary to conform with actual locations and conditions, without extra charges to Owner,

C. Remove piping, controls, fixtures, and equipment that is not to remain in service as shown on the Drawings or as required. This includes the removal of associated appurtenances and supports.

D. Patch, cap, or repair existing works affected by this demolition in concealed spaces within 6" of a live main or branch.

E. Deliver removed material to the Owner as directed by the Architect. Dispose of all other removed material offsite.

3.03 ACCESSIBILITY

A. Equipment shall be placed and piping connections made in such a manner that all routine adjustments and maintenance operations may be carried out without inconvenience and so that all code requirements for clearances are maintained.

3.04 COORDINATION

A. All work shall be coordinated with water, gas, sanitary sewer, and other services on the site. The locations of points of connection to the site services shall be confirmed prior to commencement of work.

B. Coordinate roughing-in and final plumbing fixture locations, and verify that fixtures can be installed to comply with original design and referenced standards.

3.05 EQUIPMENT

A. Equipment shall operate quietly and without objectionable vibration. Such problems, other than from equipment operating at optimum conditions, shall be the Contractor's responsibility and shall be eliminated at the direction of the Architect.

B. Install equipment to provide good appearance, easy access, and adequate space to allow replacement and maintenance. Provide bases, supports, anchor bolts, and other items required to achieve this. Installation shall be level, above moisture level, and adequately braced.

C. Extend ¼" schedule 40 black steel lubrication pipes from hard-to-reach locations to front of equipment or to access doors. Terminate with proper lubrication fittings.

D. Move equipment into building through available openings. Dismantle equipment where necessary to accomplish this. After reassembly, test equipment to verify its satisfactory operating condition.

E. Thoroughly lubricate equipment before operating. Repair of damage resulting from failure to comply with this requirement shall be the Contractor's responsibility.

F. Connections to piping shall be secured and properly aligned and all utility and control connections shall be properly isolated from the building structure by means of vibration isolators and flexible connections. Any equipment not meeting this requirement will be modified and properly reinstalled at no expense to the Owner.

3.06 INSULATION

A. Insulation shall be applied in complete accordance with the manufacturer's published installation instructions. All insulation shall be applied on clean, dry surfaces and shall be continuous through wall and ceiling openings and sleeves, except where fire stop materials are required.

B. All joints shall be firmly butted together and longitudinal jacket laps and butt strips shall be smoothly secured.

C. Specified adhesives, mastics and coatings shall be applied at the manufacturer’s recommended minimum coverage per gallon.

D. Insulation on all cold surfaces must be applied with a continuous, unbroken vapor seal. Hangers, supports, anchors, etc. that are secured directly to cold surfaces must be adequately insulated and vapor sealed to prevent condensation. Seal all pipe terminations with vapor barrier mastic.

E. All surface finishes are to be extended to protect all surfaces, ends and raw edges of insulation.

F. Inserts shall be installed at outside hangers. Inserts between the pipe and pipe hangers shall consist of rigid closed cell pipe insulation of thickness equal to the adjoining insulation. Inserts shall not be less than 12" long for pipe sizes through 2½" and not less than 18" long for pipes larger than 2 ½". Refer to manufacturer's recommendations for densities, sectional length, gauge of metal shield and distance between centering.

G. Galvanized metal shields shall be applied between hangers or supports and the pipe insulation. Shields shall be formed to fit the insulation and shall extend up to the centerline of the pipe and the length specified for hanger inserts less 4" to allow for vapor retarding butt joints on each side of shields.

H. All pipe insulation ends shall be tapered and sealed, regardless of service

3.07 PAINTING

A. Properly prepare work under this Section to be painted.

B. Painting shall be applied under the Painting section requirements, except preservative and special painting as described herein.

C. Priming as required herein, shall conform to the Painting section requirements and be of a material compatible with paint for finish painting.

D. All equipment and materials shall be cleaned of grease, wax, oil, rust or dirt in preparation for finish painting. Any prime coated surfaces showing signs of rust before being finish painted shall be thoroughly cleaned and a new prime coat applied.

E. Prime paint both sides of flashings prior to installation.

F. Furnish can of touch-up paint with each factory finished piece of equipment.

G. Paint all piping in mechanical rooms. Color as selected by the Architect.

H. Black steel piping exposed to the environment shall be painted with rust-inhibiting paint. Color as selected by Architect.

3.08 IDENTIFICATION OF SYSTEMS

A. Pipe Markers
   1. Identify all piping on this project, except piping located within walls or inaccessible areas.
   2. Locate pipe labels where piping is exposed or above accessible ceilings in finished spaces, machine rooms, and accessible maintenance spaces such as shafts, tunnels, and plenums and at exterior exposed locations, as follows:
      a. Adjacent to all valves and flanges;
      b. Near each branch connection, excluding short takeoffs for fixtures and terminal units. Where flow pattern is not obvious, mark each pipe at branch;
      c. Before and after all wall, floor and ceiling penetrations and inaccessible enclosures;
      d. Adjacent to changes in direction;
      e. At access doors, manholes, and similar access points that permit view of concealed piping;
      f. Near major equipment items and other points of origination and termination;
   3. Install pipe markers on long straight runs every 20 feet. Reduce intervals in areas of congested piping and equipment.
   4. On piping above removable acoustical ceilings. Omit intermediately spaced labels.

B. Valve Tags
   1. Identify all valves on this project, except drain lines. Attach tags so that they are easily visible but do not obstruct the operation of the valve

2. Fasteners: Attach to stem or body of valve so that tag is visible but doesn't interfere with the valve operation.

C. Underground Tape:
1. Identify all underground piping on this project with a continuous length of detectable tape.
2. If tape cannot be continuous then it must overlap by ten feet at any end.
3. If piping is buried more than 36" below the finished earth surface then two continuous lengths of tape must be buried as described

3.09 SEISMIC FORCE RESISTANCE

A. Equipment:
1. Each piece of equipment installed under this Section shall be constructed and anchored to structural supports to resist a seismic force of 150% of the equipment's operating weight in any direction. Supports, anchors, and braces shown shall be minimum.
2. Equipment manufacturer shall design, construct, and certify that his equipment satisfies the special minimum seismic resistance requirements and shall submit calculations or test results supporting his certification.

B. Cable Bracing
1. Cables shall be installed slightly slack, so as not to support gravity loads.
2. Cable shall connect the braced item to a building structural element. Cable shall have a bracket at each end to make the connections. The cable assembly, with connection brackets, shall be Mason Ind. N.Y. SCB or SCBH. Cable is held to end brackets with one or two bolts. Cable bolts shall be tightened to the torque values stated in the details or, in the case where break off nuts are provided, until the nut breaks off. Break off nuts are as manufactured by Mason West, Inc.
3. The Mason Ind. N.Y. SCBH component can be used for connection directly to the threaded vertical hanger rod used for supporting system gravity loads as detailed in Section D of OPM-0043-13.
4. The SCB bracket and cable (Ref. X1.0), SCBH bracket and cable (Ref. X1.1), and UCC rod stiffener clamp (Ref. X3.0) are manufactured by Mason Ind. N.Y. and are included (with accompanying hardware) in the kit options provided in Section D. of OPM-0043-13

C. Piping:
1. Flexibility of piping systems must be maintained by using flexible devices at critical points at junctions of separate building structures. Braces or anchors shall be designed to damp oscillations or check excessive movement. Flexible devices for piping of gas shall be loops or offsets. Flexible devices for other piping may be loops, Victaulic grooved, or roustabout couplings.
2. Piping at tops and bottoms of risers are critical points where flexibility is required, as well as at changes in direction on long runs of piping 4" and larger. Tops of risers shall be restrained from motion in horizontal direction, and midpoints shall be anchored in all directions.
3. Seismic-restraint devices shall have horizontal and vertical load testing and analysis and shall bear anchorage preapproval OPM number from OSHPD, preapproval by ICC-ES, or preapproval by another agency acceptable to authorities having jurisdiction, showing maximum seismic-restraint ratings.
4. Install lateral bracing with pipe hangers and supports to prevent swaying.

3.10 INSTALLATION, HANGERS & SUPPORTS

E. Pipe supports shall be spaced according to CPC 2019, Table 313.3 and sufficiently close to support pipes properly without formation of pockets. Hangers shall be installed at ends of mains and branches.

F. Install hangers and supports complete with necessary attachments, inserts, bolts, rods, nuts, washers, and other accessories.

G. Provide resilient mounting for domestic water piping. Thermal insulation may serve as resilient mounting for insulated piping.

H. Suspended water piping shall be anchored with steel struts installed at midpoint of each run.

I. No valve or piece of equipment shall be used to support piping.

J. Install lateral bracing with pipe hangers and supports to prevent swaying.

K. 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.

L. Install building attachments within concrete slabs or attach to structural steel. Install additional attachments at concentrated loads, including valves and flanges, 2-½ inches and larger and at changes in direction of piping. Install concrete inserts before concrete is placed; fasten inserts to forms and install reinforcing bars through openings at top of inserts.

M. Installation of piping shall be such that damage cannot result through loading, expansion or contraction of piping. Anchors shall be installed to obtain uniformity of pipe movement.

N. Hanger rod sizes shall be no smaller than 3/8-inch for pipe and tube sizes ½ to 4 inches and ½ inch for sizes 5 - 8 inches.

O. Inserts shall be installed at outside hangers. Inserts between the pipe and pipe hangers shall consist of rigid pipe insulation of thickness equal to the adjoining insulation. Inserts shall not be less than 10" long for pipe sizes up to 2 ½" and not less than 12" long for pipes larger than 2 ½".

P. Metal shields shall be applied between hangers or supports and the pipe insulation. Shields shall be formed to fit the insulation and shall extend up to the centerline of the pipe and the length specified for hanger inserts.

Q. All water heaters shall be strapped at upper 1/3 and lower 1/3 of the vertical dimensions of the unit. The lower strap shall be a minimum of 4″ from the controls.

3.11 PIPE WELDING

A. Weld all pipe 2.5 inches and larger. Use the following procedure. All welders must be AWS certified. AWS B2.1 SMAW 6G Pipe Welding Procedure Specifications

Welding process: SMAW	Grove Angle: 60 degrees
Position: 6G Fixed position	Material/Spec: A 106
Weld Progression: Up	Thickness (pipe/tube): Groove (in) .280
Backing: No	Notes: Sch. 40 Pipe
Current/Polarity: DCEP	Filler Metal Class: E6010Rt/E7018F1
Root Opening: 1/16 to 1/8	Other Filler Metal Class: Rt. 1/8, 3/32 Filler

B. Welded joints shall be beveled and butt-welded. Reductions of pipe shall be made with forged steel welding fittings. Branch reductions of two or more pipe sizes smaller than the main, may be Bonney "Weld-O-Let" fittings, or equal. Job fabricated reductions and branches shall not be used. All pipe burrs shall be reamed out. Welding rods shall be as follows, or approved equal:

Pipe Size	Arc Welding	Gas Welding
2" and larger	Fleetweld #5	Oxweld #1 or Page Hi-Test M
1½" and smaller	None	Oxweld #1 or Page Hi-Test M

3.12 INSTALLATION, PIPING

A. General

1. Rough in shall proceed as rapidly as general construction will permit. All rough-in shall be complete, at locations verified by Architect and Owner, and tested and inspected prior to installation of concrete, lath, plaster, gypsum wallboard, or other finishes.
2. All piping shall be concealed in finished rooms, installed in furred walls and partitions. Where furred or suspended ceilings occur, piping shall be installed in the concealed space at points adjacent to beams and/or other structural members, and coordinated with ductwork and equipment. Where exposed piping occurs, it shall be installed parallel to or at right angles to building walls, unless specifically shown otherwise on the Drawings.
3. Installation of piping shall be such that damage cannot result, through thermal expansion or contraction, to piping, building, or pipe hangers and supports. Anchors shall be installed at midpoints of all runs in main piping for the purpose of localizing pipe expansion or prevention of creepage.
4. All pipe lines shall be installed free from traps and air pockets, true to line and grade, with suitable supports properly spaced. All piping shall be installed without undue stresses and with provision for expansion and contraction.
5. Vertical lines shall be supported and braced at every floor/roof level.
6. All piping shall be new and free from foreign substances. American standard pipe threads shall be used for IPS threaded work. Joints in threaded piping shall be made up with Teflon tape applied to the male threads only. No screwed pipe joints shall be caulked or packed with rope or other packing materials. Pipe shall be free from tool marks, threads cut accurately with not more than two (2) threads showing beyond fitting. Friction wrenches shall not be used with plated, polished, or soft metal piping. All changes in pipe size shall be made with reducing fitting. Bushings will not be permitted.
7. Protect unattended openings in piping during construction.
8. All copper tubing shall be formed in a workmanlike manner, in accordance with the Pipe and Tube Bending Handbook of the Copper and Brass Research Association. A tube bender giving support to the periphery of the tube shall be used. The tubing shall be protected against flatting or other injury.
9. All copper connections and joints shall be made in accordance with the Copper Tube Handbook, Copper and Brass Research Association. No swaged connections will be permitted. All valves, pumps, and similar equipment shall be connected to copper piping through union or flange adapter fittings.
10. No water or drainage piping shall pass over electrical equipment unless adequate protection is provided to prevent damage by leaks or condensation.
11. Install air vents at all water piping high points when direction of flow is downward.
12. Install sediment drain faucets at all low points.
13. Valves, cocks, etc., shall be installed to allow convenient accessibility and operation.
14. Unions and flanges shall be installed to allow convenient replacement of all equipment and cleaning tubes.
15. A union connection shall be installed downstream from all valves, at equipment connections and at other locations as required or directed.
16. Shut off valves shall be provided in all main services, and where required to permit proper servicing of equipment. Valves of one type shall be of one manufacturer.
17. All valves shall be of the same size as the pipelines in which they are installed, unless specifically sized on the Drawings. All hand controlled line valves shall be ball valves,

except where throttling control or frequent operation is required, in which case globe or angle valves shall be used. Globe valves in horizontal lines shall be installed with stem in horizontal to permit line draining. All globe and angle valves shall be installed to close against pressure. Disc valves shall have discs suitable for the services for which they are to be used.

18. All valves shall be accessible and shall not be installed with the stems below the horizontal plane. Provide access panels at walls, ceilings, or floors.
19. Provide prime coated escutcheon plates at all points where exposed piping penetrates finished wall ceilings or floors.

B. Waste, Drain and Vent Piping:
1. Soil, waste, and vent piping occurring within the building shall be installed to a uniform minimum grade of ¼" per foot unless otherwise noted. Vent piping shall be graded so that all condensation shall flow directly to a soil or waste line.
2. Exterior soil and waste lines shall be installed to inverts or grades indicated on the drawings.
3. Bell and Spigot pipe shall be installed with the bell up grade.
4. Changes in direction of drainage piping shall be accomplished by the use of appropriate drainage and sanitary fittings.
5. Drilling and tapping of drains, soil, waste, or vent pipes and the use of saddle hubs and bands are prohibited.
6. Protection against breakage of piping passing under or through walls shall be provided using specified sleeves and caulking.
7. Adapters shall be installed between threaded iron and soil pipe.
8. Test tees shall be installed at the foot of all soil, waste, and storm water stacks.
9. Cleanouts shall be located where indicated on the Drawings; at all horizontal offsets; at ends of waste or sewer branches more than 5' in length; at intervals of 100' in straight runs of piping, or at closer intervals if directed or required by local code. Location of cleanouts in finished spaces shall be approved by the Architect prior to installation.

C. Hot, Cold Water Systems:
1. Di-electric unions shall be installed where copper pipe is connected to galvanized steel piping or stub outs.
2. Connections from copper pipe to fixture supply fittings shall be made with copper or brass nipples.
3. Provide 18" high vertical air chambers at all domestic water connections to fixtures and/or equipment that are not specified to have shock absorbers.
4. All domestic water piping shall be kept clear of the building structure. Where it is within 1" of the building structure it shall be wrapped with felt (3/16" minimum thickness).
5. To the greatest extent possible, domestic cold water piping shall be kept separated from hot piping and where there is a choice shall be run in the coolest portion of the available space.

D. Natural Gas Piping Systems:
1. Natural gas piping shall slope back to meter where possible; bottom of vertical natural gas lines shall be fitted with 6" long capped drip legs.
2. In addition to main shut-off valve, a natural gas stopcock shall be installed at each natural gas fired piece of equipment.
3. Install strainer on inlet of each line-pressure regulator and automatic or electrically operated valve.
4. Extend relief vent connections for service regulators, line regulators, and overpressure protection devices to outdoors and terminate with weatherproof vent cap.
5. Drips and Sediment Traps: Install drips at points where condensate may collect, including service-meter outlets, as close as practical to inlet of each appliance. Locate where

accessible to permit cleaning and emptying. Do not install where condensate is subject to freezing.

6. Construct drips and sediment traps using tee fitting with bottom outlet plugged or capped. Use nipple a minimum length of 3 pipe diameters, but not less than 3 inches long and same size as connected pipe. Install with space below bottom of drip to remove plug or cap.
7. Extend relief vent connections for service regulators, line regulators, and overpressure protection devices to outdoors and terminate with weatherproof vent cap.

E. Plumbing Fixtures:
1. All exposed bolt heads and nuts used to secure fixtures shall be concealed with vitreous china caps.
2. Seal joints between plumbing fixtures, counters, floors, and walls using sanitary-type, one-part, mildew-resistant silicone sealant. Match sealant color to fixture color. Comply with sealant requirements specified in Division 07 Section "Joint Sealants."

F. Flashing:
1. All roof and wall penetrations shall be flashed and counterflashed water tight with 26 gauge sheet metal, except as noted.
2. Vents through roof shall be flashed with Stoneman #1100-4 lead flashing assemblies. Flashing shall be extended over top of pipe and shall be turned down inside top of pipe.

G. Excavation, Backfill:
1. Provide all excavation, trenching, and backfill in connection with the work of this Section.
2. Excavation shall be carried to 4" below the bottom of pipes. Provide a sand bedding for all sloped drainage piping, and provide smooth uniformly graded bedding of firm but yielding material for all other piping, catch basins, and similar structures.
3. Backfill material shall be non-corrosive and free from all foreign material that could damage pipes. Installation shall be in accordance with "Earthwork" Section.

H. Indirect Waste Piping:
1. Indirect waste piping shall be installed to a uniform minimum grade of ¼" per foot unless otherwise noted.
2. Changes in direction of indirect waste piping shall be accomplished by the use of appropriate drainage fittings.
3. Drilling and tapping of indirect waste pipes and the use of saddle hubs and bands are prohibited.
4. Protection against breakage of piping passing under or through walls shall be provided using specified sleeves and caulking.

3.13 BELOW GRADE GAS PIPING INSTALLATION

A. Polyethylene gas distribution piping shall be installed be in accordance with CFR 49, Part 192, Subpart G (mains), Subpart H (service lines), applicable codes and regulations and ASTM D 2774.

B. When delivered, a receiving inspection shall be performed, and any shipping damage shall be reported to the Manufacturer within 7 days.

C. Burial Depth.
1. All polyethylene gas distribution piping shall be installed in accordance with applicable federal, state and local codes and shall have at least 12" of cover in private property, and at least 18 inches of cover in streets and roads.

D. Excavation.
1. Trench excavations shall conform to the Drawings and in accordance with all applicable codes.

2. The Contractor shall remove excess groundwater. Where necessary, trench walls shall be shored or reinforced, and all necessary precautions shall be taken to ensure a safe working environment.

E. Foundation & Bedding.
1. Pipe shall be laid on grade and on a stable foundation. Unstable trench bottom soils shall be removed, and a 6" foundation or bedding of compacted Class I material shall be installed to pipe bottom grade. A trench cut in rock or stony soil shall be excavated to 6" below pipe bottom grade, and brought back to grade with compacted Class I bedding. All ledge rock, boulders and large stones shall be removed.

F. Pipe Handling.
1. Pipe shall be handled in a safe manner that avoids damage to the product. When lifting with slings, only wide fabric choker slings capable of safely carrying the load, shall be used to lift, move, or lower pipe and fittings. Wire rope or chain shall not be used. Slings shall be of sufficient capacity for the load and shall be inspected before use. Worn or damaged equipment shall not be used.

G. Backfilling.
1. Embedment material soil type and particle size shall be in accordance with ASTM D 2774. Embedment shall be placed and compacted to at least 90% Standard Proctor Density in 6" lifts to at least 6" above the pipe crown. During embedment placement and compaction, care shall be taken to ensure that the haunch areas below the pipe springline are completely filled and free of voids.

H. Protection against shear and bending loads
1. In accordance with ASTM D 2774, connections shall be protected where an underground polyethylene branch or service pipe is joined to a branch fitting such as a service saddle, branch saddle or tapping tee on a main pipe, and where pipes enter or exit casings or walls. The area surrounding the connection shall be embedded in properly placed, compacted backfill, preferably in combination with a protective sleeve or other mechanical structural support to protect the polyethylene pipe against shear and bending loads.

I. Final Backfilling.
1. Final backfill shall be placed and compacted to finished grade. Native soils may be used provided the soil is free of debris, stones, boulders, clumps, frozen clods or the like larger than 8" in their largest dimension.

3.14 TESTING, INSPECTIONS

A. Contractor shall not allow or cause any work of this Section to be covered or enclosed until it has been inspected, tested, and approved by the Architect and the authorities having jurisdiction over the Work. Should any of this work be enclosed or covered up before such inspection, testing, and approval, this Contractor shall uncover the work, have the necessary inspections, tests, and approvals made and, at no expense to the Owner, make all repairs necessary to restore both his work and that of other contractors which may have been damaged to be in conformity with the Contract Documents.

B. Contractor shall make all tests required by all local, state, and federal laws, codes, ordinances, and regulations having jurisdiction over this work. Furnish all necessary labor, materials, and equipment for conducting tests, and pay all expenses in connection therewith. Should leaks develop while testing, repairs shall be made, and tests shall be repeated until a satisfactory test result is obtained.

C. Test for leaks and defects in new piping and parts of existing piping that have been altered, extended or repaired.

D. Tests
   1. Finished Plumbing Test Procedure: After plumbing fixtures have been set and traps filled with water, test connections and prove they are gastight and watertight. Plug vent stack openings on roof and building drains where they leave the building. Introduce air into piping system equal to pressure of 1-inch wg. Use U-tube or manometer inserted in trap of water closet to measure this pressure. Air pressure must remain constant without introducing additional air throughout period of inspection. Inspect plumbing fixture connections for gas and water leaks.
   2. Hot and Cold-Water Piping: Shall be hydrostatically tested for 6 hours at 150 psi. All equipment shall be tested watertight at utility pressure.
   3. Drainage and Vent Piping: Shall be tested for 1 hour by expelling air from the system, plugging all outlets and filling the pipes with water to the top of vertical sections of pipes. No loss of water shall be permitted.
   4. Natural Gas Piping: Shall be tested for 24 hours at a pressure of 50 psig with nitrogen or compressed air. No pressure drop shall be allowed during the last 4 hours of the test. Tests joints of natural gas piping with Leak-Tec or Nupro-Snoop solution while maintaining 10 psig minimum internal pressure.
   5. Condenser water piping shall be hydrostatically tested at 125-psi pressure and proved tight before covering. Tests may be made in sections provided connection to service previously tested is included in each succeeding test. Systems shall be tight for 8 hours.

3.15 DOMESTIC WATER SYSTEM STERILIZATION

A. Upon completion of this work, the new domestic water system shall be thoroughly flushed, sterilized and reflushed. Sterilization and reflushing shall be performed using the procedure below. All work shall be performed in the presence of the inspector.

B. All domestic water outlets shall have signs posted at their location stating that the water has not been sterilized and shall not be used for human consumption. The signs shall remain until the sterilization process is complete.

C. Procedure
   1. Introduce chlorine or a solution of sodium hypochlorite, filling the lines slowly and supplying the sterilization agent at a rate of 200 parts of chlorine per million. The entire system shall be completely filled with the solution. All valves shall be operated and ends of all branches tested for residual chlorine. Continue to inject the solution until at least 200 ppm of free chlorine is indicated.
   2. After the sterilizing agent has been applied, the system shall be isolated with the solution retained for at least 3 hours. Test for residual chlorine after retention. If less than 200 ppm is indicated, repeat the sterilization procedure.
   3. After satisfactory sterilization, flush the system until all traces of the chemical are removed or until the chlorine content is no greater than that in the existing supply.

D. After a period of 48 hours minimum, bacteriological tests, using samples from at least 3 representative points, shall be made by recognized testing agency, who shall certify to the Architect that the system is bacteriologically safe and at least equal in safety to that of the principal water supply. The laboratory report and certification shall be transmitted to the Architect.

3.16 ADJUSTING

A. Properly adjust all stops, and controls, and demonstrate safe and satisfactory operation of all equipment.

3.17 CLEANING OF PIPING

A. All new piping shall be thoroughly cleaned of rust, scale, etc., prior to enclosing and placing in operation. Flush all water piping systems. Water shall be forced through pipes until the systems are free from foreign substances.

B. Remove, clean and replace all strainer baskets prior to final inspection.

3.18 CLEANUP

A. Upon completion of the work of this Section, remove all surplus material, debris, and equipment associated with or used in the performance of this work.

END OF SECTION

ARB-ADA-2451-A-GR-T

SUBMITTAL DATA

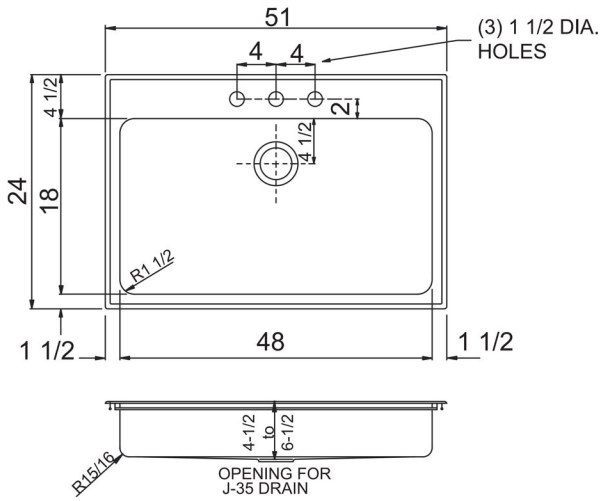
INSTITUTIONAL GROUP

ADA COMPLIANT

ART ROOM SINKS with FITTINGS

ADA Compliant





24.15 Gallon Capacity*

*CAPACITY MATTERS
Max. I.D. sizing with straight-sided, non -tapered bowl configuration. Tight corner radius design. Capacity based on 6-1/2" depth.

Seamless welded construction of 18 gauge type 304 stainless steel. Interior and top surfaces polished to a non-porous Hand Blended Just Finish. Smooth, fully coated underside insulate for sound and reduces condensation. Straight sided compartment with 1-3/4" radius corners provides greater capacity. Self-rimming top mount with Grip-Rim Plus with stainless steel mounting channels. Drain punched for Just J-35-SSF drain centered. Certified to ASME A112.19.3/CSA B45.4; UPC; IPC.

NSF C U.S. ASME A112.19.3/CSA B45.4

Sink certified to ASME A112.19.3/CSA B45.4; Uniform Plumbing Code (UPC); International Plumbing Code (IPC), by NSF International. Certified with/without overflow, less fittings.

Sink certified compliant with 2010 ADA Standards for Accessible Design and ICC/ANSI A117.1 by NSF International.

MADE IN U.S.A.

RECYCLED STAINLESS THE VALUE OPTION

FAUCET PUNCHING - MUST BE SPECIFIED		
☐	(1) Hole Centered	
☐	(2) Holes on 4" centers	
☐	(3) Holes on 4 "centers(illustrated)	
☐	Alternate Punching: Faucet Model:	Punching Required:

DEPTH - MUST BE SPECIFIED:					
☐ 4 1/2" DEEP	☐ 5" DEEP	☐ 5-1/2" DEEP	☐ 6" DEEP	☐ 6-1/2" DEEP	

DRAIN LOCATION - MUST BE SPECIFIED:				
☐ CENTER	☐ CENTER REAR	☐ LEFT REAR	☐ RIGHT REAR	

CUTOUT DIMENSIONS		
Model Number	Front-to-Back	Left-to-Right
ARB-ADA-2451-A-GR-T	23-1/4	50-1/4

APPROVED FOR MANUFACTURING

MODEL NO.: **ARB-ADA-2451-A-GR-T** QTY: _____

JOB NAME: _____

TAG/ITEM: _____

CUSTOMER: _____

SIGNATURE: _____

INCLUDES



J-1174-KS Faucet
Concealed mixing faucet with 5-1/2" reach, PVD chrome swivel gooseneck spout with ~~2.2~~ GPM flow restricting aerator. Wrist blade handles, 4", indexed hot and cold.



J-35-SSF Drain
Type 304 stainless steel drain body, stainless steel flat strainer and 1-1/2" O.D. stainless steel tailpiece, 4" long.

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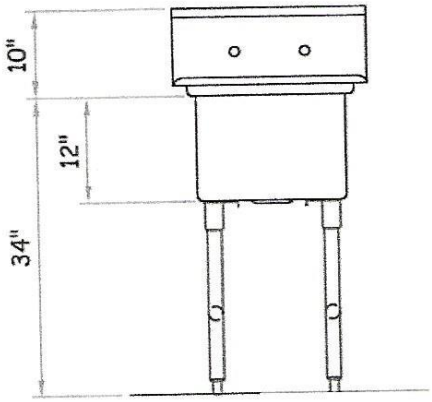
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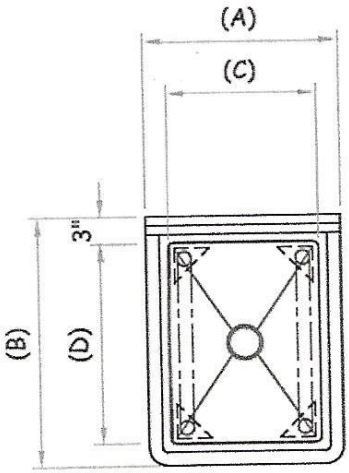
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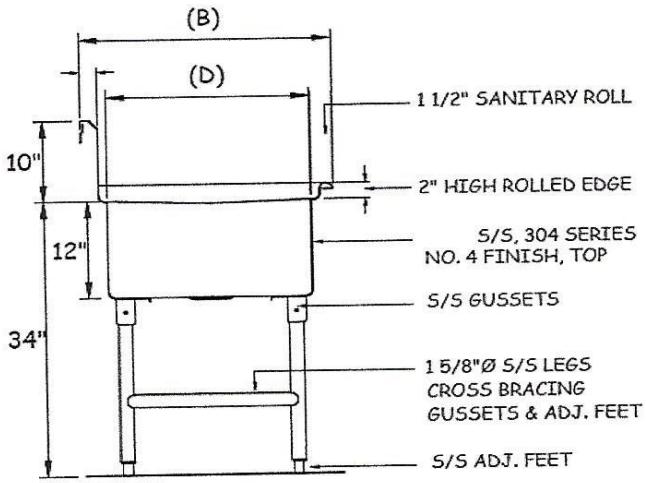
West Star
The leader in service and quality

Premier Line Sinks
Details and Specifications

P-5A







Custom Sizes Available!

MODEL NUMBER	OVERALL DIMENSIONS		TUB SIZE		WT. (LBS.)
	A	B	C	D	
SP-1-1717	22"	22 1/2"	17"	17"	50
SP-1-1723	22"	28 1/2"	17"	23"	55
SP-1-2323	28"	28 1/2"	23"	23"	60
SP-1-2923	34"	28 1/2"	29"	23"	65
SP-1-2929	34"	34 1/2"	29"	29"	70
CUSTOM	OVERALL DIMS.		TUB SIZE		
SP-1-2525	30"	30"	25"	25"	

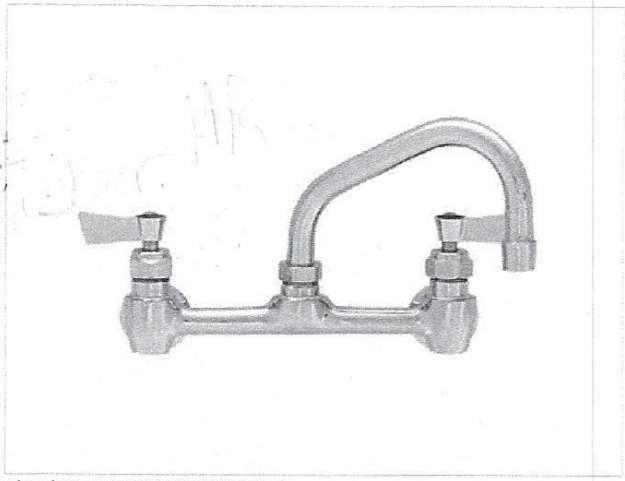
<---------- NSF

WT. = Crated shipping weight

www.weststarindustries.com
4445 E. Fremont Street / Stockton, CA 95215
Phone: 800-326-2288 Fax: (209) 955-8250 CL# 422322
Email: wsi@weststarindustries.com

Note: Specifications are subject to change without notice.

P-5A



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Faucet, Kitchen, 8" Backsplash Control Valve, Lever Handles, 12" Swing Spout

Model: **13269** List: **$268.00**

Consistent performance, durability and designed with efficiency and least enviornmental impact regarding our product, procceses and packaging in mind, Fisher faucet are the perfect faucet in any foodservice operation. Available in wide selection of spout types, flow rates and spout lengths, materials, handles and control valves. Able to be configurered for any foodservice need

- Brass Construction
- Easily direct the flow of water to any sink compartment
- Provides excellent reach and clearance for rinsing out glasses and washing dishes
- Delivers excellent water flow in any application
- Lever Handles with Color Coded Identification Buttons Red for Hot, Blue for Cold
- Two Part Swivel Stem(s) for Lower Maintenance
- 1/2" Inlet(s) Standard
- 8" Backsplash Control Valve
- Stainless Steel Seats - Guranteed for Life
- Aerator 2.20 GPM at 60 PSI (8.3 L/min @ 410 kPa)

California residents: See Proposition 65 information (/pages/california-prop-65-warning)

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Part #	Description	List	Add to List
Lever Handles			
13218 (/product/13218)	Faucet, Kitchen, 8" Backsplash Control Valve, Lever Handles, 16" Swing Spout	$271.00	Add to List (https://www.fisher-mfg.com/flag/flag/add_to_list/94036?destination=node/93951&token=deb5c0e92ea58378856c758dd5f234e7&has_js=1)

Commercial Electric Water Heaters

EWH

DURA-POWER™

Designed for use as a recovery heater having its own storage tank. Available in upright standard models (DEN) and lowboy models (DEL).

GLASSLINED TANK

- Thirteen sizes; 6 thru 119 gallon capacity. Tank interior is coated with glass specially designed by A. O. Smith for water heater use.

ELEMENTS

- Zinc plated copper sheaths for longer life. Medium watt density means lower surface temperature to minimize scale build-up and more surface to heat water. Element sizes from 1.5 to 6.1 KW. Maximum input KW (see chart).

STANDARD VOLTAGES

- 120, 277 single phase and 208, 240 and 480V unbalanced three-phase delta; easily converted to single-phase at terminal block (except 208V with 5500 watt elements). Single element heaters, single-phase only.

TERMINAL BLOCK

- Factory-installed. Just bring the service to heater and connect to block. Terminal block not supplied on 120V & 277 volt models. (No junction box on DEL6-20)

CONTROLS

- Temperature control (adjustable through a range of 130° to 170°F on single element and 120° to 181°F on dual element) and manual reset high temperature cutoff per element

CSA CERTIFIED AND ASME RATED T&P RELIEF VALVE

SIMPLIFIED CIRCUITRY, COLOR CODED FOR EASE OF SERVICE

ANODE ROD FOR MAXIMUM CORROSION PROTECTION

CABINET HAS BONDERIZED UNDERCOAT WITH BAKED ENAMEL FINISH

TOP INLET AND OUTLET OPENINGS

DRAIN VALVE (EXCLUDES DEL 6-20)

UL APPROVED FIELD CONVERSION PROGRAM

COMPLIANCE

- Meets the standby loss Requirements of the U.S. Department of Energy and current edition of ASHRAE/IES 90.1

LIMITED WARRANTY OUTLINE

- If the tank should leak any time during the first three years, under the terms of the warranty, A. O. Smith will furnish a replacement heater; installation, labor, handling and local delivery extra. THIS OUTLINE IS NOT A WARRANTY. For complete information consult the written warranty or A. O. Smith Water Products Company.



DEN-40

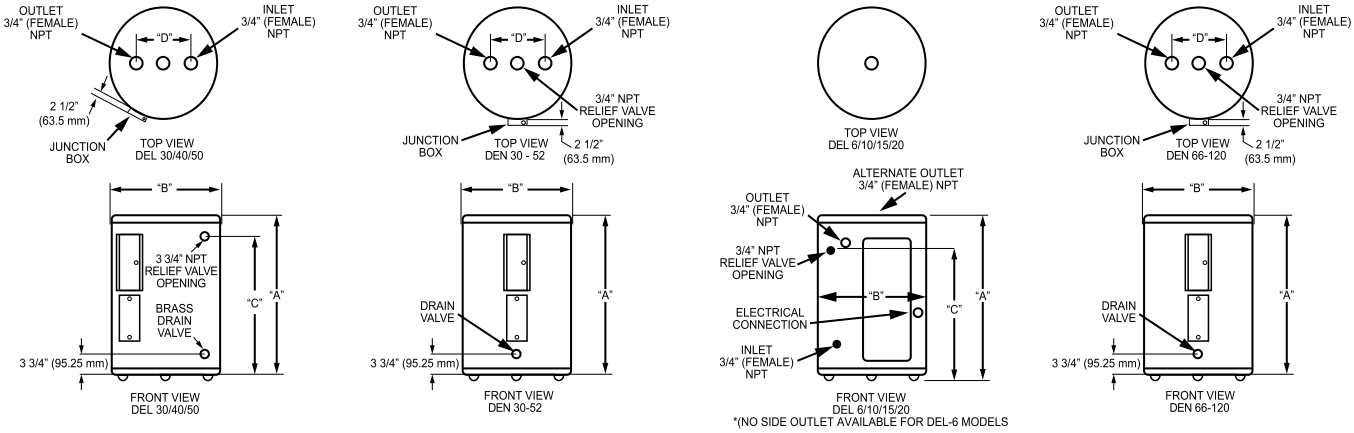
DEL-30

Low Lead Content

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Commercial Electric Water Heaters



ROUGH-IN DIMENSIONS

Models	UEF	No. of Elements	Nominal Capacity	Rated Storage Volume	A		B		C		D		Shipping Weight	
					Inches	mm	Inches	mm	Inches	mm	Inches	mm	lbs.	Kg.
DEL-6	N/A	1	6	6	15-1/2	394	14-1/4	362	11	279	N/A	N/A	35	15.9
DEL-10	N/A	1	10	10	18-1/4	464	18	457	12-1/2	318	N/A	N/A	54	24.5
DEL-15	N/A	1	15	15	26	660	18	457	20-1/2	521	N/A	N/A	58	26.3
DEL-20	N/A	1	20	19	22-1/4	565	21-3/4	552	15-3/8	391	N/A	N/A	73	33.1
DEL-30	0.92	2	30	33	33-1/2	851	26	660	24	610	8	203	118	53.5
DEL-40**	0.92	2	40	35	32	813	23	584	24	610	8	203	118	53.5
DEL-50	0.92	2	50	48	36	914	26-1/2	673	25	635	8	203	172	78
DEN-30	0.92	2	30	37	49-3/4	1264	20-1/2	521	53-1/4	1353	8	203	118	53.5
DEN-40	0.92	2	40	45	59	1499	20-1/2	521	51-1/4	1302	8	203	125	56.7
DEN-52	0.92	2	52	55	56-1/2	1435	24	610	48-1/2	1232	8	203	145	65.8
DEN-66	N/A	2	66	60	60-3/4	1543	21-3/4	552	N/A	N/A	8	203	176	79.8
DEN-80	N/A	2	80	76	59-3/8	1508	24	610	N/A	N/A	8	203	211	95.7
DEN-120	N/A	2	120	108	62-7/16	1586	29-3/8	746	N/A	N/A	8	203	326	147.9

*No side outlet available on DEL-6 Model
**Blanket model
Note: All 66, 80 and 120 models will be manufactured with two 6.1kW elements - 12.2kW

U.S Gallons/HR and Litres/HR at Temperature Rise Indicated												
Element Wattage (Upper/Lower)	Input KW	F°	36 F°	40 F°	54 F°	60 F°	72 F°	80 F°	90 F°	100 F°	108 F°	120 F°	126 F°
		C°	20 C°	22.2 C°	30 C°	33.3 C°	40 C°	44.4 C°	50 C°	55.5 C°	60 C°	66.6 C°	70 C°
6100/6100	12.2	GPH	138	124	92	82	69	62	55	49	46	41	39
		LPH	522	469	348	310	261	235	208	184	174	153	146

Recovery capacities at 100° F equal: for simultaneous element operation - 4.1 gal. x 2/3 KW of both elements.
For other rises multiply element KW as previously explained by 4.1 and divide by temperature rise.
Full load current for single phase = total watts.

ELEMENT AVAILABILITY CHART (LIGHT-DUTY COMMERCIAL ELECTRIC)

Models & Elements	Voltage	Wiring	kW Input Available									
6-Gallon Models Single-Element	120V	-	1.5	2	2.5	3						
	208V	-	1.5	2	2.5	3						
	240V	-	1.5	2	2.5	3						
	277V	-	1.5	2	2.5	3						
	480V	-		2	2.5	3						
10-Gallon through 20-Gallon Models Single-Element	120V	-	1.5	2	2.5	3						
	208V	-	1.5	2	2.5	3	3.5	4	4.5	5	5.5	6
	240V	-	1.5	2	2.5	3	3.5	4	4.5	5	5.5	6
	277V	-	1.5	2	2.5	3		4	4.5	5		6
	480V	-		2	2.5	3		4	4.5	5	5.5	6

6 gallon model not available above 3kW
6/10/15/20 gallon models all A6 circuit (2 wire) only
† Exceeds maximum amp draw.
** Simultaneous only in 3ph

Model	Element Wattage					
		120V	208V	240V	277V	480V
DEL-30	Min Watts	N/A	4500	4500	4500	4500
	Max Watts	N/A	6000 (*)	6000 (*)	6000	6000
DEL-40	Min Watts	N/A	4500	4500	4500	4500
	Max Watts	N/A	6000 (*)	6000 (*)	6000	6000
DEL-50	Min Watts	N/A	4000	4000	4000	4000
	Max Watts	N/A	6000 (*)	6000 (*)	6000	6000
DEN-30	Min Watts	N/A	4500	4500	4500	4500
	Max Watts	N/A	6000 (*)	6000 (*)	6000	6000
DEN-40	Min Watts	3000 (*)	3000	3000	3000	3000
	Max Watts	3000 (*)	6000 (*)	6000 (*)	6000	6000
DEN-52	Min Watts	2500	2500	2500	2500	2500
	Max Watts	3000 (*)	6000 (*)	6000 (*)	6000	6000

Additional limitations apply to 120V, 208V, and 240V - Simultaneous Operation are not available (*) for these voltages.

Commercial Electric Water Heaters

RECOVERY CAPACITIES

Element Wattage (Upper/ Lower)	Input	U. S. Gallons/Hr and Litres/Hr at Temperature Rise Indicated										
		F°	36	40	54	60	72	80	90	100	108	120	126
	kW	C°	20	22.2	30	33.3	40	44.4	50	55.5	60	66.6	70
Non-Simulataneous Operation													
/1500	1.5	GPH	17	15	11	10	8	8	7	6	6	5	5
		LPH	64	58	43	38	32	29	26	23	21	19	18
/2000	2	GPH	23	20	15	14	11	10	9	8	8	7	6
		LPH	85	77	57	51	43	38	34	31	28	26	24
/2500	2.5	GPH	28	25	19	17	14	13	11	10	9	8	8
		LPH	107	96	71	64	53	48	43	38	36	32	30
3000/3000	3	GPH	34	30	23	20	17	15	14	12	11	10	10
		LPH	128	115	85	77	64	58	51	46	43	38	37
4000/4000	4	GPH	45	41	30	27	23	20	18	16	15	14	13
		LPH	170	153	114	102	85	77	68	61	57	51	49
4500/4500	4.5	GPH	51	46	34	30	25	23	20	18	17	15	14
		LPH	192	173	128	115	96	86	77	69	64	58	55
5000/5000	5	GPH	56	51	38	34	28	25	23	20	19	17	16
		LPH	213	192	142	128	107	96	85	77	71	64	61
6000/6000	6	GPH	68	61	45	41	34	30	27	24	23	20	19
		LPH	256	230	170	153	128	115	102	92	85	77	73
Simulataneous Operation													
3000/3000	6	GPH	68	61	45	41	34	30	27	24	23	20	19
		LPH	256	230	170	153	128	115	102	92	85	77	73
4000/4000	8	GPH	90	81	60	54	45	41	36	32	30	27	26
		LPH	341	307	227	205	170	153	136	123	114	102	97
4500/4500	9	GPH	101	91	68	61	51	46	41	36	34	30	29
		LPH	384	345	256	230	192	173	153	138	128	115	110
5000/5000	10	GPH	113	101	75	68	56	51	45	41	38	34	32
		LPH	426	384	284	256	213	192	170	153	142	128	122
6000/6000	12	GPH	135	122	90	81	68	61	54	49	45	41	39
		LPH	511	460	341	307	256	230	205	184	170	153	146

Recovery capacities at 100° F rise equal: for non-simultaneous element operation = 4.1 gal. x kW of one element; for simultaneous element operation = 4.1 gal. x 2/3 kW of both elements.
For other rises multiply element kW as previously explained by 410 and divide by temperature rise. Full load current for single phase = total watts/voltage.

SPECIFICATION

The water heaters(s) shall be Dura-Power™ Model(s) No. _____ as manufactured by A. O. Smith or an approved equal. Heater(s) shall be rated at _____kW, _____volts, _____-phase, 60 cycle AC, and listed by Underwriters' Laboratories. Models shall meet the standby loss requirements of the U.S. Department of energy and current edition of ASHRAE/IES 90.1. Tank(s) shall be _____gallon capacity. Heater(s) shall have 150 psi working pressure and be equipped with extruded high density anode rod. All internal surfaces of the heater(s) exposed to water shall be glasslined with an alkaline borosilicate composition that has been fused-to-steel by firing at a temperature range of 1400°F to 1600°F. Electric heating elements shall be medium watt density with zinc plated copper sheath. Each element shall be controlled by an individually mounted thermostat and high temperature cutoff switch. The outer jacket shall be of backed enamel finish and shall enclose the tank with foam insulation. Electrical junction box with heavy duty terminal block shall be provided (except on 120V & 277V {no junction box on DEL-6 thru 20}). The drain valve shall be located in the front for ease of servicing. Heater tank shall have a three year limited warranty as outlined in the written warranty. Fully illustrated instruction manual to be included.

For technical information, call 800-527-1953. A. O. Smith Corporation reserves the right to make product changes or improvements without prior notice.

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SECTION 23 0000

HEATING, VENTILATING, AIR CONDITIONING

PART 1 GENERAL

1.01 SUMMARY

A. The requirements of the General Conditions, Supplemental General Conditions, Division 01 Sections and Section 23 0500 - General Mechanical apply to all work herein.

B. Section Includes:
   1. Furnishing and installation of complete "Heating, Ventilating, Air Conditioning" systems, including but not necessarily limited to the following:
      a. Variable capacity, inverter driven heat/cool model split system
      b. Direct driven centrifugal inline filter fan
      c. Ceiling mounted supply fans
      d. Gravity intake and relief ventilators
      e. Air terminals
      f. Ceiling and roof mounted exhaust fans
      g. Thermal and sound insulation for all piping and ductwork supplied under this Section
      h. Ductwork, inclusive of all air turns, dampers, grilles, diffusers, fire dampers, sound traps, supports, bracing and fresh air/combustion air ducts
      i. Flashings, curbs and caps in connection with all equipment, piping and ductwork supplied under this Section
      j. Start up, adjusting, and balancing.

C. Related Sections
   1. Division 07 Section for sheet metal flashing and trim
   2. Division 09 for finish painting
   3. Section 22 0000 - Plumbing
   4. Section 23 0500 - General Mechanical
   5. Section 23 0593 - Testing, Adjusting and Balancing for HVAC
   6. Section 23 0923 - Controls for HVAC
   7. Division 26 for electrical requirements

1.02 QUALITY ASSURANCE

A. ASHRAE Compliance
   1. Comply with applicable requirements in ASHRAE 62.1 and ASHRAE 90.1

1.03 SUBMITTALS

A. Product Data
   1. For each type of product indicated, include manufacturer's specifications and data sheets, and certified drawings on major equipment. Include physical and performance data such as weights, sizes, capacities, required clearances, performance curves, acoustical characteristics, finishes, color selection, and accessories.

B. Coordinated Layout/Shop Drawings
   1. Prepare complete consolidated and coordinated layout drawings for all new systems, and for existing systems that are in the same areas. Shop drawings shall be prepared using AutoCAD 2014 or newer and shall be drawn at a minimum ¼" = 1' - 0" scale.

2. Use of contract documents for shop drawings is not acceptable.
3. Clearly identify and dimension the proposed locations of the principal items of equipment and adequate clearance for all equipment, piping, pumps, valves and other items. Provide detailed layout of all piping systems showing the proposed routes.
4. Show the access means for all items requiring access for operations and maintenance.
5. Submit shop drawings to Architect for approval, prior to fabrication or installation of any work. Do not install equipment or piping until drawings have been approved. Any work installed without prior shop drawing approval shall be removed at the Contractor's expense.
6. Shop-wiring diagrams of temperature controls and air conditioning unit controls as specified in Section 23 09 23 and/or shown on Drawings.

C. Equipment manufacturer shall design, construct, and certify that his equipment satisfies the special minimum seismic resistance requirements and shall submit calculations or test results supporting his certification.

D. Field quality-control test reports.

E. Operation and maintenance data
1. Contractor shall provide all operating and maintenance instructions provided by the manufacturer, describing proper operation and maintenance of any equipment and devices installed. Operating and maintenance instructions shall cover maintenance, adjustment, and operation of each piece of apparatus.
2. Contractor shall also provide a parts list of all equipment and component parts for all equipment under this Section. The equipment list shall include manufacturer's name, model number, and local representative, service facilities and normal channel of supply for each item.
3. Data shall include a table of contents identifying items therein, and index tabs for each system. Neatly obscure or cross out inapplicable data from manufacturer's literature. Include the following:
   a. Manufacturer's brochures, ratings, certified shop drawings, lubrication charts and data, and parts list with part numbers. Mark each sheet with equipment identification number and actual installed condition or system and location of installation. Specifically identify which options are provided.
   b. Description of start-up and operating procedures for each system, including controls diagrams and description of operating sequences.
   c. Recommend preventative maintenance schedule and procedures.
4. Submit data to the Architect for approval. Final acceptance of the work will not be made until a satisfactory submission of this material is received and approved by the Architect.

F. As-built Drawings
1. Complete and detailed drawings shall be maintained throughout the coordination and construction phase, indicating all equipment and trades' work clearly. All equipment including piping, etc. shall clearly identify both top and bottom elevations as well as distances from equipment to established building lines. Coordinate with other trades and field conditions and show dimensions and details including building construction and access for servicing. All changes in the work shall be recorded on this set on a daily basis. In addition to changes made during course of work, show the following:
   a. Exact location, type and function of concealed valves and controllers.
   b. Exact size, elevations and location of underground and under floor piping.
2. Submit to Architect for approval.

G. Warranty
1. Equipment warranties shall be provided for all equipment, with all necessary

information filled in, except purchase date, in favor of the Owner.

H. Refer to mechanical equipment specified herein for additional requirements

1.04 DEMONSTRATION & TRAINING

A. Comply with the requirements of Division 01 and the following.
   1. The Owner's authorized representative shall be instructed in the operation and servicing of all heating, ventilating, and air conditioning systems, subsystems and equipment.
   2. Provide a minimum of one day of instruction time. All instruction shall be provided at no cost to the Owner.

PART 2 PRODUCTS

2.01 REFRIGERANT PIPING

A. Refrigerant piping shall be Type "ACR" ASTM B 280, drawn temper, seamless copper tube.

B. Pipe fittings and unions shall be wrought-copper with brazed joints. ASME B16.22. Mechanical joints on refrigerant piping are prohibited. All refrigerant piping joints shall be brazed with lead-free silver brazing alloy, minimum 15% silver content. Harris "Stay Silv 15" or equal.

C. Flexible connectors shall be bronze, double braided, with inlet and outlet connections as required. Metraflex RAF series or equal.

D. Sight glasses shall be color change moisture indication type, replaceable element, filter screen and pad, sweat solder ends; Sporlan "See-All", Henry, or equal.

E. Charging and purge valves shall be forged brass, diaphragm packless, globe type, angle or straight through, one end solder, one end flare; Henry 623 and 643 series, Sporlan, or equal.

F. Solenoid valves shall be of forged brass, extended solder end connections, molded coil; Sporlan "E" series or equal. ARI 760 & UL 429

G. Isolation/shut off valves shall be Mueller Streamline "Cyclemaster" series ball valves. Maximum working pressure shall be 700 psig. Valves shall be compatible with all CFC, HCFC and HFC refrigerants and oils, be full port construction to match line size ID, and shall have internally equalized ball design, rupture proof encapsulated stem and shall be UL Listed and CE Certified. Working temperature range shall be -40°F/300°F.

H. Filter driers shall be replaceable media, angle type; Henry "Dri-Cor" or equal; ARI 730.

I. Electronic thermostatic expansion valves shall have stainless steel body and connections, ceramic slide and port, linear flow capacity, continuous modulation, and direct coupling of motor and valve; Emerson "EX" series or equal.

J. Expansion loops shall be Metraflex "VRF Metraloop" or equal. Loop shall be constructed of two parallel sections of corrugated Type 321 stainless-steel metal hose, Type 304 stainless-steel braid, 180^0 return bend with factory supplied hanger support lug at bottom, and inlet and outlet connections. Fittings shall be Schedule 40 S Type 304 stainless-steel. The loop shall be equipped with stainless-steel to copper conversion fitting with XHP copper stub ends for copper pipe systems.
   1. Provide as required to accommodate any thermal expansion or contraction or as indicated on the Drawings. Return fitting shall be supported to allow movement.

A. Pipe hangers: All refrigerant piping shall be supported 8 feet on center and within 2 feet of a change in direction of the piping. Piping shall be supported at points not more than 15 feet apart.

K. Split system fan-coil units and heat pump units shall have brazed sweat-fitting connections on the refrigerant piping between the units with a flexible piping section at the outdoor unit.

2.02 UNIONS

A. Unions or flanges shall be furnished and installed at each threaded connection to all equipment or valves. The unions shall be located so that the piping can be easily disconnected for removal of the equipment, tank, or valve, and shall be of the type specified in the following:
1. Steel pipe: Class 150, malleable iron, ground joint: Anvil Figure 463, Stockham, or equal. ASME B16.39.
2. Copper pipe: cast copper alloy, soldered joint: Nibco series 633 or 733, Mueller Streamline, or equal. MSS SP-123
3. Dielectric: lead free, Watts, Jomar, or equal. ASSE 1079

2.03 CEILING MOUNTED SUPPLY FANS

A. Panasonic "Whisper Fresh Select" series, model FV-15NLFS1, fresh air supply fan as scheduled on the Drawings or approved equal. The fan shall be low noise remote mount type, rated for continuous run. UL

B. Motor/Blower
1. The motor shall be ECM type, with “Smartflow” technology, and shall be equipped with thermal cut-off fuse.
2. The fresh air supply rates shall be manually adjustable for 50-62-70-80-90-100-110-130-150 cfm.
3. Four-pole totally enclosed condenser motor rated for continuous run.
4. MERV 13 filter, included, shall be replaced with a MERV 14 filter

C. Housing
1. The wall sleeve shall be of galvanized steel with fully insulated exterior and shall have an integrated 6" duct collar. A gravity damper shall be included on the supply air side of the unit.

D. Controls
1. Controls shall be built-in. Customized fresh air shall be supplied based on humidity conditions of incoming air. Fan shall automatically shut off (or not turn on) when the outside relative humidity is higher than the setting on the humidity dial (adjustable from 30% to 80% RH).
2. Customized low temperature setting will shut fan off when incoming supply air is too cold. Fan will turn off (or not turn on) when the outside temperature is lower than the setting value. (from 15^0 F to 40^0 F) Fan shall automatically shut off intake air from entering the space when higher than 95° F.
3. The access panel shall have a light indicator and an alarm signal to provide notification to check and clean the filter. A reset button will reset each time the filter is changed.

E. The fans shall be two-way directional, with (3) included brackets for joist, truss, or suspension installations.

2.04 ROOF MOUNTED EXHAUST FANS

A. Greenheck “CUE” series, direct drive, roof mounted, upblast centrifugal exhaust fans, as

scheduled on the Drawings or approved equal. Each fan shall bear a permanently affixed manufacture's engraved metal nameplate containing the model number and individual serial number.

B. Construction
   1. Fan Wheel
      a. The fan wheel shall be constructed of aluminum, be non-overloading, backward inclined centrifugal type and be statically and dynamically balanced in accordance with AMCA Standard 204-05. The wheel cone and fan shall be matched with precise running tolerances.
   2. Electronically Commutated Motor (Varigreen)
      a. Motor shall include "multi-voltage" ability with "voltage doubler"
      b. Varigreen motor shall include "Hand/Off/Auto" (HOA) control.
      c. Motor enclosures shall be open drip proof type.
      d. Motor shall be a DC electronic commutation type motor (ECM) specifically designed for fan applications. AC induction type motors are not acceptable. Examples of unacceptable motors are: Shaded Pole, Permanent Split Capacitor (PSC), Split Phase, Capacitor Start and 3-phase induction type motors.
      e. Motors shall be permanently lubricated, heavy duty ball bearing type to match with the fan load and pre-wired to the specific voltage and phase.
      f. Internal motor circuitry shall convert AC power supplied to the fan to DC power to operate the motor
      g. Motor shall be speed controllable down to 20% of full speed (80% turndown). Speed shall be controlled by a potentiometer dial mounted at the motor.
      h. Motor shall be a minimum of 85% efficient at all speeds.
   3. Housing
      a. Housing shall be constructed of heavy gauge aluminum, which includes exterior housing, curb cap, windband, and motor compartment housing.
      b. Housing shall have a rigid internal support structure. Windband shall be 1-piece spun aluminum with original material thickness maintained throughout the housing. Windband shall include an integral rolled bead for strength.
      c. Curb cap base shall be fully welded to windband to ensure a leak proof construction. Tack welding, bolting, and caulking are not acceptable. Curb cap shall have integral deep spun inlet venturi and pre-punched mounting holes to ensure correct attachment to curb.
      d. Drive frame assemblies shall be constructed of heavy gauge steel and mounted on vibration isolators. Isolators shall be double studded, with no metal-to-metal contact, and sized to match the weight of each fan.
      e. Breather tube shall be 10 square inches and designed to allow wiring to be run through it.
   4. Motor cover shall be constructed of aluminum.
   5. Disconnect Switches
      a. Disconnect switches shall be NEMA1 rated, have positive electrical shut-off, and be wired from fan motor to junction box installed within motor compartment.
   6. Fans shall be vibration isolated on double studded true isolators
   7. Drain trough shall allow for one-point drainage of water, grease and other residues.

C. Options/Accessories:
   1. Fans and attached accessories shall be coated with "Permatector", concrete gray-RAL 7023, excluding damper, as noted
   2. Fans shall be UL 705 Listed – "Power Ventilators"
   3. Roof curb, model GPIP, pitched curb mounted onto roof with fan, constructed of

aluminum or galvanized steel, with 1-inch R4.3 insulation, and flashing flange. Coated with Permatector.

4. Foam curb seal
5. Gravity type backdraft damper to prevent outside air from entering back into the building when fan is off and balanced for minimal resistance to flow. Damper shall have galvanized frames with pre-punched mounting holes. Greenheck model WD-100-PB-24x24, not coated.

2.05 FILTER FAN

A. Greenheck model "SQ-80-VG", duct mounted, direct driven, backward inclined, centrifugal inline fan as scheduled on the Drawings or approved equal. The fan shall be UL 705 Listed – Power Ventilators. Each fan shall bear a permanently affixed manufacture's engraved metal nameplate containing the model number and individual serial number.

B. Wheel
   1. Wheel shall be non-overloading, backward inclined centrifugal type, constructed of composite.
   2. The wheel shall be statically and dynamically balanced in accordance to AMCA Standard 204-05
   3. The wheel cone and fan inlet shall be matched and shall have precise running tolerances.
   4. Single thickness blades shall be securely riveted or welded to a heavy gauge back plate and wheel cone.

C. Electronically Commutated Motor (Vari-Green)
   1. Motor enclosures shall be open drip proof type.
   2. Motor to be a DC electronic commutation type motor (ECM) specifically designed for fan applications. AC induction type motors are not acceptable. Examples of unacceptable motors are: Shaded Pole, Permanent Split Capacitor (PSC), Split Phase, Capacitor Start and 3 phase induction type motors.
   3. Motors shall be permanently lubricated, heavy duty ball bearing type to match with the fan load and pre-wired to the specific voltage and phase.
   4. Internal motor circuitry shall convert AC power supplied to the fan to DC power to operate the motor.
   5. Motor shall be speed controllable down to 20% of full speed (80% turndown). Speed shall be controlled by a "Vari-Green" dial mounted on exterior of fan housing.
   6. Motor cover shall be constructed of galvanized steel and cover the motor and drives

D. Housing/Cabinet Construction
   1. The housing shall be a square design constructed of heavy gauge galvanized steel.

E. Housing Supports and Drive Frame
   1. The drive frame shall be constructed of structural steel with formed flanges.

F. Disconnect Switch
   1. The disconnect switch shall be NEMA 1 Rated. The switch shall have positive electrical shut-off and be wired from fan motor to junction box.

G. Access Panel:
   1. Two-sided access panels shall permit easy access to all internal components. Access panels shall be located perpendicular to the motor mounting panel

H. Options/Accessories
   1. Sloped filter box. 2 inch MERV 14 filters
   2. UL 705 Listed – Power Ventilators

2.06 GRAVITY VENTILATORS

A. Greenheck, model GRSI for intake and model GRSR for relief, gravity ventilators as scheduled on the Drawings or approved equal.
   1. The housing shall be constructed of aluminum, includes wind band and curb cap. Windband shall be one piece spun aluminum construction and maintain original material thickness throughout the housing. Windband to include an integral rolled bead. Curb cap to have integral deep spun inlet venturi and prepunched mounting holes to ensure correct attachment to roof.
   2. Internal components shall be constructed of rigid galvanized steel and include birdscreen. Birdscreen shall be constructed of ½ inch galvanized mesh and mounted horizontally across the intake area of the hood.
   3. Curb cap shall be constructed of heavy-gauge aluminum and include a one-piece spun venturi. Curb cap shall be pre-punched for mounting.
   4. Options/Accessories
      a. Gravity type backdraft damper, galvanized frame with pre-punched mounting holes and balanced for minimal resistance to flow. (GRSR0
      b. Roof curb GPIP for pitched roof, welded straight side curb with 2" flashing flanges and wood nailer.

2.07 SPLIT SYSTEM AIR CONDITIONING

A. Daikin inverter driven, direct expansion (DX), air-cooled heat pump split system as scheduled on the Drawings or approved equal. The system shall consist of a wall mounted evaporator model FTX18AXVJU exclusively matched to outdoor model RX18AXVJU direct expansion (DX), air-cooled, Daikin swing, variable speed, inverter driven compressor using R-410A refrigerant. The outdoor unit is a horizontal discharge, variable speed, single fan unit using a single-phase power supply. The system shall have a self-diagnostic function, 3-minute time delay mechanism and have a factory pre-charge of R-410A adequate for 33 feet of total line set length. The system shall have automatic restart capability after a power failure has occurred and a low voltage cut-off feature to prevent stalling during power supply issues.

B. Indoor Unit (FTX)
   1. The indoor unit shall be factory assembled and pre-wired with all necessary electronic and refrigerant controls. Both liquid and suction lines must be individually insulated between the outdoor and indoor units.

C. Unit Cabinet:
   1. The indoor unit shall have a white, "wipe-clean" finish.
   2. The drain and refrigerant piping shall be accessible from six (6) positions for flexible installation (right side, right back, and right bottom; and left side, left back, and left bottom.
   3. The cabinet shall be supplied with a mounting plate to be installed onto a wall for securely mounting the cabinet.
   4. The cabinet includes:
      a. Indoor unit ON/OFF switch, capable of being used when the remote controller is missing. When switch is used, the default setting is AUTO mode, 76°F temperature setting, and AUTO airflow rate.
      b. OPERATION lamp that turns blue in COOL mode, yellow in FAN mode and orange in HEAT mode.
      c. TIMER lamp that blinks when activated

d. A Signal Receiver that receives signals from the remote controller at a maximum distance of 23 ft. When the unit receives a signal, you will hear the following: 2 beeps – operation start, 1 beep – Setting changed, 1 long beep – Operation stop.

5. Fan:
   a. The evaporator fan shall be an assembly consisting of a direct-driven fan by a single motor.
   b. The fan shall be statically and dynamically balanced and operate on a motor with permanent lubricated bearings.
   c. An auto-swing louver for adjustable air flow (vertically) is standard via the wireless remote control furnished with each system.
   d. The indoor fan shall offer a choice of three speeds, plus quiet and auto settings.
   e. The indoor fan shall be removable without the need to detach the heat evaporator coil or blower.
6. Filter:
   a. The return air filter provided will be a and washable filter. Two titanium apatite air-purifying filters are included for additional air filtration.
7. Coil:
   a. The evaporator coil shall be a nonferrous, aluminum fin on copper tube heat exchanger.
   b. All tube joints shall be brazed with silver alloy or phoscopper.
   c. All coils will be factory pressure tested.
   d. A detachable condensate pan shall be provided under the coil with a drain connection.
   e. The fins are to be covered with an anti-corrosion acrylic resin and hydrophilic film, rated for up to 500 hours salt spray.
8. Electrical:
   a. The outdoor unit shall be powered with 208-230 volts, 1 phase, and 60 hertz power. The indoor unit shall receive 208-230 volt, 1 phase, 60 hertz power from the outdoor unit.
   b. The allowable voltage range shall be 187 volts to 253 volts.
9. Control:
   a. The unit shall have a backlit, wireless remote infra-red controller capable to operate the system. It shall have Cooling Operation, Heating Operation, Automatic Operation, Dry Operation and Fan Only Operation.
   b. The controller shall consist of an On/Off Power switch, Mode Selector, Quiet Button (for outdoor unit), Fan Setting, Swing Louver, On/Off Timer Setting, Temperature Adjustment, °C or °F Temperature Display, Eco+ Mode, Quiet, Sleep, LED and Powerful Operation.
      1) On/Off switch powers the system on or off.
      2) Mode selector shall operate the system in auto, cool, heat, fan, or dry operation.
      3) Fan setting shall provide three fan speeds, plus quiet and auto settings.
      4) Swing louver shall adjust the airflow (horizontal and vertical) blades.
         a) Vertical movement controlled via remote, horizontal movement controlled manually.
      5) On/Off timer is used for automatically switching the unit on or off at specific times during the day.
         a) Night Set mode automatically engaged with Off Timer is set. This setting automatically adjusts the temperature setting 0.9°F (0.5°C) up in COOL, 3.6°F (2.0°C) down in HEAT to prevent excessive cooling or heating during sleeping hours.

6) Temperature adjustment allows for the increase or decrease of the desired temperature.
7) Eco+ operation adjusts the operating condition to energy saving level by limiting the maximum power consumption of the air conditioner unit.
8) Quiet operation reduces indoor unit sound pressure level by reducing the indoor unit fan speed.
9) Sleep operation automatically adjusts the temperature setting 0.9°F (0.5°C) up each hour for two hours in COOL to prevent excessive cooling during sleeping hours.
10) LED button shall change the indication display on the indoor unit.
11) Powerful operation allows quick cool down or heating up in the desired space to achieve maximum desired temperature in the shortest allowable time period.

c. The controller shall be able to display two-digit fault codes extracted from the indoor unit to aid in troubleshooting.
d. Temperature range on the remote control shall be 60°F to 86°F in COOL mode, 60°F to 86°F in HEAT mode, and 60°F to 86°F in AUTO mode. The temperature shall be controlled in 1° increments.
e. The indoor unit microprocessor has the capability to receive and process commands via return air temperature and indoor coil temperature sensors enabled by commands from the remote control.
f. The unit shall also have the capability to connect to a smart-device app via wireless adapter.

D. Sound:
1. Indoor unit sound levels shall not exceed:

Indoor Daikin Model	Cooling Mode Sound Level (H / M / L / SL) dB(A)	Heating Mode Sound Level (H /M / L/ SL) dB(A)
FTX18AXVJU	49/44/38/33	49 /42/37/33

*values are measured approximately 3 feet away with JIS standard operating conditions.

E. Outdoor Unit (RX)
1. The outdoor unit shall be specifically matched to the corresponding indoor unit size. The outdoor unit shall be complete factory assembled and pre-wired with all necessary electronic and refrigerant controls. The outdoor unit shall be controlled by a microprocessor and dedicated EEV's shall be provided for capacity control during part load of the indoor unit.
2. Unit Cabinet:
a. The outdoor unit shall be completely weatherproof and corrosion resistant. The unit shall be constructed from rust-proofed mild steel panels coated with a baked enamel finish.
b. The outdoor unit will come furnished with four (4) mounting feet, mounted across the base pan, to allow bolting to a cement pad or optionally supplied mounting bracket.
c. This assembly will be able to withstand a maximum rated wind pressure of 193psf Lateral, 93psf Uplift. See document TER-16-3146.
3. Fan:
a. The fan shall be a direct drive, propeller type fan.
b. The motor shall be inverter driven, permanently lubricated type bearings, inherent.
c. A fan guard is provided on the outdoor unit to prevent contact with fan operation.

d. Airflow shall be horizontal discharge.

4. Coil:
   a. The outdoor coil shall be nonferrous construction with corrugated fin tube.
   b. The fins are to be covered with an anti-corrosion acrylic resin and hydrophilic, rated for up to 500 hours salt spray.
   c. Refrigerant flow from the condenser will be controlled via a metering device.
   d. Automatic defrost will remove any frost from the outdoor unit allowing the system to maintain heating capacity.
5. Compressor:
   a. The outdoor compressor shall be a patented, variable speed Daikin swing inverter-driven compressor. The one-piece action reduces noise, extends life, boasts higher efficiency and reduces energy consumption.
   b. The outdoor unit shall have an accumulator and four-way reversing valve.
   c. PVE Refrigerant Oil shall be used to provide improved lubrication & better chemical stability, and no hydrolysis, leading to higher product reliability.
   d. The compressor shall have an internal thermal overload.
6. Electrical:
   a. The electrical power requirement is 208-230 volt, 1-phase, and 60 Hz power.
   b. The voltage range limitations shall be a minimum of 187 volts and a maximum of 253 volts.
7. Sound:
   a. Outdoor unit sound levels shall not exceed:

Outdoor Daikin Model	Cooling Mode Sound Level dB(A)	Heating Mode Sound Level dB(A)
RX18AXVJU	54	54

*values are measured approximately 3 feet away with JIS standard operating conditions

F. SYSTEM DIAGNOSTICS
   1. The system shall be capable of producing 2-digit fault codes:
      a. Controls
         1) I/R controller
         2) Wi-fi module
         3) Wired controller
   2. D-Checker software: The D-Checker software has the ability to display error codes and values for every sensor on the system through the outdoor unit. The sensor data points shall be graphed or recorded for export to a spreadsheet. The spreadsheet can then be analyzed to troubleshoot operational issues or acknowledge proper operation.

2.08 FILTERS FOR A/C AND AIR HANDLING EQUIPMENT

A. During construction, protect all filters upstream of air handling units with blankets of 2" fiberglass filter media or 2" disposable panel filters. UL Class 2 listed. Remove after balancing, and prior to acceptance. Filters to be provided during construction, upstream of air handling units, at return grilles, or any other return duct openings shall be Camfil "30/30" pleated panel filters, AAF/Flanders, or approved equal. MERV 8

B. Systems shall not be operated without properly installed filters, including temporary filters for use during construction. If the final pressure drop of the temporary filters is reached during the construction or test and balance, replace them with the spare set. If not used, the spare set is to be delivered to the Owner at the time of acceptance.

2.09 AIR TERMINALS

A. Titus as scheduled on Drawings or approved equal.

B. All terminals shall be steel and shall be factory painted "off white". The finish shall be #26 white. The finish shall be an anodic acrylic paint, baked at 315°F for 30 minutes. The pencil hardness must be HB to H. The paint must pass a 100-hour ASTM B117 Corrosive Environments Salt Spray Test without creepage, blistering or deterioration of film. The paint must pass a 250-hour ASTM D870 Water Immersion Test. The paint must also pass the ASTM D2794 Reverse Impact Cracking Test with a 50-inch pound force applied.

C. The manufacturer shall provide published performance data for the round diffuser. The diffuser shall be tested in accordance with ANSI/ASHRAE Standard 70-1991.

D. Air terminals for installation in gypsum board shall have a 1" border for surface mounting.
   1. Spiral Duct Supply Grille (SDG)
      a. Aluminum direct spiral duct-mounted supply grilles shall be Titus S301FS (single deflection). The deflection blades shall be short dimension of the grille. All supply grilles shall be constructed with radius end caps and foam gaskets for a tight seal to the duct diameter. All supply grilles shall be constructed with a 1 3/8"wide border.
      b. Blades shall be constructed of heavy-duty extruded aluminum and shall be spaced ¾-inch apart. Blades shall extend completely through the side frame on each side to ensure stability throughout the complete cfm operating range of the grille. Blades shall be individually adjustable without loosening or rattling and shall be securely held in place with tension wire.
      c. Air scoop damper/extractor (option ASD) shall be constructed of heavy-duty aluminum. The ASD must be operable from the face with a screwdriver.
   2. Ceiling Return (CR) and Ceiling Outside Air (OA)
      a. Eggcrate return grilles shall be model 50F. Return grilles must provide a free area of at least 90%. ½"x ½" x ½"
      b. Outer borders shall be constructed of heavy extruded aluminum with a thickness of 0.040-0.050" and shall have countersunk screw holes. Border width shall be 1¼" on all sides and shall be interlocked at the four corners and mechanically staked to form a rigid frame.

2.10 ACCESS DOORS

A. Where construction is not inherently accessible, provide adequately sized and conveniently located access doors in ceilings, walls, and furring for access to controls and for servicing valves, equipment, etc.
   1. Fire Rated walls and ceilings: Milcor, Style UFR, U.L. Class B, 1½ hour rating, insulated, self-closing, self-latching, flush key operated cylinder lock, interior latch release. Minimum size shall be 12" x 12". Provide larger sizes where required.
   2. Drywall ceilings or walls: Milcor, Style DW, prime coated steel, flush screwdriver-operated cam lock. Minimum size shall be 12" x 12". Provide larger sizes where required.
   3. Masonry and tiled walls: Milcor, Style M, prime coated steel, flush screwdriver-operated cam lock. Minimum size shall be 12" x 12". Provide larger sizes where required.
   4. Plastered walls and ceilings: Milcor, Style K, prime coated steel, flush screwdriver-operated cam lock. Minimum size shall be 12" x 12". Provide larger sizes where required.

B. Doors shall be delivered to the General Contractor for installation.

2.11 DUCTWORK

A. Sheet Metal Ductwork:
   1. Ducts and plenums shall be fabricated and installed in conformance with the latest editions of: NFPA Pamphlet No. 90A; California Building Code; California Mechanical Code and the SMACNA HVAC Duct Construction Standards (Metal & Flexible). Ducts and plenums shall be constructed of G-60 coated galvanized steel of lock forming grade conforming to ASTM A653 and A924 standards. Seals shall be airtight Class "B" seals at all transverse joints and longitudinal seams. Tables and figures hereinafter referenced are from the 2005 edition of the SMACNA HVAC Duct Construction Standards (Metal and Flexible).
   2. Rectangular duct construction shall conform to Table 2-3. All transverse joints shall be flanged per Table 2-32, with corner closures or "Duct Mate" flanged connections with corner closures per Figure 2-16 or 2-17. Elbows shall be standard radius (Type RE 1) or square throat with vanes (Type RE 2) per Figure 4-2, with double thickness turning vanes per Figures 4-3 and 4-4. Offsets and transitions shall be per Figure 4-7. Supply, return, and exhaust branch connections shall be per Figure 4-5 or 4-6. Splitters SHALL NOT be used.
   3. Round ducts shall be spiral, McGill Airflow or equal. All transverse joints and longitudinal seams shall have Class "B" seals. All branches in round duct systems shall be made with factory fabricated reducing wye branches. Duct turns shall be made with standard, factory fabricated, three-piece elbows.
   4. Lined ducts shall be fabricated such that the net inside dimensions equals the duct sizes shown on the Drawings.
   5. Flexible ducts shall be Flexmaster "6M", Casco "Silent Flex – SF-18M", or approved equal. Flexible ducts shall be used only where shown on the Drawings, and maximum length of any given flexible duct shall not exceed 5 feet. Galvanized sheet metal elbows shall be used for turns greater than 45 degrees on flexible ducts 10 inches and larger. Connections to rectangular ducts shall be made with "spin-in" fittings with air scoops. The installation of flexible ducts shall conform to Figure 3-10, with the exceptions noted herein.
   6. Supports for horizontal ducts and plenums shall be fabricated per Figures 5-5 and 5-6 and Tables 5-1, 5-2 and 5-3. The maximum distance between hangers shall be 8 feet for rectangular ducts and 12 feet for round ducts. Attachments to the structure shall be made with adequately sized lag bolts for strap hangers and adequately sized machine bolts and side beam brackets for rod hangers as shown on DSA approved drawings. Supports for vertical ducts shall be band iron strap or angle bracket type per Figures 5-8 and 5-9.
   7. All roof-mounted ductwork shall be water-tight and sloped to shed water. All transverse joints shall be T-25 flanged Ductmate "25" or approved equal.
      i Outside air intakes shall be type 316 stainless steel.

B. Exhaust ducts for fume hoods shall be Type 304 stainless-steel with stainless steel fasteners, 16-gauge, welded joints.

C. Fiberglass Ductwork:
   1. Fiberglass ductwork is unacceptable and may not be used on this project.

D. Specialties:
   1. Duct Mounted Access Doors
      a. Including those for removing filters, duct access doors shall be fabricated as detailed in Figure 7-2, with sash locks, piano hinges, and gaskets. Round duct shall be fabricated as detailed in Figure 7-3.

b. Access doors shall be double wall, rectangular, insulated or uninsulated same as duct. Insulation fill and thickness shall be as indicated for pressure class.
c. Access doors shall have a vision panel and shall have an unobstructed full swing.
d. Fabricate doors airtight and suitable for duct pressure class.

2. Dampers:
   a. Provide butterfly or multiple blade dampers, where indicated on the Drawings or as required for balancing air quantities, to values shown, without generating excessive noise. Provide Duro-Dyne "KS-385" or approved equal, locking quadrants on each manual damper. Locate dampers in furred ceilings near access panels, where possible.
   b. Butterfly dampers shall be constructed per Figure 7-4, Figures A, B, and C.
   c. Multi-blade dampers shall conform to Figure 7-5.
   d. Motorized dampers - See Temperature Controls.
   e. Backdraft dampers: Ruskin CBD6 or approved equal, heavy-duty dampers with 12 gauge galvanized steel structural brace at each corner. Blades shall be of extruded aluminum with extruded vinyl blade edge seals mechanically locked into blade edge. Corrosion resistant bearings, long life synthetic type. Linkage shall be tiebar connected to stainless steel pivot pins.
3. Remote Actuators: Young Regulator Company, Round Cable Controlled Dampers, model 5020-CC or 830A-CC (rectangular) and Remote Cable Control System Kit, model 270-301EZ. All dampers in inaccessible ceilings shall have remote actuators.
4. Air Extractors: Duct mounted volume extractors made of galvanized steel with 1-inch blade spacing, Titus model "AG-45", or equal.
5. Flexible Duct Connections: Duro-Dyne "Metal-Fab" constructed of Durolon, Ventfabrics "ventglas", or approved equal. Install at each point where a blower unit is connected to a duct. A minimum clearance of 3 inches between the duct and the source of vibration shall be maintained. Install per Figure 7-8.
6. Screens: Install removable bird screens at all outside air intakes and exhaust air discharges. Screens shall be fabricated from ½ inch x 14-gauge mesh secured in full frames. Screens and frames shall be constructed of the same material as the duct, hood, or equipment to which attached.
7. Access Panels: Milcor, Style M, prime coated steel, or approved equal. Minimum size shall be 10-inch x 10-inch. Provide larger sizes where required. Locks shall be flush, screwdriver operated. Provide as required for concealed ducts at all fire dampers, electric duct heaters, and automatic dampers, except at suspended acoustical ceilings.
8. Joints: Tape all joints airtight, using Carlisle Hardcast, Two Part II Sealing System with type "DT" pressure-less tape and "RTA 50" liquid sealant or approved equal. Install per manufacturer's directions.

2.12 INSULATION

A. General
   1. All duct insulation materials including jackets, tapes, adhesives and coatings shall meet ASTM E84 25/50 Flame Spread/Smoke Development requirements and NFPA 90A and 90B.

B. Exterior of Ductwork (Flexible Duct Wrap)
   1. Unless specified to be lined, all ductwork shall be externally insulated by wrapping with formaldehyde-free, flexible glass fiber blanket or inorganic glass mineral wool wrap, with factory applied FSK vapor barrier jacket. Thickness shall be 2 inches unless noted or required otherwise.
   2. Duct wrap shall meet the requirements of ASTM C1290, ASTM C553, and ASTM C1136.

Corrosiveness shall meet ASTM C665. Mold growth/fungi resistance shall meet ASTM C1338.

a. Johns Manville “Microlite FSK", Knauf “Atmosphere Duct Wrap”, or Certainteed "SoftTouch" or "Wide Wrap".

C. Interior of Ductwork: (Duct Liner)

1. All ducts exposed to the weather shall be internally insulated. All other ductwork within 10 feet of a fan (supply and return) shall be internally insulated. Duct liner shall be installed in supply and return ducts and plenums where noted on the Drawings. Exhaust ductwork need not be insulated.
2. Duct liner shall meet the requirements of ASTM C1071. Operating temperature shall meet ASTM C411. Microbial growth shall meet ASTM C1338, and ASTM G21 and G22.
   a. Type I - Flexible Duct Liner: Johns Manville “Linacoustic RC”, Knauf “Atmosphere Duct Liner”, or Owens Corning "QuietR Rotary Duct Liner". Thickness shall be 1 ½ inches, unless otherwise noted.
   b. Type II - Plenum Liner Board: Johns Manville “Linacoustic R-300”, Owens Corning "QuietR Duct Liner Board", or Knauf Insulation "Atmosphere Rigid Plenum Liner". Thickness shall be 1 ½ inches, unless otherwise noted.

D. Refrigerant Piping:

1. Insulate all refrigerant liquid, vapor, and suction lines, fittings, and valves with "Armacell" flexible elastomeric thermal insulation, Resolco Insul-Phen rigid closed cell phenolic foam, or equal. Install according to manufacturer’s suggested installation procedures, UV protected.
2. Liquid, suction, and hot gas (where applicable) lines shall be insulated individually.
3. Oil equalization lines between multiple condensing units shall be insulated.
4. All piping exposed to the weather shall be finished with aluminum jacketing with a laminated moisture retarder. ITW Insulation Systems, RPR Products "Insul-Mate" or approved equal. Aluminum jacketing shall be overlapped 2 to 3 inches and held in place with stainless steel bands to form a weather tight system. Elbows and tees shall be fitted with matching aluminum fitting covers. Other fittings in metal-jacketed systems shall be finished with conventional weather-resistant insulating materials with painted aluminum finish.

E. Piping insulation thickness shall be as follows:

FLUID TEMPERATURE RANGE (°F)	CONDUCTIVITY RANGE (in Btu-inch per hour per square foot per °F)	INSULATION MEAN RATING TEMPERATURE (°F)	NOMINAL PIPE DIAMETER (in inches)				
			1 and less	1 to <1.5	1.5 to < 4	4 to < 8	8 and larger
			INSULATION THICKNESS REQUIRED (in inches)				
Space cooling systems (chilled water, refrigerant and brine)							
40-60	0.21-0.27	75	0.5	0.5	1.0	1.0	1.0
Below 40	0.20-0.26	50	1.0	1.5	1.5	1.5	1.5

2.13 FIRE RATED DUCT WRAP INSULATION

A. 3M Fire Barrier Duct Wrap 615+: Lightweight, non-asbestos, high temperature, bio-soluble, calcium-magnesium-silicate (CMS) non-woven blanket, encapsulated in a scrim-reinforced foil, blanket thickness of 1.5 inches for ventilation and grease duct applications.

B. Refer to manufacturer's instructions for installation.

PART 3 EXECUTION

3.01 GENERAL INSTALLATION

A. Provide all necessary cutting in connection with the work of this Section. No structural members shall be drilled, bored, or notched in a manner which will impair their structural capacity. All penetrations of concrete or masonry shall be made with core drills. No cutting shall be done without the approval of the Architect.

3.02 HEATING & AIR CONDITIONING EQUIPMENT INSTALLATION

A. Installation must comply with the installation manual. It is recommended the system be installed by a contractor/dealer who has been through Daikin training programs.

B. All units shall be set with curbs plumb, level, and securely attached through framed opening with bolts and/or lag screws as noted on the Drawings. Connections to ductwork shall be secured, filter racks shall be aligned, enclosures and ductwork connections shall be fully waterproofed, and all utility and control connections shall be complete.

C. Split system fan coil units and heat pump units shall have brazed sweat-fitting connections on the refrigerant piping between the units with a flexible piping section at the outdoor unit.

D. Install equipment to provide good appearance, easy access, and adequate space to allow replacement and maintenance. Provide bases, supports, anchor bolts, and other items required to achieve this. Installation shall be level, above moisture level, and adequately braced.

E. Thoroughly lubricate equipment before operating. Repair of damage resulting from failure to comply with this requirement shall be the Contractor's responsibility. Extend ¼-inch schedule 40 black steel lubrication pipes from hard-to-reach locations to front of equipment or to access doors. Terminate with proper lubrication fittings.

F. Move equipment into building through available openings. Dismantle equipment where necessary to accomplish this. After reassembly, test equipment to verify its satisfactory operating condition.

G. Connections to piping shall be secured and properly aligned and all utility and control connections shall be properly isolated from the building structure by means of vibration isolators and flexible connections. Any equipment not meeting this requirement will be modified and properly reinstalled at no expense to the Owner.

H. Electrical:
   1. Contractor shall coordinate electrical requirements and connections for all power feeds with electrical contractor. Refer to Division 26 for additional information.

3.03 INSULATION INSTALLATION

A. Insulation shall be applied on clean, dry surfaces and only after tests and approvals required by the specifications have been completed.

B. Insulation on all cold surfaces must be applied with a continuous, unbroken vapor seal. Hangers, supports, anchors, etc., that are secured directly to cold surfaces shall be adequately insulated and vapor sealed to prevent condensation.

C. Adhesives, mastics, and coatings shall be applied at the manufacturer’s recommended minimum coverage per gallon.

D. Edges of vapor barrier insulation at valve stems, instrument wells, unions, and other raw edges shall be sealed adequately to prevent moisture from penetrating the insulation.

E. Insulation Jacketing
   1. Provide aluminum jacketing for all piping located aboveground, outdoors. Jacketing shall be secured to prevent removal without the use of tools.

F. Ductwork
   1. In general, duct system shall be insulated with fiberglass blanket. Insulation on all cold surfaces shall be provided with a vapor barrier jacket

G. Exterior Ductwork:
   1. Duct wrap shall be cut in a manner to meet the manufacturers' stretch-out guideline to provide a 2" staple lap and have minimum compression at the corners. All joints shall be lapped 2" and stapled with outward clinching staples 2" on center. The insulation shall be mechanically fastened to the underside of all ducts 24" wide or more using cup-head pins, weld pins, or stick pins with speed clips 18" on center. Insulation shall not be compressed to comply with required installed R-value. All joints and penetrations of the vapor barrier jacket shall be sealed with a minimum 3" wide matching pressure sensitive tape. Pressure-sensitive tape shall be firmly rubbed in place immediately after application using a "squeegee" type tool.
   2. When a vapor seal is required, two coats of vapor retarder mastic reinforced with one layer of 4" wide, open weave glass fabric may be used in lieu of pressure-sensitive tape. Mastic shall be brushed onto joint and glass fabric imbedded in it. A second coat of mastic shall be brushed over the glass fabric until the fabric is filled. Mastics shall be applied in accordance with application instructions on the container.

H. Interior Duct Liner
   1. Apply to the inside face of ducts, coated side facing air stream. Fasten using fire retardant adhesive and secure with mechanical fasteners at 12" maximum o.c., both directions, for velocities up to 2,500 fpm. Velocities over 2,500 fpm shall have fastener spacing of 6" o.c.
   2. Exposed edges must be factory or field coated with adhesive. Metal nosing shall be installed in all liner leading edges facing the airstream at fan discharge, at access doors, and at any interval of lined duct preceded by unlined duct.
   3. Insulation with torn or broken coatings shall be removed and replaced. Loose corners, edges, and butt joints will not be accepted.

I. Refrigerant Piping:
   1. The insulation shall be installed in accordance with the manufacturer's instructions. All joints and seams shall be sealed with waterproof vapor retarder adhesive. All piping exposed to the weather shall be finished with aluminum jacketing with a laminated moisture retarder. Aluminum jacketing shall be overlapped 2 to 3 inches and held in place with stainless steel bands to form a weather tight system. Elbows and tees shall be fitted with matching aluminum fitting covers. Other fittings in metal-jacketed systems shall be finished with conventional weather-resistant insulating materials with painted aluminum finish.

3.04 FILTER FAN INSTALLATION

A. Manufacturer's Instructions
   1. Compliance: Comply with manufacturer's product data, including technical bulletins, product catalog installation instructions

B. Examination
   1. Examine areas to receive fans. Notify the Engineer of conditions that would adversely affect installation or subsequent utilization and maintenance of fans. Do not proceed with

installation until unsatisfactory conditions are corrected

C. Preparation
   1. Ensure roof openings are square, accurately aligned, correctly located, and in tolerance
   2. Ensure duct is plumb, sized correctly, and to proper elevation above roof deck.

D. Installation
   1. Install fans system as indicated on the Installation, Operation and Maintenance Manual (IOM) and contract Drawings.
   2. Install fans in accordance with manufacturer's instructions.

E. System Startup
   1. Refer to Installation, Operation, and Maintenance Manual (IOM).

F. Adjusting
   1. Adjust exhaust fans to function properly.
   2. Check wheel overlap.

G. Cleaning
   1. Clean as recommended by manufacturer. Do not use material or methods which may damage finish surface or surrounding construction.

H. Protection
   1. Protect installed product and finished surfaces from damage during construction.
   2. Protect installed exhaust fans to ensure that, except for normal weathering, fans will be without damage or deterioration at time of substantial completion.

3.05 GRAVITY VENTILATORS INSTALLATION

A. Ensure roof openings are square, accurately aligned, correctly located, and in tolerance

B. Ensure duct is plumb, sized correctly, and to proper elevation above roof deck

3.06 FILTERS

A. During construction, protect all filters upstream of air handling units with blankets of 2" fiberglass filter media or 2" disposable panel filters. UL Class 2 listed.

B. Systems shall not be operated without properly installed filters. Filters used during construction shall be removed and replaced with new filters after construction is completed and the systems are ready for final acceptance by the owner.

3.07 DUCTWORK

A. All ductwork shall be installed within spaces provided, where possible. Ducts shall be installed true to line and grade, fully secured to structural framing with specified hangers and supports, insulated, and vibration isolated.

B. Each section of supply air ductwork shall be cleaned at the shop, of dust and oils, using a degreasing agent and detergent. After cleaning, ductwork shall be sealed airtight at both ends with visqueen and tape. Supply ducts shall be additionally cleaned with a disinfecting solution. Ends of all supply and internally insulated exhaust ducts shall be kept sealed until the time they are joined. When duct sections are joined, wipe down all interior surfaces with a clean tack cloth. If tack cloth shows any dust, then re-clean duct as described above. The intent is that no foreign matter be allowed to enter the ductwork at any time after factory cleaning and during construction.

3.08 REFRIGERANT PIPING INSTALLATION

A. Piping installation shall comply with all federal, state, and local regulations and industry guidelines. In addition, the following practices shall be followed.
   1. All piping shall be stored with ends sealed to prevent entry of moisture and debris.
   2. A pipe cutter specific to the piping material applied shall be used.
   3. All factory and field cut tube ends shall be de-burred and cleaned.
   4. Flared fittings shall be formed using tools recommended by the equipment manufacturer.
   5. Flare nuts shall be tightened with torque wrench furnished by the equipment manufacturer.
   6. Piping shall be continuously purged with dry nitrogen while soldering. Care shall be taken when soldering near valves or other equipment that may be damaged by extreme heat.

B. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems; indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations. Install piping as indicated unless deviations to layout are approved on Shop Drawings.

C. Install refrigerant piping according to ASHRAE 15.

D. Install piping in concealed locations unless otherwise indicated and except in equipment rooms and service areas.

E. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.

F. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.

G. Install piping adjacent to machines to allow service and maintenance.

H. Install piping free of sags and bends. Install fittings for changes in direction and branch connections. Install piping as short and direct as possible, with a minimum number of joints, elbows, and fittings.

I. Arrange piping to allow inspection and service of refrigeration equipment. Install valves and specialties in accessible locations to allow for service and inspection

J. Install refrigerant piping in protective conduit when installed belowground. Install refrigerant piping in rigid or flexible conduit in locations that are exposed to mechanical injury.

K. Slope refrigerant piping as follows:
   1. Install horizontal hot-gas discharge piping with a uniform slope downward away from compressor.
   2. Install horizontal suction lines with a uniform slope downward to compressor.
   3. Use double-suction riser for maximum compressor efficiencies if load variation is expected.
   4. Install traps and double risers to entrain oil in vertical runs.
   5. Liquid lines may be installed level.

L. When brazing or soldering, remove solenoid-valve coils and sight glasses; also remove valve stems, seats, and packing, and accessible internal parts of refrigerant specialties. Do not apply heat near expansion-valve bulb.

M. Install piping with adequate clearance between pipe and adjacent walls and hangers or

between pipes for insulation installation.

N. All refrigerant piping and valves shall be identified.

3.09 CONTRACTOR REQUIRMENTS FOR TEST & BALANCE

A. Provide T&B agency one complete set of contract documents, change orders, and approved submittals in digital and hard copy formats.

B. Provide additional valves, dampers, sheaves and belts as required by T& B agency.

C. Flag all manual volume dampers with fluorescent or other high-visibility tape.

D. Provide access to all dampers, valves, test ports, nameplates and other appurtenances as required by T & B agency.

E. Replace or repair insulation as required by T & B agency.

F. Have the HVAC systems at complete operational readiness for T & B to begin. As a minimum, verify the following:
   1. Airside:
      a. All ductwork is complete with all terminals installed.
      b. All volume, smoke and fire dampers are open and functional.
      c. Clean filters are installed.
      d. All fans are operating free of vibration and rotating in correct direction.
      e. VFD start-up is complete, and all safeties are verified.
      f. System readiness checklists are completed and returned to T&B agency.

3.10 TESTS, INSPECTIONS

A. In any test, proper safety procedures and equipment should be used, including personal protective equipment such as protective eyewear and clothing. Installers should always consider local conditions, codes and regulations, manufacturer's installation instructions, and Architects'/Engineers' specifications in any installation.

B. Make all necessary control adjustments and balancing of air flows. Operate the entire system for a period of not less than 3 working days to prove satisfactory performance. During this period, instruct designated persons in the proper operation of the systems. Should further adjustment prove necessary, operating tests shall be repeated until a satisfactory test result is obtained.

C. Contractor shall not allow or cause any work of this Section to be covered or enclosed until it has been inspected, tested, and approved by the Architect and the authorities having jurisdiction over the Work. Should any of this work be enclosed or covered up before such inspection, testing, and approval, this Contractor shall uncover the work, have the necessary inspections, tests, and approvals made and, at NO expense to the Owner, make all repairs necessary to restore both his work and that of other contractors which may have been damaged to be in conformity with the Contract Documents.

D. Furnish all necessary labor, materials, and equipment for conducting tests, and pay all expenses in connection therewith. Should leaks develop while testing, repairs shall be made, and tests shall be repeated until a satisfactory test result is obtained.

3.11 REFRIGERANT PIPING TESTING

A. Prior to charging with refrigerant, piping shall be tested for leaks under 550 psi pressure using a mixture of 95% nitrogen and 5% hydrogen gas. (WARNING! OXYGEN OR ACETYLENE

SHALL NOT BE USED IN PLACE OF DRY NITROGEN. A VIOLENT EXPLOSION MAY RESULT!).

B. Pressure and leak tests on refrigeration piping and equipment shall be done in accordance with local code requirements and ANSI B9.1. Be sure that all controls, relief valves or rupture discs that could be damaged by test pressure are removed before beginning pressure test.

C. Piping shall be continuously purged with dry nitrogen while brazing. Care shall be taken when soldering near valves or other equipment that may be damaged by extreme heat.

D. Precautions shall be taken to keep moisture out of the system, and a drier shall be used.

E. After successful completion of pressure tests, the entire system shall be purged with dry nitrogen and then evacuated with a standard vacuum pump to remove all moisture and non-condensables. Three evacuations shall be required and shall be down to 500 microns absolute pressure. Break the first two vacuums with dry nitrogen. Charge with refrigerant after third evacuation.

F. The Contractor shall notify the Owner's Representative 48 hours prior to the time and date of the evacuation.

G. The refrigerant charge shall be calculated and weighed into the system. After charging with refrigerant, all joints shall be tested with an electric hydrogen leak detector.

H. Mechanical joints in refrigerant piping systems are unacceptable. All refrigerant piping joints shall be brazed. Use silver solder, minimum 15% silver content.

I. Service technicians shall be certified in the use of CFC and HCFC refrigerant recovery and recycling equipment and shall use UL listed and labeled recovery equipment when discharging refrigerant.

3.12 CLEANUP

A. Upon completion of the work of this Section, remove all material, debris, and equipment associated with or used in the performance of this Work.

END OF SECTION

Job Name:	
Tag#	

Submittal Data Sheet

FTX18AXVJU / RX18AXVJU

1.5-Ton Wall Mounted Heat Pump System



Complete warranty details available from your local dealer or at www.daikincomfort.com. To receive the 12-Year Parts Limited Warranty, online registration must be completed within 60 days of installation. Online registration is not required in California or Quebec. *If product is installed in a commercial application, limited warranty period is 5 years.*

Efficiency

Cooling		Heating	
SEER	18.5	**HSPF**	9.0
EER	12.5	**COP**	3.60

Performance

Cooling (Btu/hr)	
Rated (Min/Max)	18,000 (5,500 / 20,000)
Sensible @ AHRI	14,480
Moisture Removal gal/h	0.41
Standard Operating Range	50°F – 115°F
Extended Operating Range*	-4°F – 115°F

Rated Cooling Conditions: Indoor: 80°F DB/67°F WB
Outdoor: 95°F DB/75°F WB

***With field settings and wind baffle**

Heating (Btu/hr)	
1:@ 47° Rated (Min/Max)	21,600 (5,500 / 24,000)
2: @ 17° Rated	12,700
Operating Range	5°F – 65°F

1: Rated Heating Conditions: Indoor: 70°F DB/60°F WB
Outdoor: 47°F DB/43°F WB

2: Rated Heating Conditions: Indoor: 70°F DB/60°F WB
Outdoor: 17°F DB/15°F WB

Indoor Specifications

	Cooling		Heating	
Airflow Rate (cfm)	**H**	**M**	**H**	**M**
	716	605	716	605
	L	**SL**	**L**	**SL**
	467	395	467	395
Sound (dBA) H / M / L / SL	49 / 44 / 38 / 33		49 / 42 / 37 / 33	
Dimensions (H × W × D) (in)	11-11/16 × 39-1/2 × 11-1/3			
Weight (Lbs)	31			

Outdoor Specifications

Compressor	Hermetically Sealed Swing Type			
Refrigerant	R-410A			
Factory Charge (Lbs)	3.20			
Refrigerant Oil	PVE (FVC50K)			
Airflow Rate (cfm)	**Cooling**		**Heating**	
	H	2,005	**H**	1,905
Sound Pressure Level (dBA)	54			
Dimensions (H × W × D) (in)	27-13/32 × 36-5/8 × 13-13/16			
Weight (Lbs)	101			

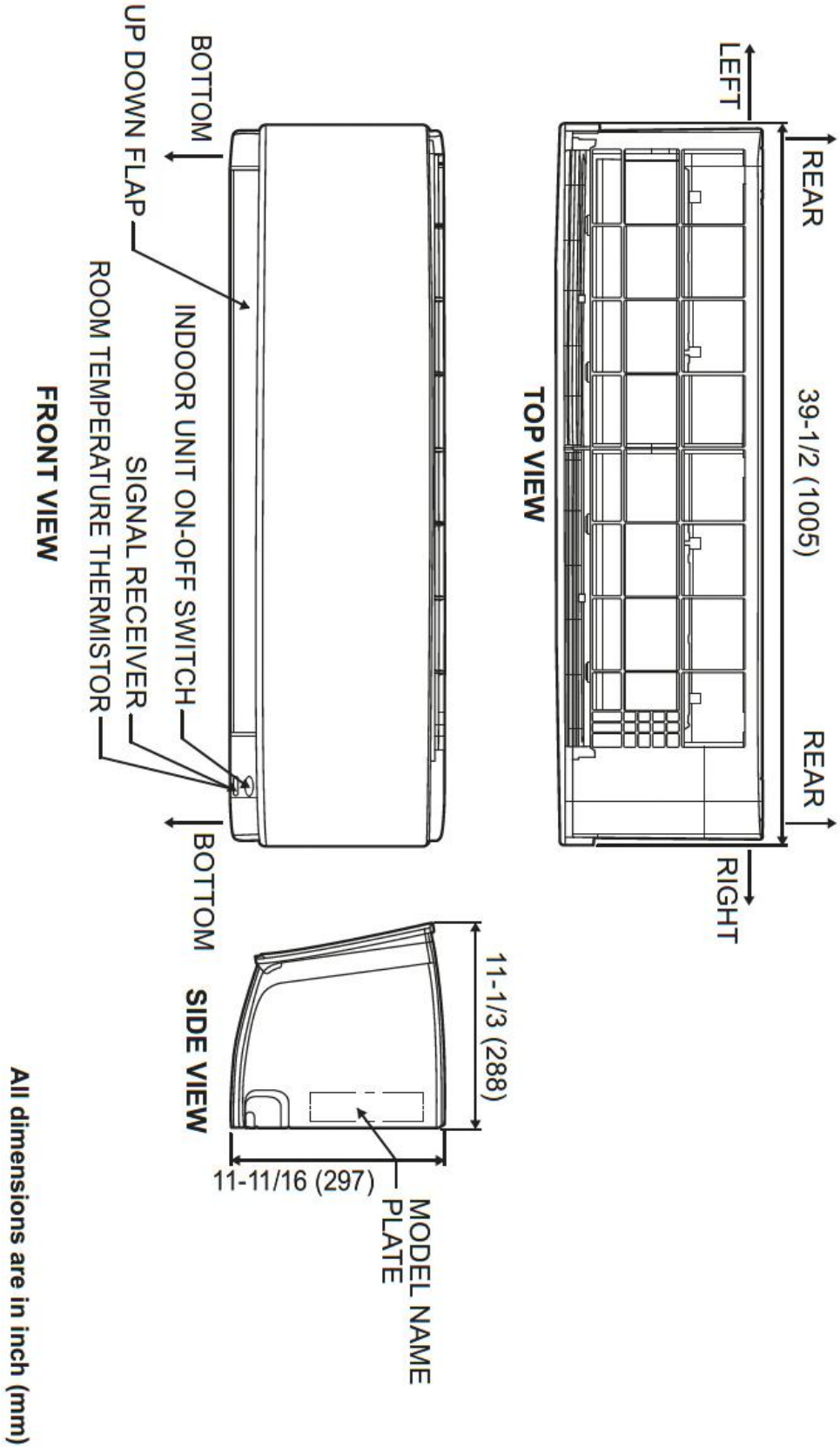
Electrical

	208/60/1	230/60/1
System MCA	16.4	16.4
System MFA	20.0	20.0
Compressor RLA	16.0	16.0
Outdoor fan motor FLA	.99	.99
Outdoor fan motor W	128	128
Indoor fan motor FLA	.50	.50
Indoor fan motor W	35	35

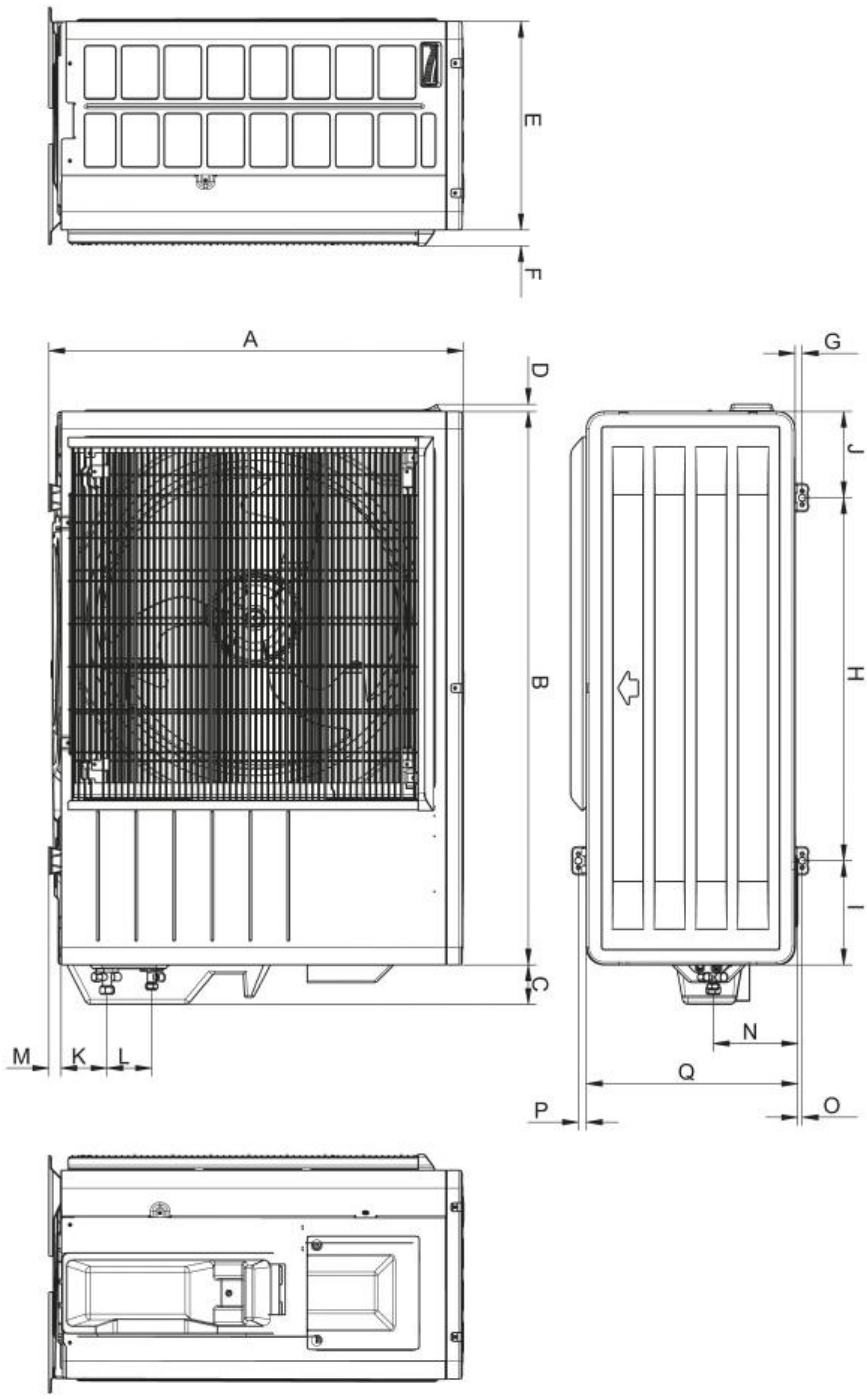
MFA: Max. fuse amps **MCA**: Min. circuit amps (A) **FLA**: Full load amps (A)
RLA: Rated load amps (A) **W**: Fan motor rated output (W)

Piping

Liquid (in)	1/4
Gas (in)	1/2
Drain (in)	3/4
Max. Interunit Piping Length (ft)	98.4
Max. Interunit Height Difference (ft)	65.625
Chargeless (ft)	32.8
Additional Charge of Refrigerant (oz/ft)	.21


LEFT
REAR
39-1/2 (1005)
REAR
RIGHT
TOP VIEW
BOTTOM
UP DOWN FLAP
INDOOR UNIT ON-OFF SWITCH
SIGNAL RECEIVER
ROOM TEMPERATURE THERMISTOR
BOTTOM
FRONT VIEW
11-1/3 (288)
11-11/16 (297)
MODEL NAME PLATE
SIDE VIEW
All dimensions are in inch (mm)

Model / Dimension	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
18/24	27-13/32 (696)	36-5/8 (930)	2-19/32 (66)	15/32 (12)	13-13/16 (351)	1-1/16 (27)	15/32 (12)	24 (610)	6-7/8 (175)	5-23/32 (145)	3-1/32 (77)	2-31/32 (75)	13/16 (21)	5-19/32 (142)	5/16 (8)	17/32 (13)	13-31/32 (355)



All dimensions are in inch (mm)

Optional Accessories

Indoor Unit		
Included	**Part Number**	**Description**
	BRP072A43	Wireless Interface Adaptor
	AZAI6WSCDKB	DKN Residential Cloud Wi-Fi Adaptor for Single- and Multi-Zone System (S21)
	BRC944B2-A08	Wired Remote Controller kit
	BRCW901A08	Wired Remote Controller Cable – 25ft (Included in above kit)
	BRCW901A03	Wired Remote Controller Cable – 10ft
	DACA-CP1-1	Inline Condensate Pump (Fits inside all Daikin wall & floor mount units)
	DACA-CP4-1	External Condensate Pump

Outdoor Unit		
Included	**Part Number**	**Description**
	DACA-WB-1	Powder-Coated Wall-Mounted Bracket
	KPW063B4E	Air Adjustment Grille

WhisperGreenSelect™ VENTILATION FAN

Built-In Self Adjusting Airflow Capability

FV-1115VK2

Specification Submittal Data / Panasonic Ventilation Fan

Description

Customizable ceiling mount ventilating fan, low sone and rated for continuous operation. ENERGY STAR® rated and certified by the Home Ventilating Institute (HVI). Evaluated by the Underwriters Laboratories and conforms to both UL and cUL standards.

Motor/Blower:

- Enclosed brushless ECM smart motor technology rated for continuous operation
- Adjustable ventilation rates at 110 – 130 – 150 CFM
- Power rating of 120 volts and 60 Hz
- UL and cUL listed for tub/shower enclosure when GFCI protected
- Motor equipped with thermal cutoff fuse
- Removable permanently lubricated plug-in motor

Housing:

- Environmentally friendly 26 gauge housing using Zinc-Aluminum-Magnesium (ZAM) coating
- Integrated 6" diameter duct adapter
- Built-in damper reduces back draft and helps with blower door testing
- Built-in metal flange provides blocking for penetrations through drywall as an Air Barrier, and assists with the decrease in leakage in the Building Envelope during blower door testing
- Suitable for installation in ceilings insulated up to R60
- Articulating and expandable installation bracket up to 24"

Grille:

- Attractive design using Poly Pro material
- Attaches directly to housing with torsion springs
- Includes a motion sensor cap for use as a cover when the motion sensor Plug 'n Play™ module has not been selected

Warranty:

- ECM Motor: 6 Years from original purchase date
- ALL Parts: 3 Years from original purchase date

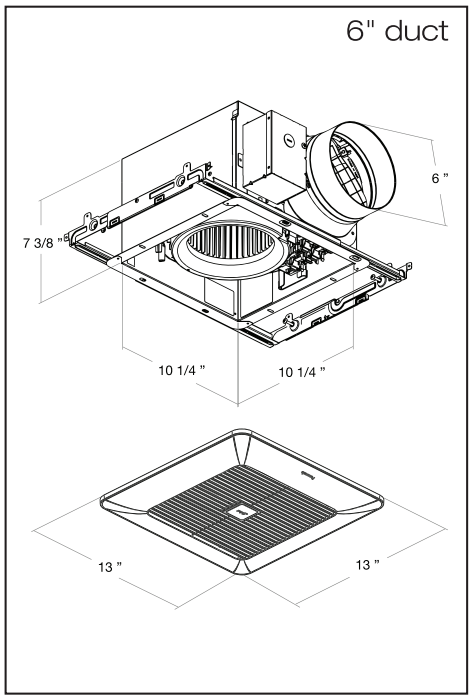
Architectural Specifications:

Customizable ceiling mount ventilation fan, ENERGY STAR® rated with built-in speed selector. Select from 110/130/150 CFM with <0.3 sone as certified by the Home Ventilating Institute (HVI) at 0.1 w.g. with 112/130/151 CFM and no more than 0.3/0.4/0.7 sones at 0.25 w.g. and 105/124/132 CFM at 0.375 w.g. Power Consumption shall be no greater than 6.9/9.2/12.9 watts at 0.1 w.g. and 12.8/16.5/22.0 watts at 0.25 w.g. and 17.9/22.1/24.4 watts at 0.375 w.g. ENERGY STAR® rated with efficiency of no less than 16.0/14.2/11.7 CFM/watt at 0.1 w.g. and 8.7/7.9/6.8 CFM/watt at 0.25 w.g. and 5.8/5.6/5.4 CFM/watt at 0.375 w.g. The motor shall be enclosed with brushless ECM motor engineered to run continuously. ECM motor speed shall automatically increase when the fan senses static pressure to maintain selected CFM. Power rating shall be 120v/60Hz. Duct diameter shall be no less than 6". **Plug 'N Play™ modules** provide up to three additional features. Select from Multi-Speed with Time Delay, Condensation Sensor, and SmartAction Motion Sensor. Fan shall be RoHS Compliant and UL and cUL listed for tub/shower enclosure when GFCI protected. Also suitable for installation in ceilings insulated up to R60.. Fan can be used to comply with ASHRAE 62.2, LEED, ENERGY STAR® IAP, EarthCraft, California Title-24 and WA Ventilation Code.

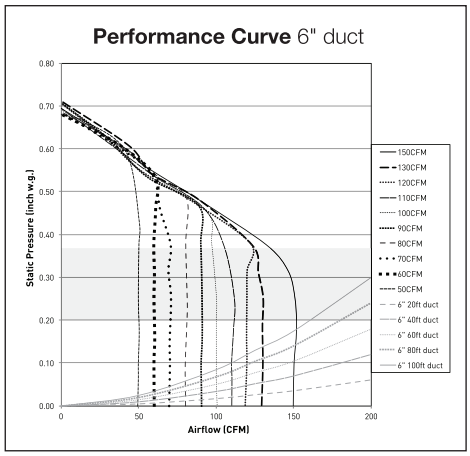
SMART FLOW ECM TECHNOLOGY

ECM Motor Technology:

When fan senses static pressure, its speed is automatically increased to ensure that the desired CFM is not compromised, which allows the fan to perform as rated.



FV-1115VK2



*Industry research indicates static pressure in typical installations ranges from 0.20" to 0.375"

Model	Quantity	Comments	Project:
			Location:
			Architect:
			Engineer:
			Contractor:
			Submitted by:
			Date:

For complete Installation Instructions visit **us.panasonic.com/ventfans**

Ceiling Radiation Damper: WhisperGreen Select™ is UL listed for use with the Panasonic Ceiling Radiation Damper (Model #: PC-RD05C5, sold separately).

WhisperGreenSelect™ VENTILATION FAN

Built-In Self Adjusting Airflow Capability

FV-1115VK2

Plug 'N Play™ Modules

Plug 'N Play™ modules provide up to three additional features. Select from Multi-Speed with Time Delay, Motion Sensor, and Condensation Sensor.



FV-VS15VK1: Multi-Speed with Time Delay

Allows you to select the proper CFM settings to satisfy ASHRAE 62.2 continuous ventilation requirements. The fan runs continuously at a pre-set lower level (0, 50-120 CFM, in 10 CFM increments), then elevates to a maximum level of operation (110-130-150 CFM) when the wall switch is turned on, or when the motion sensor or Condensation Sensor module is activated. A High/Low delay timer returns the fan to the pre-set CFM level after a period of time set by the user.



FV-MSVK1: Motion Sensor

Automatically activates when someone enters the room. Once the settings have been applied, the fan becomes truly automatic. This module also activates a 20 minute delay off timer for the fan.



FV-CSVK1: Condensation Sensor

Helps control bathroom condensation to prevent mold and mildew. Sensor technology detects relative humidity and temperature to anticipate dew point, automatically turning the fan on to control humidity. Built-in Relative Humidity (RH) sensitivity adjustment enables fine tuning for moist conditions and for satisfying CalGreen requirements. When the condensation sensor is used in conjunction with multi-speed functionality, the fan will kick up to high speed when the condensation sensor detects moisture in the room. This module also activates a 20 minute delay off timer for the fan.

Fan Specifications	WhisperGreen Select™: FV-1115VK2								
Static Pressure in inches w.g.	0.1	0.25	0.375	0.1	0.25	0.375	0.1	0.25	0.375
Air Volume (CFM)	150	151	132	130	130	124	110	112	105
Noise (sones)	<0.3	0.7	-	<0.3	0.4	-	<0.3	0.3	-
Power Consumption (watts)	12.9	22.0	24.4	9.2	16.5	22.1	6.9	12.8	17.9
Energy Efficiency (CFM/Watt)	11.7	6.8	5.4	14.2	7.9	5.6	16.0	8.7	5.8
Speed (RPM)	684	916	1084	645	900	1080	625	894	1083
Current (amps)	0.14	0.22	0.24	0.10	0.17	0.22	0.08	0.13	0.18
MAX. Current (amps)	0.24								
Power Rating (V/Hz)	120/60								
ENERGY STAR rated	Yes								

*Industry research indicates static pressure in typical installations ranges from 0.20" to 0.375"

Fan Specifications	FV-1115VK2 + FV-VS15VK1 (Multi Speed Plug 'N Play™ module)																													
Static Pressure in inches w.g.	0.1	0.25	0.375	0.1	0.25	0.375	0.1	0.25	0.375	0.1	0.25	0.375	0.1	0.25	0.375	0.1	0.25	0.375	0.1	0.25	0.375	0.1	0.25	0.375	0.1	0.25	0.375	0.1	0.25	0.375
Air Volume (CFM)	150	151	132	130	130	124	120	120	122	110	112	105	100	100	97	90	91	90	80	81	80	70	71	70	60	60	60	50	50	50
Noise (sones)	<0.3	0.7	-	<0.3	0.4	-	<0.3	0.3	-	<0.3	0.3	-	<0.3	0.2	-	<0.3	0.3	-	<0.3	0.3	-	<0.3	0.4	-	<0.3	0.4	-	<0.3	0.5	-
Power Consumption (watts)	12.9	22.0	24.4	9.2	16.5	22.1	7.7	14.0	20.5	6.9	12.8	17.9	5.5	11.0	16.0	4.7	9.7	15.0	4.2	9.0	13.9	3.7	8.1	12.2	3.3	7.2	11.2	3.0	6.4	10.2
Energy Efficiency (CFM/Watt)	11.7	6.8	5.4	14.2	7.9	5.6	15.7	8.6	6.0	16.0	8.7	5.8	18.2	9.1	6.0	19.1	9.3	6.0	19.0	9.0	5.7	19.2	8.8	5.8	18.2	8.3	5.3	17.3	8.1	5.1
Speed (RPM)	684	916	1084	645	900	1080	633	895	1086	625	894	1083	615	898	1093	602	900	1099	608	912	1104	591	914	1109	608	913	1117	609	910	1116
Current (amps)	0.14	0.22	0.24	0.10	0.17	0.22	0.09	0.15	0.21	0.08	0.13	0.18	0.07	0.12	0.16	0.06	0.10	0.15	0.05	0.10	0.14	0.05	0.09	0.13	0.04	0.08	0.12	0.04	0.07	0.11
MAX. Current (amps)	0.33																													
Power Rating (V/Hz)	120/60																													
ENERGY STAR rated	Yes																													

*Industry research indicates static pressure in typical installations ranges from 0.20" to 0.375"

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IAQ Division
Two Riverfront Plaza
Newark, NJ 07102

us.panasonic.com/ventfans

Most Efficient 2020 ENERGY STAR www.energystar.gov

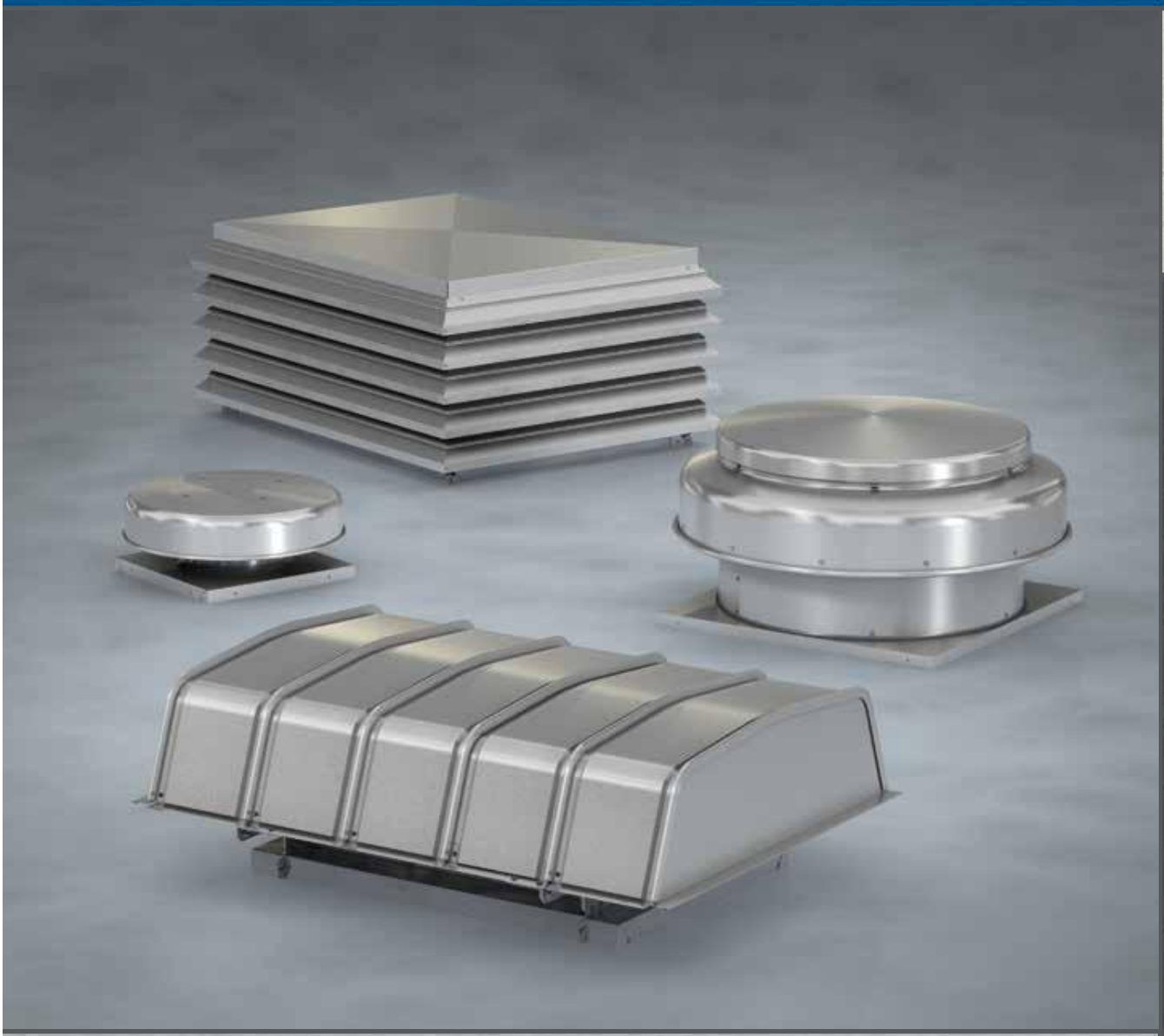
Panasonic

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Gravity Ventilators

Models FGI/FGR, GRSI/GRSR, WIH/WRH

Intake and Relief



GREENHECK

Building Value in Air.

BUILDING VALUE IN AIR.

May
2021

Gravity Ventilators

GREENHECK
Building Value in Air.

Gravity ventilators allow air to enter or exhaust a building using the pressure in a building. The air inside a building will exhaust out as the pressure inside a building increases. Similarly, air enters the building through the gravity ventilator as the inside pressure decreases.

Fabra Hood 4



Designed for intake or relief applications, the fabra hood models FGI or FGR offer many important advantages over other gravity roof ventilators. These models are superior in load bearing strength, weather-resistance, dimensional flexibility and appearance.

Models FGI and FGR 4-7

Dimensions and Performance Data 8-13

Specifications 18

Spun Aluminum 14



For natural gravity or positive pressure systems, the intake model GRSI or relief model GRSR offers excellent performance and durability. Featuring an exceptional low silhouette design and rugged construction, this model is both efficient and economical.

Model GRSI and GRSR 14

Dimensions and Performance Data 14-15

Specifications 18

Louvered Penthouse 16



The WIH intake or WRH relief penthouse units offer an aesthetically pleasing design. This flexible design allows for units to be shipped in pre-assembled sections that can be easily assembled without special tools.

Models WIH and WRH 16

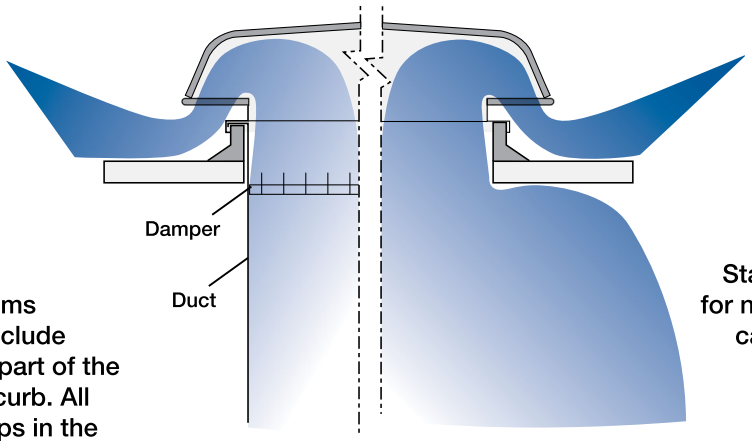
Dimensions and Performance Data 16-17

Specifications 19

Model Comparison

Model	Intake	Relief	High Wind	Performance	
				Maximum Volume (CFM)	Maximum Static Pressure (in. wg)
GRSI	✓			15,200	0.4
GRSR		✓		18,400	0.4
FGI	✓		✓	109,800	0.4
FGR		✓	✓	96,800	0.3
WIH	✓			40,000	0.1
WRH		✓		60,000	0.2

System Resistance



Ducted Systems

Static pressure drops shown for ducted systems in this catalog do not include pressure drops for any part of the system below the roof curb. All additional pressure drops in the ducted system must be calculated by the system designer.

Non-ducted Systems

Static pressure drops shown for non-ducted systems in this catalog include all entrance and discharge losses.

Performance Data

Performance data shown on models include static pressure drops for both ducted and non-ducted systems. Pressure drop values as shown are lower for ducted systems than for non-ducted systems. The non-ducted pressure drop includes the sudden expansion at the throat for intake and sudden contraction loss at the throat for exhaust. These losses are not present when a duct is attached to the throat. Calculating total system resistance for ducted systems also requires adding the pressure drop values shown to the combined total of the other losses in the system. A damper installed in either a ducted or non-ducted system will also require including additional pressure drop value. Where insect screens or filters are installed, the static pressure drops shown on page 6 should be included in system resistance calculations in lieu of standard cataloged pressure drops.

Fabra Hood Models FGI/FGR



Fabra hoods are designed for intake (model FGI) or relief (model FGR) applications. The fabra hood design offers many important advantages not found in other gravity roof ventilators. Its design is superior in appearance, load-bearing strength, weather resistance, and dimensional flexibility.

Appearance

The clean lines and uniform structural design of the fabra hood complement any building's appearance. The fabra hood is designed with a low profile to mount close to the roofline. The result is minimum impact on the building silhouette.

Strength and Weather Resistance

These hoods are strong enough to handle the snow loads found in even the harshest of northern climates and have proven their ruggedness. The key to the fabra hood's strength and rigidity is in the design of the arched hood panels. Each panel provides structural support and is formed with interlocking edges. The result is a strong, rigid shell without the obstruction and performance losses of excessive internal support braces. The interlocking ribs also create tight, weather-resistant joints. No caulking or caps are required to seal out rain and snow.

Third-Party Certified for High Wind

Miami-Dade, Notice of Acceptance NOA-19-0802.02
Florida Product Approval (FLPA) - FL12917

- Highest industry rating

Maximum High Wind Certifications Sizes		
Model	Throat Diameter	
	Width inches *(mm)*	Length inches *(mm)*
FGI	54 *(1372)*	54 *(1372)*
FGR	66 *(1676)*	66 *(1676)*

- Fabra hoods are certified for static and cyclic wind loading and missile impact
- Designed to withstand wind loads of up to 70 psf (steel) and 40 psf (aluminum)

  > No tie downs are needed
- Installation/mounting details are provided

Performance

The rounded inner surfaces of the fabra hood's arched panels promote a smooth, uninterrupted airflow to reduce pressure losses. Cataloged performance data is assured through extensive air testing of both ducted and non-ducted installations with standard birdscreens in place. Intake and relief units differ in size and performance. It is important to note that the "free area" (the opening surrounding the throat) is larger for intake hoods. This larger free area (twice that of the throat) limits the entry of airborne debris and moisture by creating lower intake air velocities. Since relief units are not affected by velocity considerations, the free area is equal to the throat area. Consequently, the smaller overall dimensions of relief units result in lower cost.

Broad Range of Sizes

Model FGI (intake) and FGR (relief) are available in throat sizes ranging from a minimum of 8 inches *(203 mm)* wide by 8 inches *(203 mm)* long to a maximum of 72 inches *(1829 mm)* wide by 180 inches *(4572 mm)* long. The complete range of suggested throat sizes is shown on pages 8-13. Other sizes are also available in increments of one inch within the limits shown.

Shipping

Most fabra hoods ship assembled unless the dimensions are too large to fit in a semitrailer. See pages 8-13 for specific dimensional data.

Assembly

Hoods of long lengths can be constructed on the job site with the interlocking rib design. Where the appearance of a single unit is desired, large roof openings can be covered using a single hood. This also represents cost savings in working with a single roof penetration. Neither special tools nor training are required for assembly. See page 7 for details.

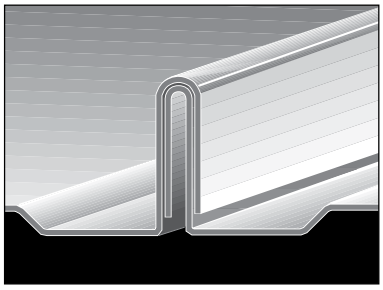
Fabra Hood Construction Features

GREENHECK
Building Value in Air.

Precision Formed Locking Rib System

Strength, weather tightness, and adjustable lengths are the primary advantages of the fabra hood's arched, interlocking hood panels. A single, precision roll forming operation creates the rib, the adjacent channel and the arch. All three features work in combination for rigidity and efficient water drainage.

Fabra hoods are available with hood panels and bases constructed of aluminum or galvanized steel as specified.



Accessibility

Fabra hoods are designed for ease of access to allow inspection and maintenance of screens, filters, and dampers. There are two options for opening the hood:

1. Completely lift the hood off the base by removing the bolts on all the support members.
2. Hinged hood action allows the hood to swing up and over to lie on the roof deck by removing the end bolts on only one side of the support member.

   NOTE: We do not recommend using this hinging function with larger hoods or prop any hood partway open for your safety. Take care to avoid handling an unbolted hood in strong winds, especially with larger size units.



1 Hood panels
Panels are arched and precision roll-formed for strength and weather tightness. The design and construction provides sufficient structural strength to allow inlet and outlet areas to be virtually unobstructed by support members.

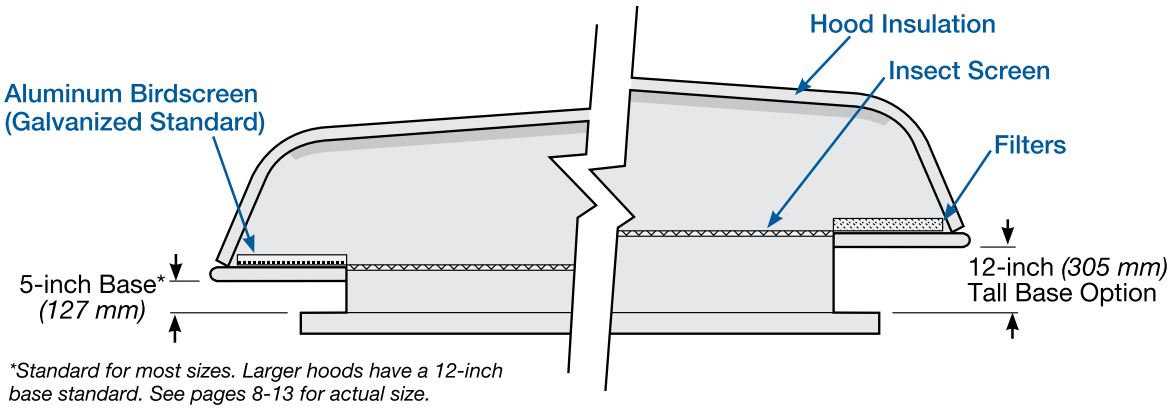
2 Birdscreens
Standard birdscreens are constructed of 1/2-inch *(13 mm)* galvanized steel mesh for minimum airflow restriction.

3 Support members
Heavy-gauge galvanized steel support members provide additional structural strength as well as a hood/base interface. Larger hoods have truss braces added for increased strength.

4 Standard base
The standard base height is 5 inches *(127 mm)* for most sizes. Bases include pre-punched mounting holes for ease of installation. The curb cap is 6 inches *(152 mm)* larger than the throat size to minimize airflow restrictions. Reinforced steel hood support members are securely attached to the base and direct hood loads to the roof curb. 12 inch *(305 mm)* bases are optional. See page 6 for details.

5 Vertical end panels
Vertical panels are fully locked into the hood's end panels.

Fabra Hood Construction Options



*Standard for most sizes. Larger hoods have a 12-inch base standard. See pages 8-13 for actual size.

12-inch tall bases

12-inch *(305 mm)* bases are recommended for intake applications to prevent moisture entry and for all applications where rain or snow may accumulate on the roof deck. A 12-inch (*305 mm*) base on larger-size units will provide more clearance space from the roof deck and allow for better airflow.

Fiberglass hood insulation

Either 1/2-inch *(13 mm)* or 1-inch *(25 mm)* insulation can be factory applied to the underside of the hood to prevent condensation. Insulation is also factory applied to individual panels of large unassembled units.

Aluminum birdscreen

3/4 x 1-1/4 inch *(19 mm x 32 mm)* diamond shape is available in place of standard galvanized birdscreen.

Tie-down points

Heavy-gauge galvanized steel tie-down points are available as cable attachment points at the ends of each hood support rail and prevent damage to the fabra hood in locations where unusually strong winds occur.

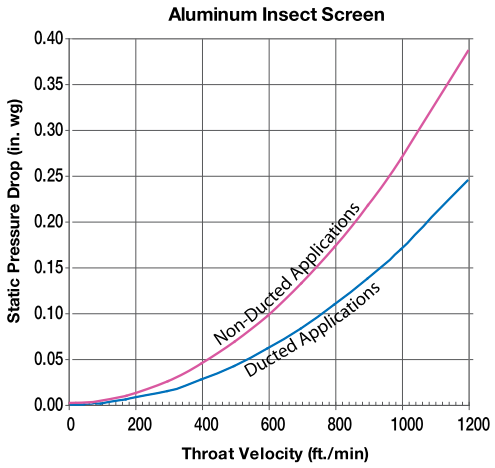
Special coatings

Options are available for decorative or protective coatings purposes. Refer to the Performance Coatings brochure for complete coating options.

- Greenheck's Permatector™ is the standard coating for steel products in both indoor and outdoor applications.
- Greenheck's Hi-Pro Polyester is formulated for exterior durability, color and gloss retention. Excellent for chemical applications.

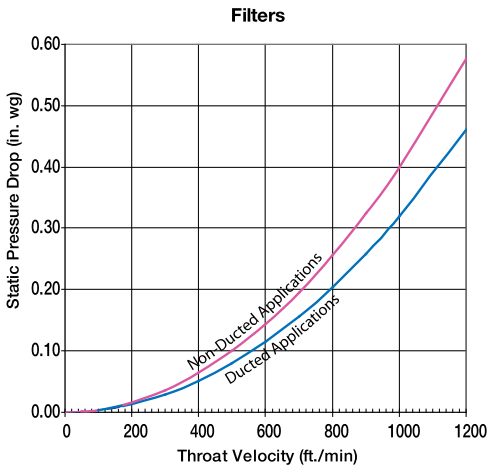
Aluminum Insect Screen

A fine mesh aluminum insect screen tightly fitted to the top of the throat is available to prevent the entry of insects. (This is in addition to the standard birdscreen and is available on factory-assembled units only.) Use the curves on the graph below to determine the static pressure drop for units with an insect screen.



Filters

Two-inch aluminum filters are available on model FGI (intake) for applications where foreign material must be removed from the airstream. Use the curves on the graph below to determine the static pressure drop for units with filters.



Fabra Hood Accessories



Backdraft Dampers

Backdraft dampers are available for intake or relief with either gravity or motorized operation. Motorized dampers are recommended for all intake or low-velocity relief applications. Damper sizes are the same as throat sizes.



Roof Curbs

Prefabricated roof curbs ensure compatibility between the gravity ventilator, curb, and roof opening. Curb extensions are also available. Curb models are available to meet a wide range of applications and varying roof architecture and construction. See the Greenheck Roof Curbs, Extensions and Equipment Supports catalog for complete details on these products.

On-Site Assembly

Flexibility is a primary feature of the fabra hood design. Interlocking hood panels and extendible throats allow units to be constructed to long lengths. On-site assembly for these larger units is not difficult and offers several advantages.

For jobs with large throat sizes, assembling hoods on-site reduces costs. There is a cost-savings in carrying unassembled components to the roof versus the expense of cranes or other equipment involved in lifting a bulky assembled unit. The risk of damage in transporting large assembled units also is reduced; when assembled on the roof deck.

The space saved by a compact crate of knocked-down component parts also reduces shipping charges and final costs over large, fully assembled units.

Ease of Assembly

Hoods of any length can be constructed on the job site with ease. No special tools or training are required to assemble a Greenheck fabra hood.

Assemble fabra hoods using these basic steps:

Step 1 Base ends, base sides, and intermediate hood supports (when required) are placed in position and bolted together.

Step 2 Attach hood support angles.

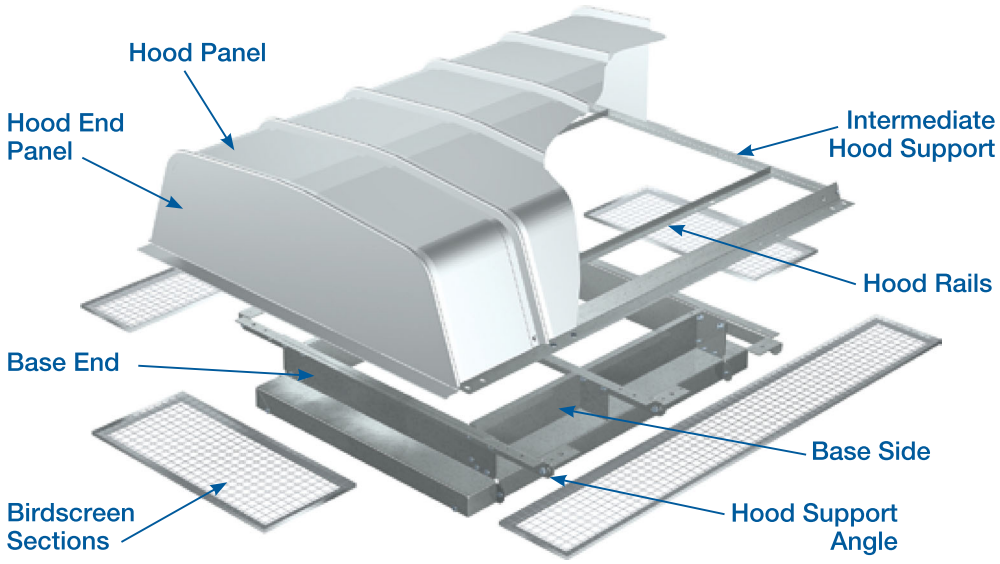
Step 3 Tighten all fasteners and caulk all inside base corners.

Step 4 Attach birdscreens to hood support angles.

Step 5 Attach hood rails to hood support angles.

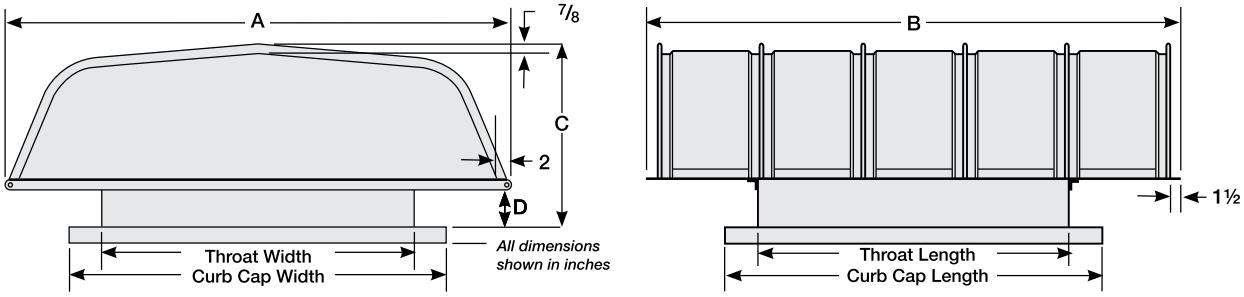
Step 6 Assemble hood panels and end panels to hood rails.

All hardware comes with each unit along with complete, detailed, and well-illustrated instructions.



Fabra Hood - Gravity Intake
Model FGI

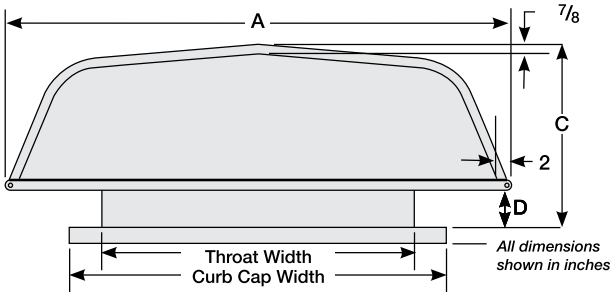
GREENHECK
Building Value in Air.

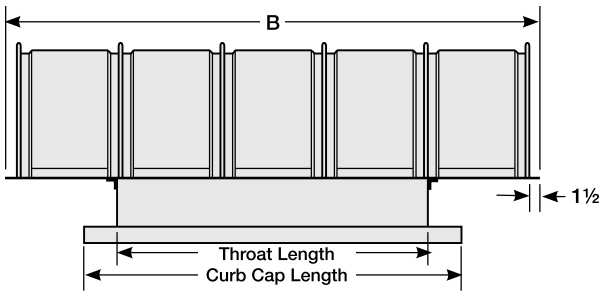


Dimensional Data								Performance Data							Shipped Assembled	Galvanized Unit Weight
								DUCTED STATIC PRESSURE DROP (in. wg)								
								0.030	0.047	0.071	0.089	0.119	0.149	0.196		
								NON-DUCTED STATIC PRESSURE DROP (in. wg)								
								0.053	0.085	0.127	0.158	0.212	0.267	0.350		
								HOOD INTAKE VELOCITY / THROAT VELOCITY (ft/min.)								
Throat Area	Throat Width x Length	Curb Cap Width x Length	Optional Damper Width x Length	Width	Length	Overall Height	Base Height	235/475	297/600	364/735	406/820	470/950	527/1065	604/1220		
				A	B	C	D									
ft^2	Inches							CFM								POUNDS
0.44	8 x 8	14 x 14	8 x 8	22	27	14	5	211	267	327	364	422	474	542	Yes	37
0.67	8 x 12	14 x 18	8 x 12	22	27	14	5	316	401	490	546	633	710	813	Yes	37
1.00	8 x 18	14 x 24	8 x 18	22	39	14	5	475	601	735	820	949	1066	1220	Yes	46
1.33	8 x 24	14 x 30	8 x 24	22	39	14	5	633	802	980	1093	1266	1421	1627	Yes	49
1.67	8 x 30	14 x 36	8 x 30	22	51	14	5	791	1002	1225	1366	1582	1776	2033	Yes	57
1.00	12 x 12	18 x 18	12 x 12	26	27	14	5	475	601	735	820	949	1066	1220	Yes	37
1.50	12 x 18	18 x 24	12 x 18	26	39	14	5	712	902	1102	1229	1424	1598	1830	Yes	46
2.00	12 x 24	18 x 30	12 x 24	28	39	14	5	949	1202	1470	1639	1899	2131	2440	Yes	49
2.50	12 x 30	18 x 36	12 x 30	27	51	14	5	1187	1503	1837	2049	2374	2664	3050	Yes	57
3.00	12 x 36	18 x 42	12 x 36	31	51	14	5	1424	1804	2205	2459	2848	3197	3660	Yes	63
3.50	12 x 42	18 x 48	12 x 42	29	63	14	5	1662	2104	2572	2869	3323	3729	4270	Yes	73
4.00	12 x 48	18 x 54	12 x 48	33	63	14	5	1899	2405	2939	3279	3798	4262	4880	Yes	79
1.36	14 x 14	20 x 20	14 x 14	29	27	16	5	646	818	1000	1116	1292	1450	1660	Yes	43
1.75	14 x 18	20 x 24	14 x 18	28	39	16	5	831	1052	1286	1434	1662	1865	2135	Yes	49
2.33	14 x 24	20 x 30	14 x 24	32	39	16	5	1108	1403	1715	1913	2215	2486	2846	Yes	55
2.92	14 x 30	20 x 36	14 x 30	30	51	16	5	1385	1753	2143	2391	2769	3108	3558	Yes	62
3.50	14 x 36	20 x 42	14 x 36	36	51	16	5	1662	2104	2572	2869	3323	3729	4270	Yes	70
4.08	14 x 42	20 x 48	14 x 42	33	63	16	5	1938	2455	3001	3347	3877	4351	4981	Yes	80
4.67	14 x 48	20 x 54	14 x 48	38	63	16	5	2215	2806	3429	3825	4431	4972	5693	Yes	87
5.25	14 x 54	20 x 60	14 x 54	36	75	16	5	2492	3156	3858	4303	4985	5594	6405	Yes	96
1.78	16 x 16	22 x 22	16 x 16	30	39	16	5	844	1069	1306	1457	1688	1894	2169	Yes	52
2.22	16 x 20	22 x 26	16 x 20	31	39	16	5	1055	1336	1633	1821	2110	2368	2711	Yes	54
2.67	16 x 24	22 x 30	16 x 24	36	39	16	5	1266	1603	1960	2186	2532	2841	3253	Yes	60
3.33	16 x 30	22 x 36	16 x 30	34	51	16	5	1582	2004	2450	2732	3165	3552	4066	Yes	68
4.00	16 x 36	22 x 42	16 x 36	40	51	16	5	1899	2405	2939	3279	3798	4262	4880	Yes	76
4.67	16 x 42	22 x 48	16 x 42	38	63	16	5	2215	2806	3429	3825	4431	4972	5693	Yes	87
5.33	16 x 48	22 x 54	16 x 48	36	75	16	5	2532	3206	3919	4371	5064	5683	6506	Yes	95
6.00	16 x 54	22 x 60	16 x 54	40	75	16	5	2848	3607	4409	4918	5697	6393	7320	Yes	104
6.67	16 x 60	22 x 66	16 x 60	38	87	16	5	3165	4008	4899	5464	6330	7103	8133	Yes	129
7.33	16 x 66	22 x 72	16 x 66	42	87	16	5	3481	4409	5389	6011	6963	7814	8946	Yes	136
2.25	18 x 18	24 x 24	18 x 18	32	39	16	5	1068	1353	1653	1844	2136	2397	2745	Yes	55
3.00	18 x 24	24 x 30	18 x 24	40	39	16	5	1424	1804	2205	2459	2848	3197	3660	Yes	64
3.75	18 x 30	24 x 36	18 x 30	38	51	16	5	1780	2254	2756	3074	3560	3996	4575	Yes	73
4.50	18 x 36	24 x 42	18 x 36	36	63	16	5	2136	2705	3307	3688	4272	4795	5490	Yes	83
5.25	18 x 42	24 x 48	18 x 42	42	63	16	5	2492	3156	3858	4303	4985	5594	6405	Yes	92
6.00	18 x 48	24 x 54	18 x 48	40	75	16	5	2848	3607	4409	4918	5697	6393	7320	Yes	101
6.75	18 x 54	24 x 60	18 x 54	45	75	16	5	3204	4058	4960	5533	6409	7192	8235	Yes	111
7.50	18 x 60	24 x 66	18 x 60	43	87	16	5	3560	4509	5511	6147	7121	7991	9149	Yes	136
8.25	18 x 66	24 x 72	18 x 66	46	87	16	5	3916	4960	6063	6762	7833	8790	10064	Yes	145
9.00	18 x 72	24 x 78	18 x 72	45	99	16	5	4272	5411	6614	7377	8545	9590	10979	Yes	155
2.78	20 x 20	26 x 26	20 x 20	37	39	16	5	1319	1670	2041	2277	2637	2960	3389	Yes	61
3.33	20 x 24	26 x 30	20 x 24	44	39	16	5	1582	2004	2450	2732	3165	3552	4066	Yes	69
4.17	20 x 30	26 x 36	20 x 30	42	51	16	5	1978	2505	3062	3415	3956	4440	5083	Yes	77
5.00	20 x 36	26 x 42	20 x 36	40	63	16	5	2374	3006	3674	4098	4747	5328	6100	Yes	89
5.83	20 x 42	26 x 48	20 x 42	48	63	16	5	2769	3507	4287	4781	5538	6215	7116	Yes	98
6.67	20 x 48	26 x 54	20 x 48	44	75	16	5	3165	4008	4899	5464	6330	7103	8133	Yes	107
7.50	20 x 54	26 x 60	20 x 54	49	75	16	5	3560	4509	5511	6147	7121	7991	9149	Yes	117
8.33	20 x 60	26 x 66	20 x 60	47	87	16	5	3956	5010	6124	6830	7912	8879	10166	Yes	143
9.17	20 x 66	26 x 72	20 x 66	45	99	16	5	4352	5511	6736	7513	8703	9767	11183	Yes	154
10.00	20 x 72	26 x 78	20 x 72	49	99	16	5	4747	6012	7349	8196	9494	10655	12199	Yes	162
10.83	20 x 78	26 x 84	20 x 78	47	111	16	5	5143	6513	7961	8880	10286	11543	13216	Yes	194
11.67	20 x 84	26 x 90	20 x 84	51	111	16	5	5538	7014	8573	9563	11077	12431	14232	Yes	203

Fabra Hood - Gravity Intake
Model FGI

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Building Value in Air.

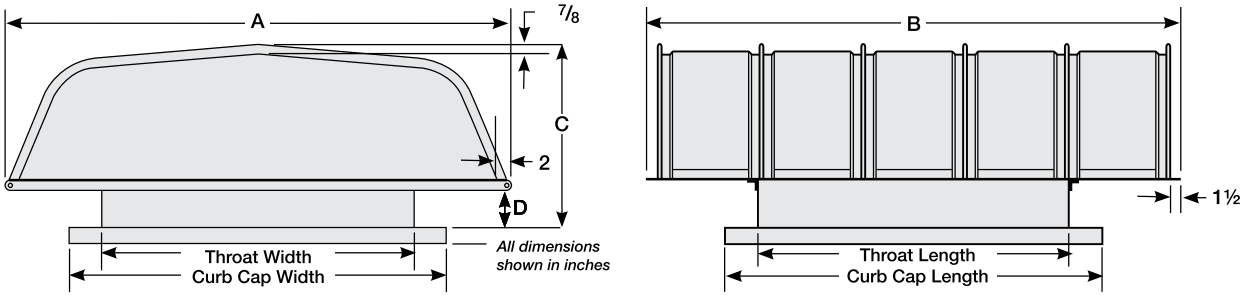




Dimensional Data								Performance Data								
								DUCTED STATIC PRESSURE DROP (in. wg)								
								0.030	0.047	0.071	0.089	0.119	0.149	0.196		
								NON-DUCTED STATIC PRESSURE DROP (in. wg)								
								0.053	0.085	0.127	0.158	0.212	0.267	0.350		
								HOOD INTAKE VELOCITY / THROAT VELOCITY (ft/min.)								
Throat Area	Throat Width x Length	Curb Cap Width x Length	Optional Damper Width x Length	Width	Length	Overall Height	Base Height								Shipped Assembled	Galvanized Unit Weight
				A	B	C	D	235/475	297/600	364/735	406/820	470/950	527/1065	604/1220		
ft^2	Inches							CFM								POUNDS
4.00	24 x 24	30 x 30	24 x 24	52	39	19	5	1899	2405	2939	3279	3798	4262	4880	Yes	82
5.00	24 x 30	30 x 36	24 x 30	49	51	19	5	2374	3006	3674	4098	4747	5328	6100	Yes	91
6.00	24 x 36	30 x 42	24 x 36	47	63	19	5	2848	3607	4409	4918	5697	6393	7320	Yes	104
7.00	24 x 42	30 x 48	24 x 42	54	63	19	5	3323	4208	5144	5738	6646	7459	8539	Yes	114
8.00	24 x 48	30 x 54	24 x 48	52	75	19	5	3798	4809	5879	6557	7596	8524	9759	Yes	125
9.00	24 x 54	30 x 60	24 x 54	50	87	19	5	4272	5411	6614	7377	8545	9590	10979	Yes	154
10.00	24 x 60	30 x 66	24 x 60	55	87	19	5	4747	6012	7349	8196	9494	10655	12199	Yes	163
11.00	24 x 66	30 x 72	24 x 66	54	99	19	5	5222	6613	8083	9016	10444	11721	13419	Yes	174
12.00	24 x 72	30 x 78	24 x 72	58	99	19	5	5697	7214	8818	9836	11393	12786	14639	Yes	185
13.00	24 x 78	30 x 84	24 x 78	56	111	19	5	6171	7815	9553	10655	12343	13852	15859	Yes	220
14.00	24 x 84	30 x 90	24 x 84	60	111	19	5	6646	8417	10288	11475	13292	14917	17079	Yes	230
15.00	24 x 90	30 x 96	24 x 90	58	123	19	5	7121	9018	11023	12295	14242	15983	18299	Yes	244
6.25	30 x 30	36 x 36	30 x 30	60	51	19	5	2967	3757	4593	5123	5934	6659	7625	Yes	108
7.50	30 x 36	36 x 42	30 x 36	58	63	19	5	3560	4509	5511	6147	7121	7991	9149	Yes	119
8.75	30 x 42	36 x 48	30 x 42	57	75	19	5	4154	5260	6430	7172	8308	9323	10674	Yes	131
10.00	30 x 48	36 x 54	30 x 48	64	75	19	5	4747	6012	7349	8196	9494	10655	12199	Yes	143
11.25	30 x 54	36 x 60	30 x 54	62	87	19	5	5341	6763	8267	9221	10681	11987	13724	Yes	174
12.50	30 x 60	36 x 66	30 x 60	60	99	19	5	5934	7515	9186	10246	11868	13319	15249	Yes	186
13.75	30 x 66	36 x 72	30 x 66	66	99	19	5	6527	8266	10104	11270	13055	14651	16774	Yes	200
15.00	30 x 72	36 x 78	30 x 72	64	111	19	5	7121	9018	11023	12295	14242	15983	18299	Yes	225
16.25	30 x 78	36 x 84	30 x 78	69	111	19	5	7714	9769	11941	13319	15428	17314	19824	Yes	251
17.50	30 x 84	36 x 90	30 x 84	67	123	19	5	8308	10521	12860	14344	16615	18646	21349	Yes	264
18.75	30 x 90	36 x 96	30 x 90	72	123	19	5	8901	11272	13779	15368	17802	19978	22874	Yes	278
9.00	36 x 36	42 x 42	36 x 36	69	63	19	5	4272	5411	6614	7377	8545	9590	10979	Yes	134
10.50	36 x 42	42 x 48	36 x 42	67	75	19	5	4985	6312	7716	8606	9969	11188	12809	Yes	147
12.00	36 x 48	42 x 54	36 x 48	66	87	19	5	5697	7214	8818	9836	11393	12786	14639	Yes	176
13.50	36 x 54	42 x 60	36 x 54	73	87	19	5	6409	8116	9921	11065	12817	14384	16469	Yes	196
15.00	36 x 60	42 x 66	36 x 60	72	99	19	5	7121	9018	11023	12295	14242	15983	18299	Yes	208
16.50	36 x 66	42 x 72	36 x 66	78	99	19	5	7833	9920	12125	13524	15666	17581	20129	Yes	224
18.00	36 x 72	42 x 78	36 x 72	76	111	19	5	8545	10821	13227	14754	17090	19179	21959	Yes	252
19.50	36 x 78	42 x 84	36 x 78	74	123	19	5	9257	11723	14330	15983	18514	20777	23789	Yes	280
21.00	36 x 84	42 x 90	36 x 84	80	123	19	5	9969	12625	15432	17213	19938	22376	25618	Yes	295
22.50	36 x 90	42 x 96	36 x 90	78	135	19	5	10681	13527	16534	18442	21362	23974	27448	Yes	311
24.00	36 x 96	42 x 102	36 x 96	83	135	19	5	11393	14428	17637	19672	22787	25572	29278	Yes	324
25.50	36 x 102	42 x 108	36 x 102	81	147	19	5	12105	15330	18739	20901	24211	27170	31108	No	340
12.25	42 x 42	48 x 48	42 x 42	78	75	23	5	5815	7365	9002	10041	11631	13052	14944	Yes	178
14.00	42 x 48	48 x 54	42 x 48	76	87	23	5	6646	8417	10288	11475	13292	14917	17079	Yes	221
15.75	42 x 54	48 x 60	42 x 54	85	87	23	5	7477	9469	11574	12909	14954	16782	19214	Yes	252
17.50	42 x 60	48 x 66	42 x 60	83	99	23	5	8308	10521	12860	14344	16615	18646	21349	Yes	261
19.25	42 x 66	48 x 72	42 x 66	81	111	23	5	9138	11573	14146	15778	18277	20511	23484	Yes	291
21.00	42 x 72	48 x 78	42 x 72	88	111	23	5	9969	12625	15432	17213	19938	22376	25618	Yes	320
22.75	42 x 78	48 x 84	42 x 78	86	123	23	5	10800	13677	16718	18647	21600	24240	27753	Yes	355
24.50	42 x 84	48 x 90	42 x 84	84	135	23	5	11631	14729	18004	20081	23261	26105	29888	Yes	373
26.25	42 x 90	48 x 96	42 x 90	90	135	23	5	12461	15781	19290	21516	24923	27970	32023	Yes	392
28.00	42 x 96	48 x 102	42 x 96	88	147	23	5	13292	16833	20576	22950	26584	29834	34158	No	412
29.75	42 x 102	48 x 108	42 x 102	93	147	23	5	14123	17885	21862	24385	28246	31699	36293	No	429
31.50	42 x 108	48 x 114	42 x 108	91	159	23	5	14954	18937	23148	25819	29907	33563	38428	No	450
16.00	48 x 48	54 x 54	48 x 48	86	87	25	5	7596	9619	11758	13114	15191	17048	19519	Yes	257
18.00	48 x 54	54 x 60	48 x 54	85	99	25	5	8545	10821	13227	14754	17090	19179	21959	Yes	278
20.00	48 x 60	54 x 66	48 x 60	94	99	25	5	9494	12024	14697	16393	18989	21310	24399	Yes	299
22.00	48 x 66	54 x 72	48 x 66	92	111	25	5	10444	13226	16167	18032	20888	23441	26838	Yes	332
24.00	48 x 72	54 x 78	48 x 72	90	123	25	5	11393	14428	17637	19672	22787	25572	29278	Yes	353
26.00	48 x 78	54 x 84	48 x 78	98	123	25	5	12343	15631	19106	21311	24685	27703	31718	No	383
28.00	48 x 84	54 x 90	48 x 84	92	135	25	5	13292	16833	20576	22950	26584	29834	34158	No	412
30.00	48 x 90	54 x 96	48 x 90	98	135	25	5	14242	18036	22046	24589	28483	31965	36598	No	430
32.00	48 x 96	54 x 102	48 x 96	96	147	25	5	15191	19238	23515	26229	30382	34096	39038	No	452
34.00	48 x 102	54 x 108	48 x 102	94	159	25	5	16140	20440	24985	27868	32281	36227	41478	No	475
36.00	48 x 108	54 x 114	48 x 108	100	159	25	5	17090	21643	26455	29507	34180	38358	43917	No	495
38.00	48 x 114	54 x 120	48 x 114	98	171	25	5	18039	22845	27924	31147	36079	40489	46357	No	517

Fabra Hood - Gravity Intake
Model FGI

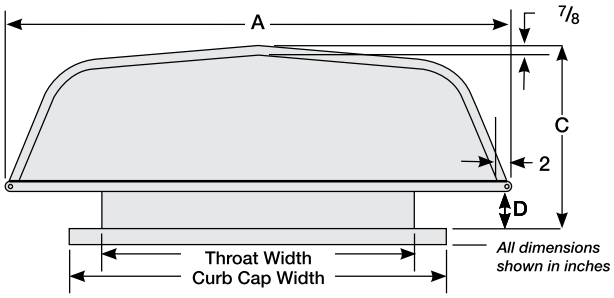
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Building Value in Air.

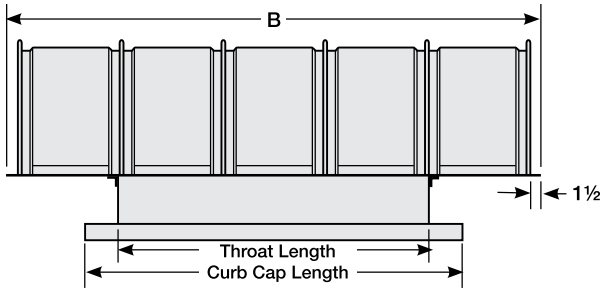


Dimensional Data								Performance Data								
								DUCTED STATIC PRESSURE DROP (in. wg)								
Throat Area	Throat Width x Length	Curb Cap Width x Length	Optional Damper Width x Length	Width	Length	Overall Height	Base Height	0.030	0.047	0.071	0.089	0.119	0.149	0.196	Shipped Assembled	Galvanized Unit Weight
								NON-DUCTED STATIC PRESSURE DROP (in. wg)								
								0.053	0.085	0.127	0.158	0.212	0.267	0.350		
								HOOD INTAKE VELOCITY / THROAT VELOCITY (ft/min.)								
				A	B	C	D	235/475	297/600	364/735	406/820	470/950	527/1065	604/1220		
ft^2	Inches							CFM								POUNDS
20.25	54 x 54	60 x 60	54 x 54	95	99	26	5	9613	12174	14881	16598	19226	21576	24704	No	304
22.50	54 x 60	60 x 66	54 x 60	105	99	26	5	10681	13527	16534	18442	21362	23974	27448	No	341
24.75	54 x 66	60 x 72	54 x 66	103	111	26	5	11749	14879	18188	20286	23499	26371	30193	No	370
27.00	54 x 72	60 x 78	54 x 72	101	123	26	5	12817	16232	19841	22131	25635	28769	32938	No	394
29.25	54 x 78	60 x 84	54 x 78	109	123	26	5	13886	17585	21495	23975	27771	31166	35683	No	433
31.50	54 x 84	60 x 90	54 x 84	107	135	26	5	14954	18937	23148	25819	29907	33563	38428	No	457
33.75	54 x 90	60 x 96	54 x 90	105	147	26	5	16022	20290	24801	27663	32044	35961	41173	No	481
36.00	54 x 96	60 x 102	54 x 96	112	147	26	5	17090	21643	26455	29507	34180	38358	43917	No	502
38.25	54 x 102	60 x 108	54 x 102	110	159	26	5	18158	22995	28108	31352	36316	40756	46662	No	528
40.50	54 x 108	60 x 114	54 x 108	108	171	26	5	19226	24348	29762	33196	38452	43153	49407	No	550
42.75	54 x 114	60 x 120	54 x 114	114	171	26	5	20294	25701	31415	35040	40589	45550	52152	No	572
25.00	60 x 60	66 x 66	60 x 60	104	111	29.5	5	11868	15030	18371	20491	23736	26638	30498	No	379
27.50	60 x 66	66 x 72	60 x 66	114	111	29.5	5	13055	16533	20209	22540	26110	29301	33548	No	404
30.00	60 x 72	66 x 78	60 x 72	112	123	29.5	5	14242	18036	22046	24589	28483	31965	36598	No	429
32.50	60 x 78	66 x 84	60 x 78	110	135	29.5	5	15428	19539	23883	26639	30857	34629	39648	No	473
35.00	60 x 84	66 x 90	60 x 84	119	135	29.5	5	16615	21042	25720	28688	33230	37293	42697	No	500
37.50	60 x 90	66 x 96	60 x 90	117	147	29.5	5	17802	22544	27557	30737	35604	39956	45747	No	525
40.00	60 x 96	66 x 102	60 x 96	115	159	29.5	5	18989	24047	29394	32786	37978	42620	48797	No	552
42.50	60 x 102	66 x 108	60 x 102	122	159	29.5	5	20176	25550	31231	34835	40351	45284	51847	No	576
45.00	60 x 108	66 x 114	60 x 108	120	171	29.5	5	21362	27053	33068	36884	42725	47948	54897	No	601
47.50	60 x 114	66 x 120	60 x 114	126	171	29.5	5	22549	28556	34906	38933	45098	50611	57947	No	733
50.00	60 x 120	66 x 126	60 x 120	124	183	29.5	5	23736	30059	36743	40982	47472	53275	60996	No	761
30.25	66 x 66	72 x 72	66 x 66	113	123	29.5	5	14360	18186	22229	24794	28721	32232	36903	No	431
33.00	66 x 72	72 x 78	66 x 72	123	123	29.5	5	15666	19839	24250	27048	31332	35162	40258	No	504
35.75	66 x 78	72 x 84	66 x 78	121	135	29.5	5	16971	21492	26271	29302	33942	38092	43612	No	555
38.50	66 x 84	72 x 90	66 x 84	120	147	29.5	5	18277	23146	28292	31557	36553	41022	46967	No	632
41.25	66 x 90	72 x 96	66 x 90	128	147	29.5	5	19582	24799	30313	33811	39164	43952	50322	No	643
44.00	66 x 96	72 x 102	66 x 96	126	159	29.5	5	20888	26452	32334	36065	41775	46882	53677	No	663
46.75	66 x 102	72 x 108	66 x 102	133	159	29.5	5	22193	28105	34354	38319	44386	49812	57032	No	726
49.50	66 x 108	72 x 114	66 x 108	131	171	29.5	5	23499	29759	36375	40573	46997	52742	60386	No	753
52.25	66 x 114	72 x 120	66 x 114	129	183	29.5	5	24804	31412	38396	42827	49608	55673	63741	No	784
55.00	66 x 120	72 x 126	66 x 120	136	183	29.5	5	26110	33065	40417	45081	52219	58603	67096	No	823
57.75	66 x 126	72 x 132	66 x 126	134	195	36.5	12	27415	34719	42438	47335	54830	61533	70451	No	900
60.50	66 x 132	72 x 138	66 x 132	132	207	36.5	12	28721	36372	44459	49589	57441	64463	73806	No	916
36.00	72 x 72	78 x 78	72 x 72	134	123	29.5	5	17090	21643	26455	29507	34180	38358	43917	No	587
39.00	72 x 78	78 x 84	72 x 78	132	135	29.5	5	18514	23446	28659	31966	37028	41555	47577	No	641
42.00	72 x 84	78 x 90	72 x 84	130	147	29.5	5	19938	25250	30864	34425	39876	44751	51237	No	670
45.00	72 x 90	78 x 96	72 x 90	136	159	29.5	5	21362	27053	33068	36884	42725	47948	54897	No	733
48.00	72 x 96	78 x 102	72 x 96	136	171	29.5	5	22787	28857	35273	39343	45573	51144	58556	No	771
51.00	72 x 102	78 x 108	72 x 102	135	171	29.5	5	24211	30661	37478	41802	48421	54341	62216	No	791
54.00	72 x 108	78 x 114	72 x 108	136	183	29.5	5	25635	32464	39682	44261	51270	57537	65876	No	811
57.00	72 x 114	78 x 120	72 x 114	136	195	29.5	5	27059	34268	41887	46720	54118	60734	69536	No	848
60.00	72 x 120	78 x 126	72 x 120	136	207	29.5	5	28483	36071	44091	49179	56966	63930	73196	No	886
63.00	72 x 126	78 x 132	72 x 126	136	207	36.5	12	29907	37875	46296	51638	59815	67127	76855	No	934
66.00	72 x 132	78 x 138	72 x 132	136	219	36.5	12	31332	39678	48500	54097	62663	70323	80515	No	973
69.00	72 x 138	78 x 144	72 x 138	136	219	36.5	12	32756	41482	50705	56556	65511	73520	84175	No	976
72.00	72 x 144	78 x 150	72 x 144	136	231	36.5	12	34180	43285	52910	59015	68360	76716	87835	No	1015
75.00	72 x 150	78 x 156	72 x 150	136	231	36.5	12	35604	45089	55114	61474	71208	79913	91495	No	1116
78.00	72 x 156	78 x 162	72 x 156	136	243	36.5	12	37028	46893	57319	63933	74056	83109	95154	No	1228
81.00	72 x 162	78 x 168	72 x 162	136	243	36.5	12	38452	48696	59523	66392	76905	86306	98814	No	1351
84.00	72 x 168	78 x 174	72 x 168	136	255	36.5	12	39876	50500	61728	68851	79753	89502	102474	No	1486
87.00	72 x 174	78 x 180	72 x 174	136	255	36.5	12	41301	52303	63932	71310	82601	92699	106134	No	1634
90.00	72 x 180	78 x 186	72 x 180	136	267	36.5	12	42725	54107	66137	73768	85450	95895	109793	No	1798

Fabra Hood - Gravity Relief
Model FGR

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Building Value in Air.

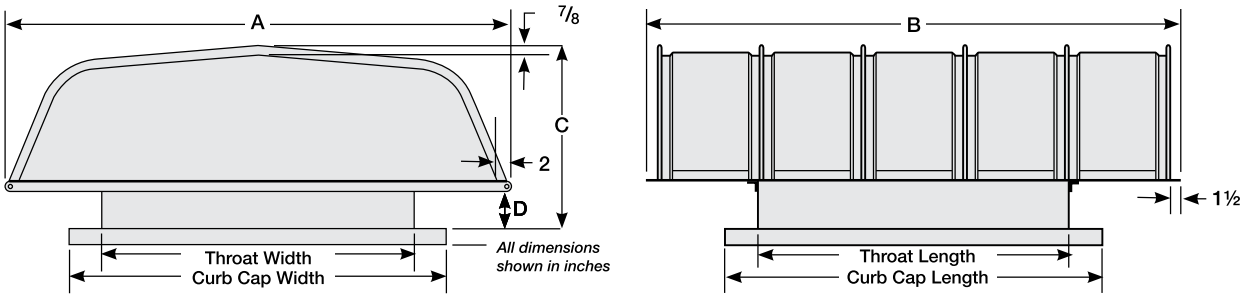




Dimensional Data								Performance Data								
								DUCTED STATIC PRESSURE DROP (in. wg)								
								0.024	0.043	0.060	0.084	0.107	0.136	0.160		
								NON-DUCTED STATIC PRESSURE DROP (in. wg)								
								0.042	0.075	0.105	0.146	0.186	0.236	0.278		
								HOOD AND THROAT VELOCITY (ft/min.)								
Throat Area	Throat Width x Length	Curb Cap Width x Length	Optional Damper Width x Length	Width	Length	Overall Height	Base Height								Shipped Assembled	Galvanized Unit Weigh
				A	B	C	D	420	560	660	780	880	990	1075		
ft^2	Inches							CFM								POUNDS
0.44	8 x 8	14 x 14	8 x 8	22	27	14	5	186	248	294	346	391	440	478	Yes	37
0.67	8 x 12	14 x 18	8 x 12	22	27	14	5	279	372	441	520	586	661	717	Yes	37
1.00	8 x 18	14 x 24	8 x 18	22	39	14	5	418	559	661	779	880	991	1075	Yes	46
1.33	8 x 24	14 x 30	8 x 24	22	39	14	5	557	745	881	1039	1173	1321	1434	Yes	48
1.67	8 x 30	14 x 36	8 x 30	22	51	14	5	697	931	1101	1299	1466	1651	1792	Yes	56
1.00	12 x 12	18 x 18	12 x 12	26	27	14	5	418	559	661	779	880	991	1075	Yes	37
1.50	12 x 18	18 x 24	12 x 18	26	39	14	5	627	838	991	1169	1319	1486	1613	Yes	46
2.00	12 x 24	18 x 30	12 x 24	26	39	14	5	836	1117	1322	1559	1759	1982	2151	Yes	48
2.50	12 x 30	18 x 36	12 x 30	26	51	14	5	1045	1396	1652	1948	2199	2477	2688	Yes	56
3.00	12 x 36	18 x 42	12 x 36	26	51	14	5	1254	1676	1983	2338	2639	2972	3226	Yes	58
3.50	12 x 42	18 x 48	12 x 42	26	63	14	5	1463	1955	2313	2727	3079	3468	3764	Yes	69
4.00	12 x 48	18 x 54	12 x 48	26	63	14	5	1672	2234	2643	3117	3518	3963	4301	Yes	71
1.36	14 x 14	20 x 20	14 x 14	28	27	16	5	569	760	900	1061	1197	1349	1464	Yes	42
1.75	14 x 18	20 x 24	14 x 18	28	39	16	5	731	977	1157	1364	1539	1734	1882	Yes	50
2.33	14 x 24	20 x 30	14 x 24	28	39	16	5	975	1303	1542	1818	2052	2312	2509	Yes	53
2.92	14 x 30	20 x 36	14 x 30	28	51	16	5	1219	1629	1928	2273	2565	2890	3136	Yes	60
3.50	14 x 36	20 x 42	14 x 36	28	51	16	5	1463	1955	2313	2727	3079	3468	3764	Yes	62
4.08	14 x 42	20 x 48	14 x 42	28	63	16	5	1707	2281	2699	3182	3592	4046	4391	Yes	74
4.67	14 x 48	20 x 54	14 x 48	28	63	16	5	1951	2606	3084	3637	4105	4624	5018	Yes	76
5.25	14 x 54	20 x 60	14 x 54	28	75	16	5	2194	2932	3470	4091	4618	5202	5645	Yes	87
1.78	16 x 16	22 x 22	16 x 16	30	39	16	5	743	993	1175	1385	1564	1761	1912	Yes	52
2.22	16 x 20	22 x 26	16 x 20	30	39	16	5	929	1241	1469	1732	1955	2202	2390	Yes	53
2.67	16 x 24	22 x 30	16 x 24	30	39	16	5	1115	1489	1762	2078	2346	2642	2868	Yes	55
3.33	16 x 30	22 x 36	16 x 30	30	51	16	5	1393	1862	2203	2598	2932	3303	3584	Yes	64
4.00	16 x 36	22 x 42	16 x 36	30	51	16	5	1672	2234	2643	3117	3518	3963	4301	Yes	66
4.67	16 x 42	22 x 48	16 x 42	30	63	16	5	1951	2606	3084	3637	4105	4624	5018	Yes	78
5.33	16 x 48	22 x 54	16 x 48	30	63	16	5	2229	2979	3525	4156	4691	5284	5735	Yes	80
6.00	16 x 54	22 x 60	16 x 54	30	75	16	5	2508	3351	3965	4676	5277	5945	6452	Yes	91
6.67	16 x 60	22 x 66	16 x 60	31	75	16	5	2786	3724	4406	5195	5864	6605	7169	Yes	95
7.33	16 x 66	22 x 72	16 x 66	30	87	16	5	3065	4096	4846	5715	6450	7266	7886	Yes	120
2.25	18 x 18	24 x 24	18 x 18	32	39	16	5	940	1257	1487	1753	1979	2229	2419	Yes	55
3.00	18 x 24	24 x 30	18 x 24	32	39	16	5	1254	1676	1983	2338	2639	2972	3226	Yes	57
3.75	18 x 30	24 x 36	18 x 30	32	51	16	5	1567	2094	2478	2922	3298	3715	4032	Yes	67
4.50	18 x 36	24 x 42	18 x 36	32	51	16	5	1881	2513	2974	3507	3958	4458	4839	Yes	69
5.25	18 x 42	24 x 48	18 x 42	32	63	16	5	2194	2932	3470	4091	4618	5202	5645	Yes	81
6.00	18 x 48	24 x 54	18 x 48	33	63	16	5	2508	3351	3965	4676	5277	5945	6452	Yes	84
6.75	18 x 54	24 x 60	18 x 54	32	75	16	5	2821	3770	4461	5260	5937	6688	7258	Yes	95
7.50	18 x 60	24 x 66	18 x 60	34	75	16	5	3135	4189	4956	5845	6597	7431	8065	Yes	99
8.25	18 x 66	24 x 72	18 x 66	32	87	16	5	3448	4608	5452	6429	7256	8174	8871	Yes	124
9.00	18 x 72	24 x 78	18 x 72	35	87	16	5	3762	5027	5948	7013	7916	8917	9678	Yes	129
2.78	20 x 20	26 x 26	20 x 20	34	39	16	5	1161	1551	1836	2165	2443	2752	2987	Yes	58
3.33	20 x 24	26 x 30	20 x 24	34	39	16	5	1393	1862	2203	2598	2932	3303	3584	Yes	60
4.17	20 x 30	26 x 36	20 x 30	34	51	16	5	1742	2327	2754	3247	3665	4128	4480	Yes	69
5.00	20 x 36	26 x 42	20 x 36	34	51	16	5	2090	2793	3304	3896	4398	4954	5377	Yes	71
5.83	20 x 42	26 x 48	20 x 42	34	63	16	5	2438	3258	3855	4546	5131	5779	6273	Yes	84
6.67	20 x 48	26 x 54	20 x 48	36	63	16	5	2786	3724	4406	5195	5864	6605	7169	Yes	89
7.50	20 x 54	26 x 60	20 x 54	34	75	16	5	3135	4189	4956	5845	6597	7431	8065	Yes	98
8.33	20 x 60	26 x 66	20 x 60	37	75	16	5	3483	4654	5507	6494	7330	8256	8961	Yes	104
9.17	20 x 66	26 x 72	20 x 66	35	87	16	5	3831	5120	6058	7143	8063	9082	9857	Yes	128
10.00	20 x 72	26 x 78	20 x 72	38	87	16	5	4180	5585	6609	7793	8796	9908	10753	Yes	135
10.83	20 x 78	26 x 84	20 x 78	37	99	16	5	4528	6051	7159	8442	9529	10733	11649	Yes	153
11.67	20 x 84	26 x 90	20 x 84	39	99	16	5	4876	6516	7710	9092	10262	11559	12545	Yes	158

Fabra Hood - Gravity Relief
Model FGR

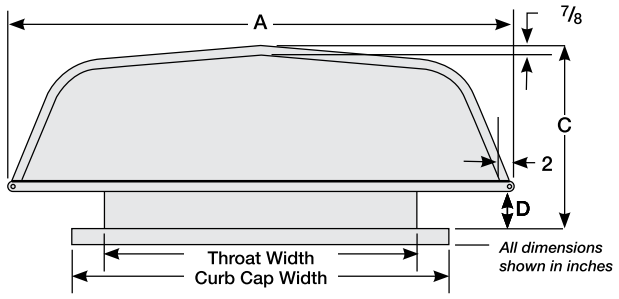
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Building Value in Air.

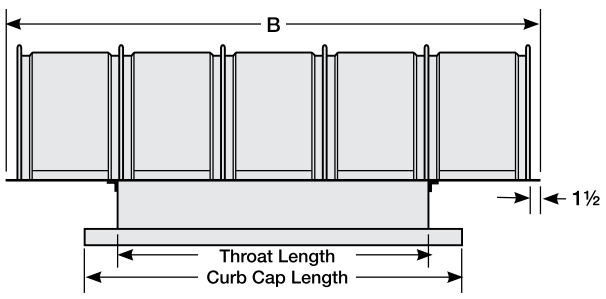


Dimensional Data								Performance Data								
								DUCTED STATIC PRESSURE DROP (in. wg)								
								0.024	0.043	0.060	0.084	0.107	0.136	0.160		
								NON-DUCTED STATIC PRESSURE DROP (in. wg)								
								0.042	0.075	0.105	0.146	0.186	0.236	0.278		
								HOOD AND THROAT VELOCITY (ft/min.)								
Throat Area	Throat Width x Length	Curb Cap Width x Length	Optional Damper Width x Length	Width	Length	Overall Height	Base Height								Shipped Assembled	Galvanized Unit Weight
				A	B	C	D	420	560	660	780	880	990	1075		
ft^2	Inches							CFM								POUNDS
4.00	24 x 24	30 x 30	24 x 24	38	39	19	5	1672	2234	2643	3117	3518	3963	4301	Yes	69
5.00	24 x 30	30 x 36	24 x 30	38	51	19	5	2090	2793	3304	3896	4398	4954	5377	Yes	79
6.00	24 x 36	30 x 42	24 x 36	40	51	19	5	2508	3351	3965	4676	5277	5945	6452	Yes	84
7.00	24 x 42	30 x 48	24 x 42	38	63	19	5	2926	3910	4626	5455	6157	6935	7527	Yes	95
8.00	24 x 48	30 x 54	24 x 48	42	63	19	5	3344	4468	5287	6234	7037	7926	8603	Yes	102
9.00	24 x 54	30 x 60	24 x 54	40	75	19	5	3762	5027	5948	7013	7916	8917	9678	Yes	113
10.00	24 x 60	30 x 66	24 x 60	44	75	19	5	4180	5585	6609	7793	8796	9908	10753	Yes	120
11.00	24 x 66	30 x 72	24 x 66	42	87	19	5	4598	6144	7269	8572	9675	10898	11829	Yes	146
12.00	24 x 72	30 x 78	24 x 72	45	87	19	5	5016	6702	7930	9351	10555	11889	12904	Yes	152
13.00	24 x 78	30 x 84	24 x 78	43	99	19	5	5434	7261	8591	10131	11434	12880	13979	Yes	171
14.00	24 x 84	30 x 90	24 x 84	46	99	19	5	5852	7819	9252	10910	12314	13871	15054	Yes	178
15.00	24 x 90	30 x 96	24 x 90	44	111	19	5	6269	8378	9913	11689	13194	14861	16130	Yes	202
6.25	30 x 30	36 x 36	30 x 30	44	51	19	5	2612	3491	4130	4870	5497	6192	6721	Yes	88
7.50	30 x 36	36 x 42	30 x 36	49	51	19	5	3135	4189	4956	5845	6597	7431	8065	Yes	95
8.75	30 x 42	36 x 48	30 x 42	46	63	19	5	3657	4887	5783	6819	7696	8669	9409	Yes	107
10.00	30 x 48	36 x 54	30 x 48	52	63	19	5	4180	5585	6609	7793	8796	9908	10753	Yes	116
11.25	30 x 54	36 x 60	30 x 54	49	75	19	5	4702	6283	7435	8767	9895	11146	12097	Yes	128
12.50	30 x 60	36 x 66	30 x 60	54	75	19	5	5225	6982	8261	9741	10995	12385	13441	Yes	136
13.75	30 x 66	36 x 72	30 x 66	51	87	19	5	5747	7680	9087	10715	12094	13623	14786	Yes	162
15.00	30 x 72	36 x 78	30 x 72	49	99	19	5	6269	8378	9913	11689	13194	14861	16130	Yes	172
16.25	30 x 78	36 x 84	30 x 78	53	99	19	5	6792	9076	10739	12663	14293	16100	17474	Yes	191
17.50	30 x 84	36 x 90	30 x 84	51	111	19	5	7314	9774	11565	13637	15393	17338	18818	Yes	216
18.75	30 x 90	36 x 96	30 x 90	54	111	19	5	7837	10472	12391	14611	16492	18577	20162	Yes	223
9.00	36 x 36	42 x 42	36 x 36	58	51	19	5	3762	5027	5948	7013	7916	8917	9678	Yes	110
10.50	36 x 42	42 x 48	36 x 42	54	63	19	5	4389	5865	6939	8182	9236	10403	11291	Yes	119
12.00	36 x 48	42 x 54	36 x 48	62	63	19	5	5016	6702	7930	9351	10555	11889	12904	Yes	130
13.50	36 x 54	42 x 60	36 x 54	58	75	19	5	5643	7540	8922	10520	11874	13375	14517	Yes	142
15.00	36 x 60	42 x 66	36 x 60	55	87	19	5	6269	8378	9913	11689	13194	14861	16130	Yes	168
16.50	36 x 66	42 x 72	36 x 66	61	87	19	5	6896	9216	10904	12858	14513	16348	17743	Yes	178
18.00	36 x 72	42 x 78	36 x 72	58	99	19	5	7523	10054	11895	14027	15832	17834	19356	Yes	190
19.50	36 x 78	42 x 84	36 x 78	63	96	19	5	8150	10891	12887	15196	17152	19320	20969	Yes	211
21.00	36 x 84	42 x 90	36 x 84	60	111	19	5	8777	11729	13878	16365	18471	20806	22582	Yes	235
22.50	36 x 90	42 x 96	36 x 90	64	111	19	5	9404	12567	14869	17534	19790	22292	24195	Yes	244
24.00	36 x 96	42 x 102	36 x 96	62	123	19	5	10031	13405	15861	18703	21110	23778	25808	Yes	258
25.50	36 x 102	42 x 108	36 x 102	65	123	19	5	10658	14242	16852	19872	22429	25265	27421	Yes	266
12.25	42 x 42	48 x 48	42 x 42	63	63	23	5	5120	6842	8096	9546	10775	12137	13173	Yes	144
14.00	42 x 48	48 x 54	42 x 48	60	75	23	5	5852	7819	9252	10910	12314	13871	15054	Yes	157
15.75	42 x 54	48 x 60	42 x 54	67	75	23	5	6583	8797	10409	12274	13853	15605	16936	Yes	169
17.50	42 x 60	48 x 66	42 x 60	64	87	23	5	7314	9774	11565	13637	15393	17338	18818	Yes	197
19.25	42 x 66	48 x 72	42 x 66	70	87	23	5	8046	10752	12722	15001	16932	19072	20700	Yes	208
21.00	42 x 72	48 x 78	42 x 72	67	99	23	5	8777	11729	13878	16365	18471	20806	22582	Yes	222
22.75	42 x 78	48 x 84	42 x 78	72	99	23	5	9509	12707	15035	17729	20010	22540	24463	Yes	245
24.50	42 x 84	48 x 90	42 x 84	69	111	23	5	10240	13684	16191	19092	21550	24274	26345	Yes	270
26.25	42 x 90	48 x 96	42 x 90	67	123	23	5	10972	14661	17348	20456	23089	26008	28227	Yes	284
28.00	42 x 96	48 x 102	42 x 96	71	123	23	5	11703	15639	18504	21820	24628	27741	30109	Yes	296
29.75	42 x 102	48 x 108	42 x 102	69	135	23	5	12434	16616	19661	23183	26167	29475	31991	Yes	311
31.50	42 x 108	48 x 114	42 x 108	73	135	23	5	13166	17594	20817	24547	27707	31209	33873	Yes	321
16.00	48 x 48	54 x 54	48 x 48	68	75	25	5	6687	8936	10574	12468	14073	15852	17205	Yes	168
18.00	48 x 54	54 x 60	48 x 54	76	75	25	5	7523	10054	11895	14027	15832	17834	19356	Yes	187
20.00	48 x 60	54 x 66	48 x 60	73	87	25	5	8359	11171	13217	15586	17591	19815	21506	Yes	216
22.00	48 x 66	54 x 72	48 x 66	79	87	25	5	9195	12288	14539	17144	19351	21797	23657	Yes	246
24.00	48 x 72	54 x 78	48 x 72	76	99	25	5	10031	13405	15861	18703	21110	23778	25808	Yes	242
26.00	48 x 78	54 x 84	48 x 78	73	111	25	5	10867	14522	17182	20261	22869	25760	27958	Yes	281
28.00	48 x 84	54 x 90	48 x 84	79	111	25	5	11703	15639	18504	21820	24628	27741	30109	Yes	319
30.00	48 x 90	54 x 96	48 x 90	76	123	25	5	12539	16756	19826	23378	26387	29723	32260	Yes	310
32.00	48 x 96	54 x 102	48 x 96	81	123	25	5	13375	17873	21148	24937	28146	31704	34410	Yes	350
34.00	48 x 102	54 x 108	48 x 102	78	135	25	5	14211	18990	22469	26495	29905	33686	36561	Yes	367
36.00	48 x 108	54 x 114	48 x 108	83	135	25	5	15047	20107	23791	28054	31665	35668	38711	Yes	381
38.00	48 x 114	54 x 120	48 x 114	80	147	25	5	15883	21224	25113	29612	33424	37649	40862	No	398

Fabra Hood - Gravity Relief
Model FGR

GREENHECK
Building Value in Air.





Dimensional Data								Performance Data								
								DUCTED STATIC PRESSURE DROP (in. wg)								
Throat Area	Throat Width x Length	Curb Cap Width x Length	Optional Damper Width x Length	Width	Length	Overall Height	Base Height	0.024	0.043	0.060	0.084	0.107	0.136	0.160	Shipped Assembled	Galvanized Unit Weight
								NON-DUCTED STATIC PRESSURE DROP (in. wg)								
								0.042	0.075	0.105	0.146	0.186	0.236	0.278		
								HOOD AND THROAT VELOCITY (ft/min.)								
				A	B	C	D	420	560	660	780	880	990	1075		
ft^2	Inches							CFM								POUNDS
20.25	54 x 54	60 x 60	54 x 54	85	75	26	5	8464	11310	13382	15780	17811	20063	21775	Yes	223
22.50	54 x 60	60 x 66	54 x 60	81	87	26	5	9404	12567	14869	17534	19790	22292	24195	Yes	266
24.75	54 x 66	60 x 72	54 x 66	78	99	26	5	10345	13824	16356	19287	21769	24521	26614	Yes	285
27.00	54 x 72	60 x 78	54 x 72	85	99	26	5	11285	15080	17843	21040	23748	26751	29034	Yes	300
29.25	54 x 78	60 x 84	54 x 78	82	111	26	5	12225	16337	19330	22794	25727	28980	31453	Yes	345
31.50	54 x 84	60 x 90	54 x 84	88	111	26	5	13166	17594	20817	24547	27707	31209	33873	Yes	363
33.75	54 x 90	60 x 96	54 x 90	85	123	26	5	14106	18850	22304	26301	29686	33438	36292	Yes	380
36.00	54 x 96	60 x 102	54 x 96	90	123	26	5	15047	20107	23791	28054	31665	35668	38711	Yes	396
38.25	54 x 102	60 x 108	54 x 102	87	135	26	5	15987	21364	25278	29807	33644	37897	41131	Yes	416
40.50	54 x 108	60 x 114	54 x 108	85	147	26	5	16928	22620	26765	31561	35623	40126	43550	No	433
42.75	54 x 114	60 x 120	54 x 114	90	147	26	5	17868	23877	28252	33314	37602	42355	45970	No	450
25.00	60 x 60	66 x 66	60 x 60	90	87	29.5	5	10449	13963	16521	19482	21989	24769	26883	Yes	284
27.50	60 x 66	66 x 72	60 x 66	87	99	29.5	5	11494	15360	18174	21430	24188	27246	29571	Yes	304
30.00	60 x 72	66 x 78	60 x 72	94	99	29.5	5	12539	16756	19826	23378	26387	29723	32260	Yes	320
32.50	60 x 78	66 x 84	60 x 78	91	111	29.5	5	13584	18152	21478	25326	28586	32200	34948	Yes	367
35.00	60 x 84	66 x 90	60 x 84	97	111	29.5	5	14629	19548	23130	27275	30785	34677	37636	Yes	387
37.50	60 x 90	66 x 96	60 x 90	94	123	29.5	5	15674	20945	24782	29223	32984	37154	40324	Yes	403
40.00	60 x 96	66 x 102	60 x 96	91	135	29.5	5	16719	22341	26434	31171	35183	39631	43013	Yes	423
42.50	60 x 102	66 x 108	60 x 102	97	135	29.5	5	17763	23737	28087	33119	37382	42108	45701	No	444
45.00	60 x 108	66 x 114	60 x 108	94	147	29.5	5	18808	25134	29739	35067	39581	44584	48389	No	460
47.50	60 x 114	66 x 120	60 x 114	99	147	29.5	5	19853	26530	31391	37016	41780	47061	51078	No	479
50.00	60 x 120	66 x 126	60 x 120	96	159	29.5	5	20898	27926	33043	38964	43979	49538	53766	No	496
30.25	66 x 66	72 x 72	66 x 66	95	99	29.5	5	12643	16895	19991	23573	26607	29971	32528	No	322
33.00	66 x 72	72 x 78	66 x 72	103	99	29.5	5	13793	18431	21808	25716	29026	32695	35486	No	342
35.75	66 x 78	72 x 84	66 x 78	99	111	29.5	5	14942	19967	23626	27859	31445	35420	38443	No	388
38.50	66 x 84	72 x 90	66 x 84	96	123	29.5	5	16092	21503	25443	30002	33864	38144	41400	No	410
41.25	66 x 90	72 x 96	66 x 90	103	123	29.5	5	17241	23039	27260	32145	36282	40869	44357	No	430
44.00	66 x 96	72 x 102	66 x 96	100	135	29.5	5	18390	24575	29078	34288	38701	43594	47314	No	449
46.75	66 x 102	72 x 108	66 x 102	106	135	29.5	5	19540	26111	30895	36431	41120	46318	50271	No	471
49.50	66 x 108	72 x 114	66 x 108	103	147	29.5	5	20689	27647	32713	38574	43539	49043	53228	No	489
52.25	66 x 114	72 x 120	66 x 114	109	147	29.5	5	21839	29183	34530	40717	45958	51767	56185	No	509
55.00	66 x 120	72 x 126	66 x 120	106	159	29.5	5	22988	30719	36347	42860	48376	54492	59143	No	530
57.75	66 x 126	72 x 132	66 x 126	103	171	36.5	12	24137	32255	38165	45003	50795	57217	62100	No	595
60.50	66 x 132	72 x 138	66 x 132	108	171	36.5	12	25287	33791	39982	47146	53214	59941	65057	No	616
36.00	72 x 72	78 x 78	72 x 72	112	99	29.5	5	15047	20107	23791	28054	31665	35668	38711	No	365
39.00	72 x 78	78 x 84	72 x 78	108	111	29.5	5	16301	21783	25774	30392	34303	38640	41937	No	412
42.00	72 x 84	78 x 90	72 x 84	105	123	29.5	5	17555	23458	27756	32730	36942	41612	45163	No	434
45.00	72 x 90	78 x 96	72 x 90	112	123	29.5	5	18808	25134	29739	35067	39581	44584	48389	No	457
48.00	72 x 96	78 x 102	72 x 96	109	135	29.5	5	20062	26809	31721	37405	42219	47557	51615	No	479
51.00	72 x 102	78 x 108	72 x 102	115	135	29.5	5	21316	28485	33704	39743	44858	50529	54841	No	497
54.00	72 x 108	78 x 114	72 x 108	112	147	29.5	5	22570	30161	35686	42081	47497	53501	58067	No	519
57.00	72 x 114	78 x 120	72 x 114	109	159	29.5	5	23824	31836	37669	44419	50136	56474	61293	No	541
60.00	72 x 120	78 x 126	72 x 120	115	159	29.5	5	25078	33512	39652	46757	52774	59446	64519	No	607
63.00	72 x 126	78 x 132	72 x 126	112	171	36.5	12	26332	35187	41634	49094	55413	62418	67745	No	629
66.00	72 x 132	78 x 138	72 x 132	117	171	36.5	12	27586	36863	43617	51432	58052	65390	70971	No	648
69.00	72 x 138	78 x 144	72 x 138	114	183	36.5	12	28840	38538	45599	53770	60690	68363	74197	No	670
72.00	72 x 144	78 x 150	72 x 144	119	183	36.5	12	30093	40214	47582	56108	63329	71335	77423	No	690
75.00	72 x 150	78 x 156	72 x 150	117	195	36.5	12	31347	41890	49564	58446	65968	74307	80649	No	759
78.00	72 x 156	78 x 162	72 x 156	121	195	36.5	12	32601	43565	51547	60784	68607	77280	83875	No	834
81.00	72 x 162	78 x 168	72 x 162	118	207	36.5	12	33855	45241	53530	63121	71245	80252	87101	No	918
84.00	72 x 168	78 x 174	72 x 168	116	219	36.5	12	35109	46916	55512	65459	73884	83224	90327	No	1010
87.00	72 x 174	78 x 180	72 x 174	120	219	36.5	12	36363	48592	57495	67797	76523	86197	93553	No	1111
90.00	72 x 180	78 x 186	72 x 180	118	231	36.5	12	37617	50268	59477	70135	79161	89169	96779	No	1222

Spun Aluminum
Model GRSI/GRSR/GRSF

GREENHECK
Building Value in Air.



Construction Features

When you buy a Greenheck gravity ventilator, you receive a ventilator with the industry's best performance and durability for intake (model GRSI) or relief (model GRSR) for natural gravity or positive pressure systems. Exceptional low silhouette design and construction features make this unit a rugged, efficient, and economical air inlet or outlet.

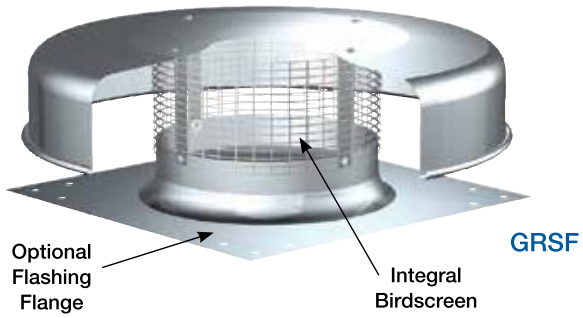
- Broadest performance in the industry, up to 18,400 cfm (31,300 m^3/hr)
- Most advanced weather protection of any ventilator in its class
- Greenheck subjects these products to extensive life testing, ensuring the ventilator will provide years of reliable performance
- All aluminum exterior for corrosion-resistant construction
- Integral birdscreen to prevent the entry of birds and/or small objects
- Built-in curb cap with pre-punched holes for easy attachment to roof curbs
- Optional built-in flashing flange (model GRSF) with pre-punched holes for quick and easy installations without a roof curb.

Use the GRS with the following accessories:

Gravity or motorized dampers to ensure weather tightness.

Prefab curbs to reduce installation time.

Protective coatings to extend the life of the unit or blend its color with other equipment.

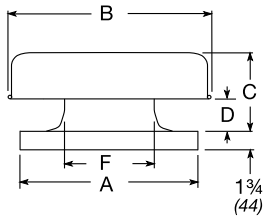


Dimensions

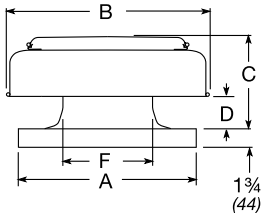
Model Size	A	B	C	D	E	F	Damper Size	Curb Thickness	Shroud Thickness	Unit Weight
8	19 *(483)*	20½ *(521)*	7¼ *(184)*	1½ *(38)*	20¼ *(514)*	8¼ *(210)*	8 x 8 *(203 x 203)*	0.051 *(1.3)*	0.051 *(1.3)*	7 *(3)*
10	19 *(483)*	20½ *(521)*	7¾ *(197)*	2 *(51)*	20¼ *(514)*	10¼ *(260)*	10 x 10 *(254 x 254)*	0.051 *(1.3)*	0.051 *(1.3)*	8 *(4)*
12	22 *(559)*	29 *(737)*	10 *(254)*	3½ *(89)*	23¼ *(591)*	12¼ *(311)*	12 x 12 *(305 x 305)*	0.064 *(1.6)*	0.064 *(1.6)*	10 *(5)*
15	22 *(559)*	29 *(737)*	10 *(254)*	3½ *(89)*	23¼ *(591)*	14¼ *(362)*	16 x 16 *(406 x 406)*	0.064 *(1.6)*	0.064 *(1.6)*	13 *(6)*
16	26 *(660)*	29 *(737)*	11 *(279)*	4¼ *(108)*	27¼ *(692)*	16¼ *(413)*	16 x 16 *(406 x 406)*	0.064 *(1.6)*	0.064 *(1.6)*	16 *(7)*
18	30 *(762)*	35½ *(902)*	9¾ *(248)*	1¾ *(44)*	31¼ *(794)*	20¼ *(514)*	18 x 18 *(457 x 457)*	0.064 *(1.6)*	0.064 *(1.6)*	19 *(9)*
20	30 *(762)*	35½ *(902)*	11¼ *(286)*	3¾ *(95)*	31¼ *(794)*	20¼ *(514)*	18 x 18 *(457 x 457)*	0.064 *(1.6)*	0.064 *(1.6)*	24 *(11)*
24	34 *(864)*	38¼ *(972)*	11 *(279)*	4 *(102)*	35¼ *(895)*	24½ *(622)*	24 x 24 *(610 x 610)*	0.064 *(1.6)*	0.064 *(1.6)*	29 *(13)*
30	40 *(1016)*	48 *(1219)*	18¾ *(476)*	5 7/16 *(138)*	-	30½ *(775)*	30 x 30 *(762 x 762)*	0.064 *(1.6)*	0.064 *(1.6)*	35 *(16)*
36	46 *(1168)*	56¾ *(1441)*	21¼ *(540)*	10 *(254)*	-	36½ *(927)*	36 x 36 *(914 x 914)*	0.064 *(1.6)*	0.080 *(2.0)*	45 *(20)*
42	52 *(1321)*	63¼ *(1607)*	24¼ *(616)*	11¼ *(286)*	-	42½ *(1089)*	42 x 42 *(1067 x 1067)*	0.064 *(1.6)*	0.080 *(2.0)*	60 *(27)*
48	58 *(1473)*	72 *(1829)*	26¼ *(667)*	11¼ *(286)*	-	48½ *(1232)*	48 x 48 *(1219 x 1219)*	0.064 *(1.6)*	0.080 *(2.0)*	80 *(36)*

All dimensions are in inches *(millimeters)* and the weight in pounds (kilograms). NOTE: Sizes GRS-8 through 24 have a one-piece cover and shroud. Access is gained through the removal of screws. Sizes GRS-30 through 48 have a removable cover, separate from the shroud, to facilitate maintenance and servicing of dampers.

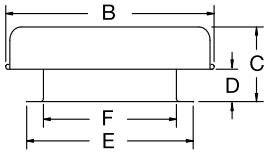
GRSI/GRSR Sizes 8 - 24



GRSI/GRSR - Sizes 30 - 48



GRSF - Sizes 8 - 24 with Optional Flashing Flange



Performance

Performance data for these units was obtained through actual testing. The information is presented in capacity versus total pressure drop through the GRS. Total pressure drop includes the static and velocity pressure drops. To find the static drop alone, use the following equations.

$$\text{Throat Velocity} = \left[\frac{\text{CFM}}{\text{Throat Area}}\right]$$

$$\text{Static Pressure} = \left[\text{Total Pressure}\right] - \left[\text{Velocity Pressure}\right]$$

$$\text{Velocity Pressure (in. wg)*} = \left[\frac{\text{Throat Velocity}}{4008.6}\right]^2$$

*1 inch wg = *249 Pa*

The data is presented for both discharge and intake units. The intake velocity of the intake unit should not exceed 600 feet per minute. Above this velocity, airborne particles may be carried into the building. The table below displays the maximum recommended values for the respective intake units. In areas where snow depths may be a problem, 12 inch *(305 mm)* or higher curbs are recommended.

			Volume (CFM)									Recommended Maximum Intake Capacities	
		GRSI Size	Throat Area (ft^2)	Total Pressure Drop (in. wg)								Intake Area (ft^2)	Max. CFM Intake
				0.04	0.06	0.08	0.10	0.15	0.20	0.25	0.30	0.35	
Model GRSI	Intake Performance	8	0.37	178	218	252	282	345	398	445	488	527	1.30	780
		10	0.57	279	342	395	442	541	624	698	765	826	1.72	1032
		12	0.82	400	490	566	633	775	895	1001	1097	1184	2.52	1512
		15	1.12	553	677	782	874	1071	1237	1383	1515	1636	2.57	1542
		16	1.45	742	908	1049	1173	1436	1658	1854	2031	2194	3.02	1812
		18	1.83	901	1104	1274	1425	1745	2015	2253	2468	2665	3.42	2052
		20	2.25	1096	1343	1550	1733	2123	2452	2741	3002	3243	4.43	2658
		24	3.24	1542	1888	2180	2438	2985	3447	3854	4222	4560	4.95	2970
		30	5.03	2013	2465	2847	3183	3898	4501	5032	5512	5954	7.49	4496
		36	7.29	2921	3577	4130	4618	5656	6531	7301	7998	8639	10.2	6111
		42	9.77	3911	4791	5532	6185	7574	8746	9779	10712	11570	12.0	7159
		48	12.8	5139	6294	7268	8126	9952	11491	12848	14074	15201	15.5	9286
		GRSR Size	Throat Area (ft^2)	Total Pressure Drop (in. wg)										
				0.04	0.06	0.08	0.10	0.15	0.20	0.25	0.30	0.35		
Model GRSR	Relief Performance	8	0.37	231	282	326	365	446	516	576	631	682		
		10	0.57	331	406	468	524	641	741	828	907	980		
		12	0.82	468	573	662	740	907	1047	1171	1282	1385		
		15	1.12	663	811	937	1048	1283	1481	1656	1814	1960		
		16	1.45	870	1065	1230	1375	1685	1945	2175	2382	2573		
		18	1.83	1060	1298	1499	1676	2052	2370	2649	2902	3135		
		20	2.25	1284	1572	1815	2029	2486	2870	3209	3515	3797		
		24	3.24	1879	2301	2657	2971	3638	4201	4697	5145	5558		
		30	5.03	2281	2794	3226	3607	4418	5101	5703	6247	6748		
		36	7.29	3279	4016	4637	5184	6349	7331	8197	8979	9699		
		42	9.77	4672	5722	6607	7387	9047	10447	11680	12795	13820		
		48	12.8	6211	7607	8783	9820	12027	13888	15527	17009	18372		

Table is based on 600 ft/min. maximum intake velocity. Above these values (numbers in gray), provisions should be made to contain incoming moisture.

Louvered Penthouse Models WIH/WRH

GREENHECK
Building Value in Air.



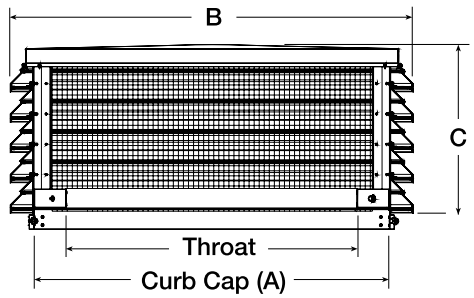
Greenheck designs penthouse units for use in gravity intake or relief applications where aesthetics are important.

- Clean horizontal lines blend perfectly with modern architecture.
- The unique louver design offers a low pressure drop, low hood height, and maintains a maximum weather resistance.
- All-aluminum construction assures lasting durability and appearance.
- The removable cover is equipped with insulation to prevent condensation.

The flexible design of WIH (intake) and WRH (relief) models allow for shipment in pre-assembled sections. These sections are easy to assemble on the jobsite without special tools. All required fasteners and complete assembly instructions are shipped with each unit.

Options include a variety of bird and insect screens, dampers, roof curbs, special finishes and factory assembled based on shipping limitations.

DIMENSIONAL DRAWING FOR CHARTS



Use these tables for specific product dimensions

Dimensional & Performance Data

Dimensions (inches)						Intake (WIH) Volume (CFM)						Relief (WRH) Volume (CFM)						
						Total Pressure Drop (in. wg*)						Total Pressure Drop (in. wg*)						
						.008	.029	.045	.065	.088	.115	.025	.055	.075	.098	.125	.154	.221
						THROAT VELOCITY (ft/min.)						THROAT VELOCITY (ft/min.)						
Throat	Area (ft^2)	A	B	C	Number of Louvers	200	400	500	600	700	800	400	600	700	800	900	1000	1200
12 x 12	1.00	20 x 20	26 x 26	12¼	3	200	400	500	600	700	800	400	600	700	800	900	1000	1200
12 x 14	1.20	20 x 22	26 x 28	12¼	3	240	480	600	720	840	960	480	720	840	960	1080	1200	1440
12 x 16	1.30	20 x 24	26 x 30	12¼	3	260	520	650	780	910	1040	520	780	910	1040	1170	1300	1560
12 x 18	1.50	20 x 26	26 x 32	12¼	3	300	600	750	900	1050	1200	600	900	1050	1200	1350	1500	1800
12 x 22	1.80	20 x 30	26 x 36	12¼	3	360	720	900	1080	1260	1440	720	1080	1260	1440	1620	1800	2160
12 x 24	2.00	20 x 32	26 x 38	12¼	3	400	800	1000	1200	1400	1600	800	1200	1400	1600	1800	2000	2400
14 x 14	1.36	22 x 22	28 x 28	12¼	3	272	544	680	816	952	1088	544	816	952	1088	1224	1360	1632
14 x 16	1.55	22 x 24	28 x 30	12¼	3	310	620	775	930	1085	1240	620	930	1085	1240	1395	1550	1860
14 x 18	1.75	22 x 26	28 x 32	12¼	3	350	700	875	1050	1225	1400	700	1050	1225	1400	1575	1750	2100
14 x 20	1.95	22 x 28	28 x 34	12¼	3	390	780	975	1170	1365	1560	780	1170	1365	1560	1755	1950	2340
14 x 24	2.34	22 x 32	28 x 38	12¼	3	468	936	1170	1404	1638	1872	936	1404	1638	1872	2106	2340	2808
14 x 28	2.70	22 x 36	28 x 42	12¼	3	540	1080	1350	1620	1890	2160	1080	1620	1890	2160	2430	2700	3240
16 x 16	1.78	24 x 24	30 x 30	12¼	3	356	712	890	1068	1246	1424	712	1068	1246	1424	1602	1780	2136
16 x 20	2.22	24 x 28	30 x 34	12¼	3	444	888	1110	1332	1554	1776	888	1332	1554	1776	1998	2220	2664
16 x 24	2.68	24 x 30	30 x 36	12¼	3	536	1072	1340	1608	1876	2144	1072	1608	1876	2144	2412	2680	3216
16 x 28	3.11	24 x 36	30 x 42	12¼	3	622	1244	1555	1866	2177	2488	1244	1866	2177	2488	2799	3110	3732
16 x 30	3.33	24 x 38	30 x 44	12¼	3	666	1332	1665	1998	2331	2664	1328	1992	2324	2656	2988	3320	3984
16 x 32	3.55	24 x 40	30 x 46	12¼	3	710	1420	1775	2130	2485	2840	1420	2130	2485	2840	3195	3550	4260
18 x 18	2.25	26 x 26	32 x 32	12¼	3	450	900	1125	1350	1575	1800	900	1350	1575	1800	2025	2250	2700
18 x 24	3.00	26 x 32	32 x 38	12¼	3	600	1200	1500	1800	2100	2400	1200	1800	2100	2400	2700	3000	3600
18 x 26	3.25	26 x 34	32 x 40	12¼	3	650	1300	1625	1950	2275	2600	1300	1950	2275	2600	2925	3250	3900
18 x 30	3.74	26 x 38	32 x 44	12¼	4	748	1496	1870	2244	2618	2992	1496	2004	2618	2992	3366	3740	4488
18 x 32	4.00	26 x 40	32 x 46	12¼	4	800	1600	2000	2400	2800	3200	1600	2400	2800	3200	3600	4000	4800
18 x 36	4.50	26 x 44	32 x 50	16	4	900	1800	2250	2700	2150	3600	1800	2700	3150	3600	4050	4500	5400
22 x 22	3.37	30 x 30	36 x 36	16	4	674	1348	1685	2022	3359	2696	1348	2022	2359	2696	3033	3370	4044
22 x 26	3.97	30 x 34	36 x 40	16	4	794	1588	1985	2382	2779	3176	1588	2832	2779	3176	3573	3970	4764
22 x 30	4.60	30 x 38	36 x 44	16	4	920	1840	2300	2760	3220	3680	1840	2760	3220	3680	4140	4600	5520
22 x 36	5.50	30 x 44	36 x 50	16	5	1100	2200	2750	3300	3850	4400	2200	3300	3850	4400	4950	5500	6600
22 x 40	6.10	30 x 48	36 x 54	16	5	1220	2440	3050	3660	4270	4880	2440	3660	4270	4880	5490	6100	7320
22 x 44	6.73	30 x 52	36 x 58	16	5	1346	2692	3365	4038	4711	5384	2692	4038	4711	5384	6057	6730	8076
24 x 24	4.00	32 x 32	38 x 38	16	4	800	1600	2000	2400	2800	3200	1600	2400	2800	3200	3600	4000	4800
24 x 30	5.00	32 x 38	38 x 44	16	5	1000	2000	2500	3000	3500	4000	2000	3000	3500	4000	4500	5000	6000
24 x 36	6.00	32 x 44	38 x 50	16	5	1200	2400	3000	3600	4200	4800	2400	3600	4200	4800	5400	6000	7200
24 x 40	6.67	32 x 48	38 x 54	16	5	1334	2668	3335	4002	4669	5336	2668	4002	4669	5336	6003	6670	8004
24 x 44	7.35	32 x 52	38 x 58	19¾	5	1470	2940	3675	4410	5145	5880	2940	4410	5145	5880	6615	7350	8820
24 x 48	8.00	32 x 56	38 x 62	19¾	5	1600	3200	4000	4800	5600	6400	3200	4800	5600	6400	7200	8000	9600

* Total pressure drop includes velocity pressure losses at outlet of throat, but does not include birdscreen loss. Increase the total pressure drop with a 1.15 multiplier to allow for birdscreen pressure drop.

Louvered Penthouse Models WIH/WRH

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Construction Features

Weather Shield



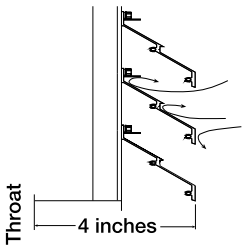
The interior vertical edge of the curb cap forms the throat and weather shield. Each corner is shielded to prevent leakage. The louvers are mounted 4 inches from the roof opening for added weather protection.

Multi-section hood covers

The multi-sect covers allow for easy access inside to perform maintenance of components such as insect screens, birdscreens, and dampers.

Weather-Resistant Louver Blades

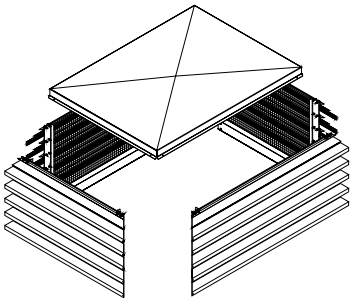
Each unit features weather-resistant aluminum louver blades with mitered corners. The sturdy extruded aluminum louver blade has a material thickness of 0.080 inches.



Assembled Sides and Cover

The unit has four side sections and a reinforced cover. A factory-assembled side consists of the curb cap, vertical supports, and the number of louvers required for the specified height.

The sides are joined at the four corners by stainless steel screws in each louver. These screws are countersunk to maintain the appearance of the mitered corner. The cover is securely fastened to the unit by stainless steel fasteners.



Note: Please consult factory for other sizes

Dimensional & Performance Data						Intake (WIH) Volume (CFM)						Relief (WRH) Volume (CFM)						
Dimensions (inches)						Total Pressure Drop (in. wg*)						Total Pressure Drop (in. wg*)						
						.008	.029	.045	.065	.088	.115	.025	.055	.075	.098	.125	.154	.221
						THROAT VELOCITY (ft/min.)						THROAT VELOCITY (ft/min.)						
Throat	Area (ft^2)	A	B	C	Number of Louvers	200	400	500	600	700	800	400	600	700	800	900	1000	1200
28 x 28	5.44	36 x 36	42 x 42	19¾	5	1088	2176	2720	3264	3808	4352	2176	3264	3808	4352	4896	5440	6528
28 x 36	7.00	36 x 44	42 x 50	19¾	5	1400	2800	3500	4200	4900	5600	2800	4200	4900	5600	6300	7000	8400
28 x 40	7.80	36 x 48	42 x 54	19¾	5	1560	3900	4680	5460	6240	7020	3120	4680	5460	6240	7020	7800	9360
28 x 44	8.55	36 x 52	42 x 58	19¾	5	1710	3420	4275	5130	5985	6840	3420	5130	5985	6840	7695	8550	10260
28 x 50	9.75	36 x 58	42 x 64	19¾	5	1950	3900	4875	5850	6825	7800	3900	5850	6825	7800	8775	9750	11700
28 x 56	10.9	36 x 64	42 x 70	23½	6	2180	4360	5450	6540	7630	8720	4360	6540	7630	8720	9810	10900	13080
32 x 32	7.10	40 x 40	46 x 46	19¾	5	1420	2840	3550	4260	4970	5680	2840	4260	4970	5680	6390	7100	8520
32 x 36	8.00	40 x 44	46 x 50	19¾	5	1600	3200	4000	4800	5600	6400	3200	4800	5600	6400	7200	8000	9600
32 x 40	8.90	40 x 48	46 x 54	19¾	5	1780	3560	4450	5340	6230	7120	3560	5340	6230	7120	8010	8900	10680
32 x 48	10.7	40 x 56	46 x 62	23½	6	2140	4280	5350	6420	7490	8560	4280	6420	7490	8560	9630	10700	12840
32 x 54	12.0	40 x 62	46 x 68	23½	6	2400	4800	6000	7200	8400	9600	4800	7200	8400	9600	10800	12000	14400
32 x 64	14.2	40 x 72	46 x 78	27¼	7	2840	5680	7100	8520	9940	11360	5680	8520	9940	11360	12780	14200	17040
36 x 36	9.00	44 x 44	50 x 50	19¾	5	1800	3600	4500	5400	6300	7200	3600	5400	6300	7200	8100	9000	10800
36 x 40	10.0	44 x 48	50 x 54	23½	6	2000	4000	5000	6000	7000	8000	4000	6000	7000	8000	9000	10000	12000
36 x 48	12.0	44 x 56	50 x 62	23½	6	2400	4800	6000	7200	8400	9600	4800	7200	8400	9600	10800	12000	14400
36 x 54	13.5	44 x 62	50 x 68	23½	6	2700	5400	6750	8100	9950	10800	5400	8100	9450	10800	12150	13500	16200
36 x 60	15.0	44 x 68	50 x 74	27¼	6	3000	6000	7500	9000	10500	12000	6000	9000	10500	12000	13500	15000	18000
36 x 72	18.0	44 x 80	50 x 86	27¼	7	3600	7200	9000	10800	12600	14400	7200	10800	12600	14400	16200	18000	21600
42 x 42	12.3	50 x 50	56 x 56	23½	6	2450	4900	6125	7350	8575	9800	4900	7350	8575	9800	11025	12250	14700
42 x 48	14.0	50 x 56	56 x 62	27¼	7	2800	5600	7000	8400	9800	11200	5600	8400	9800	11200	12600	14000	16800
42 x 54	15.8	50 x 62	56 x 68	27¼	7	3150	6300	7875	9450	11025	12600	6300	9450	11025	12600	14175	15750	18900
42 x 60	17.5	50 x 68	56 x 74	31	8	3500	7000	8750	10500	12250	14000	7000	10500	12250	14000	15750	17500	21000
42 x 72	21.0	50 x 80	56 x 86	31	8	4200	8400	10500	12600	14700	16800	8400	12600	14700	16800	18900	21000	25200
42 x 84	24.5	50 x 92	56 x 98	34¾	9	4900	9800	12250	14700	17150	19600	9800	14700	17150	19600	22050	24500	29400
48 x 48	16.0	56 x 56	62 x 62	27¼	7	3200	6400	8000	9600	11200	12800	6400	9600	11200	12800	14400	16000	19200
48 x 54	18.0	56 x 62	62 x 68	27¼	8	3600	7200	9000	10800	12600	14400	7200	10800	12600	14400	16200	18000	21600
48 x 64	21.4	56 x 72	62 x 78	31	8	4280	8560	10700	12840	14980	17120	8560	12840	14980	17120	19260	21400	25680
48 x 72	24.0	56 x 80	62 x 86	34¾	9	4800	9600	12000	14400	16800	19200	9600	14400	16800	19200	21600	24000	28800
48 x 84	28.0	56 x 92	62 x 98	34¾	10	5600	11200	14000	16800	19600	22400	11200	16800	19600	22400	25200	28000	33600
48 x 96	32.0	56 x 104	62 x 110	38½	10	6400	12800	16000	19200	22400	25600	12800	19200	22400	25600	28800	32000	38400
54 x 54	20.3	62 x 62	68 x 68	31	8	4050	8100	10125	12150	14175	16200	8100	12150	14175	16200	18225	20250	24300
54 x 60	22.0	62 x 68	68 x 74	31	9	4400	8800	11000	13200	15400	17600	8800	13200	15400	17600	19800	22000	26400
54 x 72	27.0	62 x 80	68 x 86	34¾	10	5400	10800	13500	16200	18900	21600	10800	16200	18900	21600	24300	27000	32400
54 x 84	31.5	62 x 92	68 x 98	38½	10	6300	12600	15750	18900	22050	25200	12600	18900	22050	25200	28350	31500	37800
54 x 96	36.0	62 x 104	68 x 110	38½	11	7200	14400	18000	21600	25200	28800	14400	21600	25200	28800	32400	36000	43200
54 x 108	40.5	62 x 116	68 x 122	42½	11	8100	16200	20250	24300	28350	32400	16200	24300	28350	32400	36450	40500	48600
60 x 60	25.0	68 x 68	74 x 74	34¾	9	5000	10000	12500	15000	17500	20000	10000	15000	17500	20000	22500	25000	30000
60 x 72	30.0	68 x 80	74 x 86	38½	10	6000	12000	15000	18000	21000	24000	12000	18000	21000	24000	27000	30000	36000
60 x 84	35.0	68 x 92	74 x 98	42¼	11	7000	14000	17500	21000	24500	28000	14000	21000	24500	28000	31500	35000	42000
60 x 96	40.0	68 x 104	74 x 110	42½	12	8000	16000	20000	24000	28000	32000	16000	24000	28000	32000	36000	40000	48000
60 x 108	45.0	68 x 116	74 x 122	46	13	9000	18000	22500	27000	31500	36000	18000	27000	31500	36000	40500	45000	54000
60 x 120	50.0	68 x 128	74 x 134	46	13	10000	20000	25000	30000	35000	40000	20000	30000	35000	40000	45000	50000	60000

Fabra Hood - FGI/FGR



Gravity roof ventilators shall be constructed of heavy-gauge aluminum or galvanized steel as specified.

Hoods shall be constructed of precision-formed, arched panels with interlocking seams.

Bases shall be constructed so that the curb cap is 6 inches *(152 mm)* larger than the throat size.

Standard base height shall be 5 inches *(127 mm)* for most sizes. Optional 12-inch *(305 mm)* bases shall be furnished as specified for intake applications to restrict the entry of moisture and for all applications where rain and/or snow may accumulate on the roof deck.

Hood support members shall be constructed of galvanized steel and fastened so that the hood can be either removed completely from the base or hinged open.

Birdscreens constructed of 1/2-inch *(13 mm)* galvanized steel mesh shall be mounted horizontally across the intake/discharge area of the hood.

Gravity hoods shall be fabra hood model FGI for intake or model FGR for relief as manufactured by Greenheck Fan Corporation of Schofield, Wisconsin and/or in Rocklin, California, USA.

Spun Aluminum Gravity Roof Ventilator - GRSI/GRSR/GRSF



Exterior construction shall be heavy-gauge aluminum windband with a rolled bead.

Curb cap shall be constructed of heavy-gauge aluminum and includes a one-piece spun venturi.

Curb cap shall be pre-punched for mounting.

Internal components shall be constructed of rigid galvanized steel and include birdscreen.

Gravity ventilator shall be models GRSI, GRSR or GRSF as manufactured by Greenheck Fan Corporation, Schofield, Wisconsin, USA.

Louvered Penthouse - WIH/WRH



Models WIH and WRH shall be low silhouette louvered penthouse units for intake or relief applications.

Construction shall be all aluminum to assure lasting durability and appearance.

Unit shall have a removable aluminum cover for internal access and shall be lined with fiberglass insulation to prevent condensation.

Cover shall be securely fastened to the unit by corrosion-resistant fasteners.

Birdscreen shall be constructed of 1/2-inch *(13 mm)* mesh securely mounted across intake/relief openings.

Units shall feature a weather-resistant 0.080-inch *(2 mm)* aluminum louver with mitered corners.

Louvers shall be mounted 4 inches *(102 mm)* from the throat for maximum weather protection.

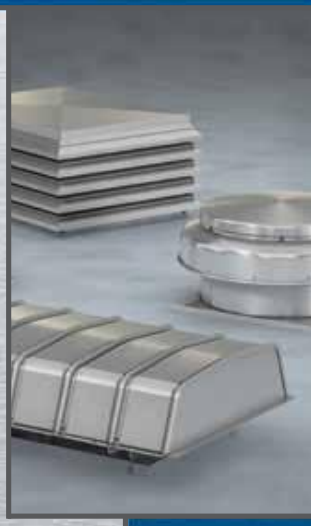
Louver design shall result in low pressure drops, low hood heights and maintain maximum weather resistance.

Louvered penthouses shall be models WIH or WRH shall be manufactured by Greenheck Fan Corporation, in Schofield, Wisconsin and/or in Rocklin, California, USA.

Quick Delivery and Quick Build Program

Gravity models are available for shipment to your job site in less than 24 hours from our strategically located warehouses or available on our Quick Build program.

Model	Size	Best Available Program
GRS	8 through 30	In Stock
GRSF	8, 10, 12	
GRS	36 through 48	1 Day
GRSF	15 through 24	
FGI	10 x 10 through 72 x 180	5 Days
FGR	10 x 10 through 72 x 180	



Computer Aided Product Selection

All Greenheck products are supported by the industry's best product literature, electronic media and two product selection tools – CAPS®, our computer aided product selection software program and eCAPS®, our online selection tool. These programs will guide you from initial design through detailed submittals.



And, of course, you can always count on the personal service and expertise of our national and international representative organization. To locate your nearest Greenheck representative call 715-359-6171 or visit our website at www.greenheck.com

Building Value in Air

Greenheck delivers value to mechanical engineers by helping them solve virtually any air quality challenges their clients face with a comprehensive selection of top quality, innovative air-related equipment. We offer extra value to contractors by providing easy-to-install, competitively priced, reliable products that arrive on time. And building owners and occupants value the energy efficiency, low maintenance and quiet dependable operation they experience long after the construction project ends.

Our Commitment

As a result of our commitment to continuous improvement, Greenheck reserves the right to change specifications without notice.

Product warranties can be found online at Greenheck.com, either on the specific product page or in the literature section of the website at Greenheck.com/Resources/Library/Literature.

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Building Value in Air.

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Printed Date: 02/18/2022
Job: TLHS Kiln
Mark: FF-1
Model: SQ-80-VG

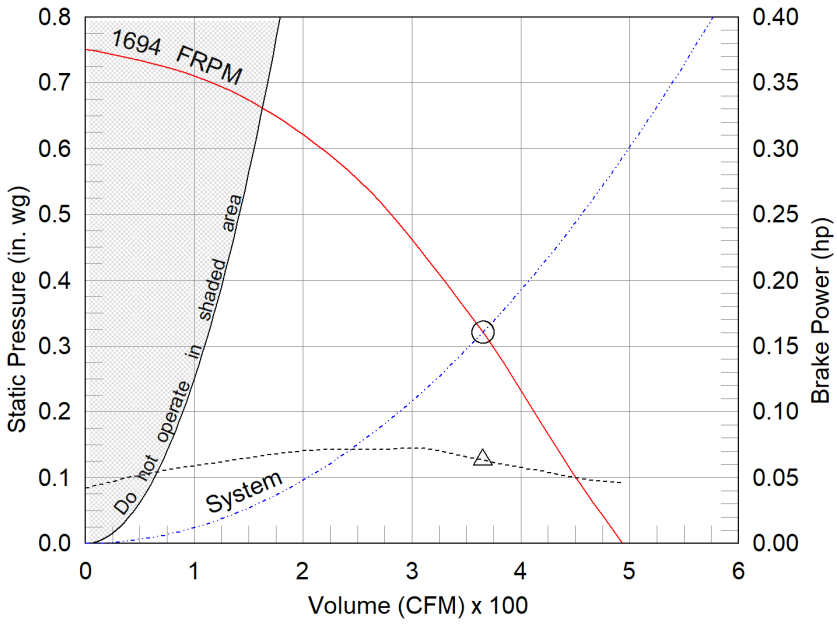
Model: SQ-80-VG

Direct Drive Centrifugal Inline Fan

Dimensional	
Quantity	1
Weight w/o Acc's (lb)	48
Weight w/ Acc's (lb)	81

Performance	
Requested Volume (CFM)	365
Actual Volume (CFM)	365
Total External SP (in. wg)	0.321
Fan RPM	1694
Operating Power (hp)	0.06
Elevation (ft)	56
Airstream Temp.(F)	70
Air Density (lb/ft3)	0.075
Tip Speed (ft/min)	4,823
Static Eff. (%)	29

Motor	
Motor Mounted	Yes
Size (hp)	1/10
Voltage/Cycle/Phase	208/60/1
Enclosure	ODP
Motor RPM	1725
Windings	1



△ Operating Bhp point
○ Operating point at Total External SP
Fan curve
System curve
Brake horsepower curve

Static Pressure Calculations

External SP	0.25	in. wg
Filters	0.071	in. wg
Total External SP	0.321	in. wg

Sound Power by Octave Band

Sound Data	62.5	125	250	500	1000	2000	4000	8000	LwA	dBA	Sones
Inlet	67	74	71	63	62	59	55	48	68	57	8.3
Radiated	68	76	65	57	57	53	49	44	64	53	7.1

Notes:

All dimensions shown are in units of in.
*NEC FLA - based on tables 430.248 or 430.250 of National Electrical Code 2017. Actual motor FLA may vary, for sizing thermal overload, consult factory.
LwA - A weighted sound power level, based on ANSI S1.4
dBA - A weighted sound pressure level, based on 11.5 dB attenuation per Octave band at 5 ft - dBA levels are not licensed by AMCA International
Sones - calculated using AMCA 301 at 5 ft

Model: SQ-80-VG

Direct Drive Centrifugal Inline Fan

Standard Construction Features:

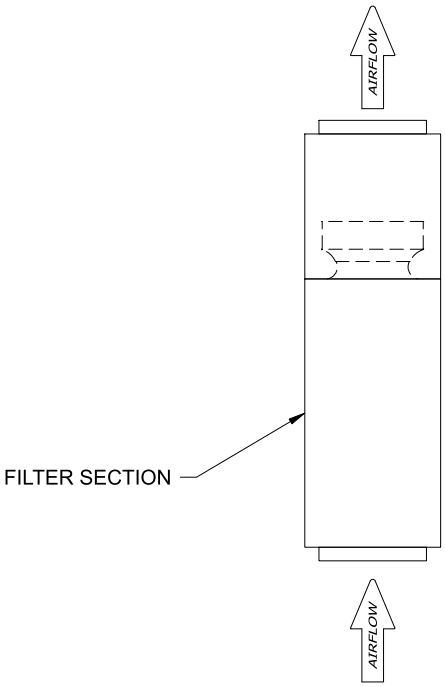
- Galvanized steel housing - Backward inclined composite (sizes 60-95) or aluminum (sizes 97-160) wheel - Two bolted access panels - Integral duct connection flanges - Ball bearing motors (sizes 97-160 and all vari-green motors), sleeve bearing motors (sizes 60-95) - Corrosion resistant fasteners

Selected Options & Accessories:

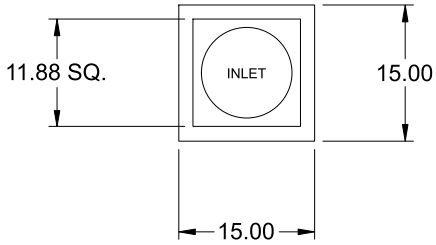
Motor - Vari-Green EC motor
Control - Vari-Green Dial on Exterior of Fan Housing, Mounted and Wired
UL/cUL 705 Listed - "Power Ventilators"
Composite Wheel Material
Motor Cover
Sloped Filter Box, 2 in. Pleated (MERV 13) Filters
Unit Warranty: 1 Yr (Standard)

SQ-80-VG

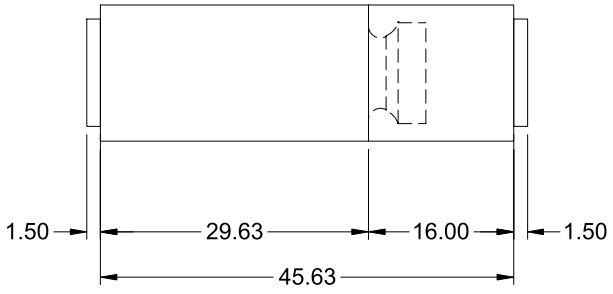
Direct Drive Centrifugal Inline Fan



TOP VIEW



END VIEW



SIDE VIEW

Notes: All dimensions shown are in units of in.

AMCA



AMCA Licensed for Sound and Air Performance Without Appurtenances (Accessories). Power rating (BHP/kW) does not include transmission losses.

Greenheck Fan Corporation certifies that the model shown herein is licensed to bear the AMCA Seal. The ratings shown are based on tests and procedures performed in accordance with AMCA Publication 211 and AMCA Publication 311 and comply with the requirements of the AMCA Certified Ratings Program. Performance certified is for installation type B: Free inlet, Ducted outlet. Power rating (BHP/kW) does not include transmission losses. Performance ratings do not include the effects of appurtenances (accessories). The inlet sound ratings shown are loudness values in fan sones at 5 ft. (1.5 m) in a hemispherical free field calculated per AMCA Standard 301. Values shown are for installation type B: free inlet hemispherical sone levels. dBA levels are not licensed by AMCA International. The AMCA Certified Ratings Seal applies to inlet sone ratings only. Radiated (casing) sound data is the sound generated through the fan housing when the fan is ducted on both the inlet and outlet.

The AMCA licensed air and/or sound performance data has been modified for installation, appurtenances or accessories, etc. not included in the certified data. The modified performance is not AMCA licensed but is provided to aid in selection and applications of the product.

GREENHECK
Building Value in Air.

Printed Date: 02/28/2022
Job: TLHS Kiln
Mark: H-1
Model: GO - 130.00 - S

GO Type 2, Heat and Condensate Hood

Model	Hood Length (in.)	Width (in.)	Height (in.)	Exhaust Volume (CFM)	Exhaust SP (in. w.g.)	Condensate Baffle	Gutter
GO	130	60	24	1620	0.315	No Baffle	No

Selected Options & Accessories:

Option or Accessory	Description
Mounting Height	80 in. off Finished Floor

Material: 430 SS 100% Construction
(Hanger brackets - galvanized steel)

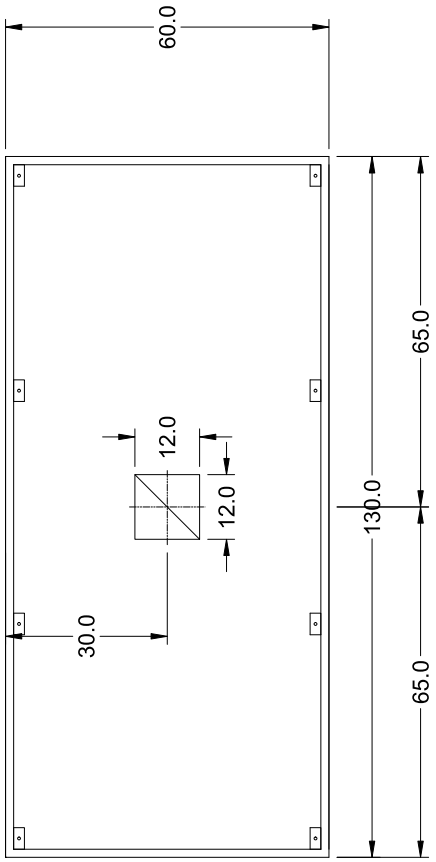
Features:
Stainless Steel Finish for Higher Corrosion Resistance

Section Data:

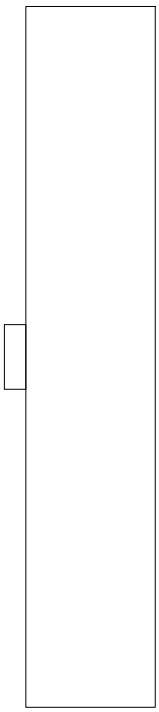
Section Num.	Length (in.)	Weight (LBS)	Volume (CFM)	SP(in. w.g.)	Drain	Light Qty	Light Type	Foot Candles
1	130.00	237.000	1620.0	0.315	None	0		na

Exhaust Collar Data:

Section Num.	Collar Num.	Collar Size (LxW) in. or Diameter (in.)		Pos. Off Left (in.)	Pos. Off Back (in.)	Velocity (fpm)	Mounting Option
1	1	12 x 12		65	30	1620	Factory Mounted Exhaust Collar(s)



MARK: H-1 - SECTION 1
PLAN VIEW





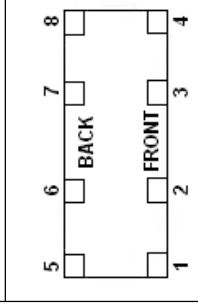
MARK: H-1 - SECTION 1
ELEVATION VIEW

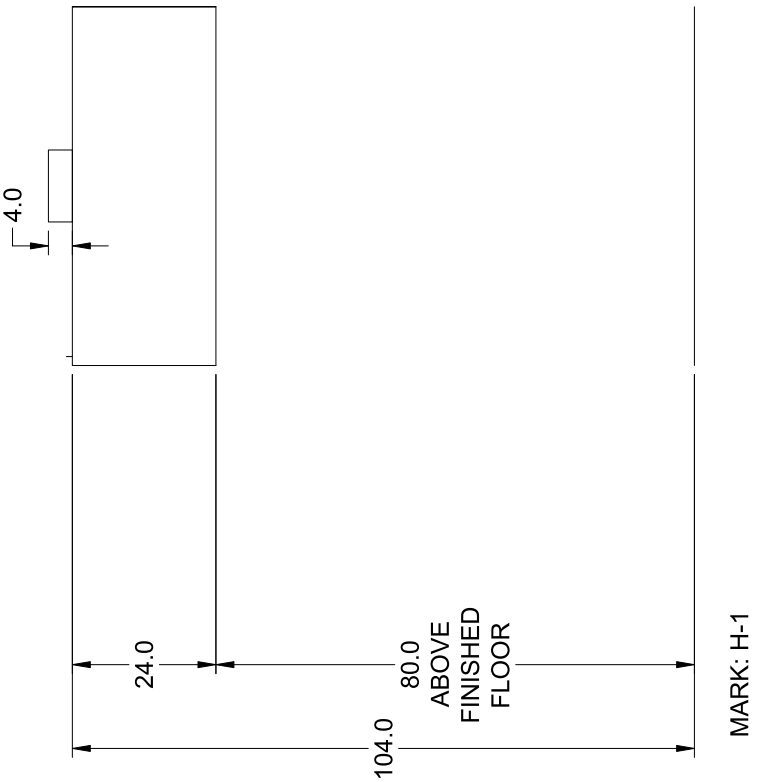
NOTE: All dimensions are in units of in.

Printed Date: 02/28/2022
Job: TLHS Kiln
Mark: H-1
Model: GO - 130.00 - S

Hanger Bracket Locations			
Sec #	Brkt #	Distance Off Left (in)	Distance Off Front (in)
1	1	3.50	2.50
1	2	43.29	2.50
1	3	86.58	2.50
1	4	126.50	2.50
1	5	3.50	57.50
1	6	43.29	57.50
1	7	86.58	57.50
1	8	126.50	57.50

Bracket Mounting Position for an 8 Bracket Hood





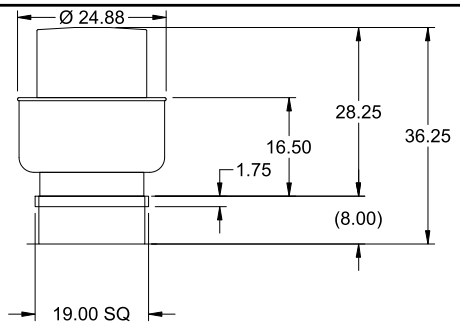
NOTE: All dimensions are in units of in.

Model: CUE-120-VG

Direct Drive Upblast Centrifugal Roof Exhaust Fan

Previously: CUE-121-VG

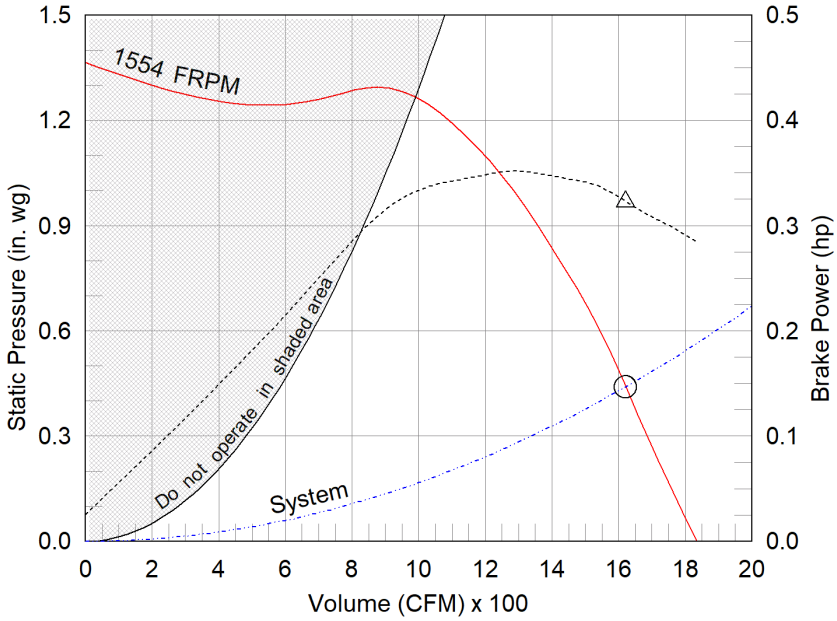
Dimensional	
Quantity	1
Weight w/o Acc's (lb)	51
Weight w/ Acc's (lb)	53
Weight w/ Acc's and Curb (lb)	73
Standard Curb Cap Size (in.)	19 x 19
Roof Opening (in.)	14.5 x 14.5



OVERALL HEIGHT MAY BE GREATER DEPENDING ON MOTOR, ADAPTER, AND/OR HINGE BASE.

Performance	
Requested Volume (CFM)	1,620
Actual Volume (CFM)	1,620
Total External SP (in. wg)	0.44
Fan RPM	1554
Operating Power (hp)	0.32
Elevation (ft)	56
Airstream Temp.(F)	70
Air Density (lb/ft3)	0.075
Tip Speed (ft/min)	5,316
Static Eff. (%)	35

Misc Fan Data	
Fan Eff. Index (FEI)	-
Outlet Velocity (ft/min)	1,266



△ Operating Bhp point
○ Operating point at Total External SP
Fan curve
System curve
Brake horsepower curve

Motor	
Motor Mounted	Yes
Size (hp)	1/2
Voltage/Cycle/Phase	208/60/1
Enclosure	ODP
Motor RPM	1725
Efficiency Rating	High
Windings	1
FLA (Amps)	3.8
Min. Circuit Ampacity (MCA)	5
Max. Overcurrent Protection (MOP)	15
Short Circuit Current Rtg (SCCR)	5 kA

Sound Power by Octave Band

Sound Data	62.5	125	250	500	1000	2000	4000	8000	LwA	dBA	Sones
Inlet	77	79	85	70	65	65	59	52	78	67	14.8

Notes:

All dimensions shown are in units of in.
*NEC FLA, MCA and MOP are for reference only – based on tables 430.248 or 430.25 of National Electric Code 2020. Actual motor FLA may vary, for sizing thermal overload, consult factory. MCA and MOP values shown only account for the motor, not accessories (damper actuator, field supplied VFD, etc).
LwA - A weighted sound power level, based on ANSI S1.4
dBA - A weighted sound pressure level, based on 11.5 dB attenuation per Octave band at 5 ft - dBA levels are not licensed by AMCA International
Sones - calculated using ANSI/AMCA 301 at 5 ft

Model: CUE-120-VG

Direct Drive Upblast Centrifugal Roof Exhaust Fan

Standard Construction Features:

- Aluminum housing - Backward inclined aluminum wheel - Aluminum curb cap with prepunched mounting holes - Drain trough - Ball bearing motors (sizes 85-300 and all Vari Green), sleeve bearing motors (sizes 60-80) - Motor isolated on shock mounts - Corrosion resistant fasteners

Selected Options & Accessories:

Motor - Vari-Green EC motor
Control - Dial for balancing
Standard Curb Cap Size - 19 Square
UL/cUL 762 Listed - "Power Ventilators for Rest. Exh. Appliances"
Switch, NEMA-1, Toggle, Shipped with Unit
Junction Box Mounted & Wired
High Temp Curb Seal Rated for Continuous Duty at 1500 F (Factory Attached)
Unit Warranty: 1 Yr (Standard)

Selected Sub Marks

See individual submittals for full details
GPF-19-G8

AMCA



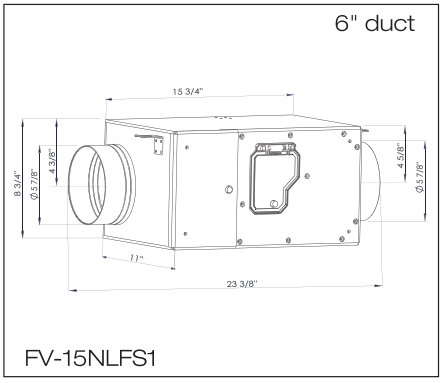
AMCA Licensed for Sound and Air Performance. Power rating (BHP/kW) does not include transmission losses.

Greenheck Fan Corporation certifies that the model shown herein is licensed to bear the AMCA Seal. The ratings shown are based on tests and procedures performed in accordance with AMCA Publication 211 and AMCA Publication 311 and comply with the requirements of the AMCA Certified Ratings Program. Performance certified is for installation type A: Free inlet, Free outlet. Power rating (BHP/kW) does not include transmission losses. Performance ratings do not include the effects of appurtenances (accessories). The sound ratings shown are loudness values in fan sones at 5 ft. (1.5 m) in a hemispherical free field calculated per ANSI/AMCA Standard 301. Values shown are for installation type A: free inlet hemispherical sone levels. dBA levels are not licensed by AMCA International. The AMCA Certified Ratings Seal applies to sone ratings only.

WhisperFresh™ Select

FV-15NLFS1

Specification Submittal Data / Panasonic Fresh Air Supply Fan



Description:
Customizable fresh air supply fan shall be low noise remote mount type rated for continuous run. ENERGY STAR® rated and fan shall be certified by the Home Ventilating Institute (HVI). Evaluated by Underwriters Laboratories and conform to both UL and cUL safety standards.

Motor/Blower:
- Fresh air supply rates shall be manually adjustable for 50-60-70-80-90-100-110-130-150 CFM.
- Four–pole totally enclosed condenser motor rated for continuous run.
- Power rating shall be 120 volts and 60 Hz.
- Motor equipped with thermal–cutoff fuse.
- MERV 13 filter included; MERV 8 and MERV 13 replacements available.
- ECM motor with Smartflow technology.

Housing:
- Galvanized steel wall sleeve with fully insulated exterior.
- Integrated 6” Duct collar.
- Includes gravity damper on supply air side of unit.
- Insulated housing to prevent condensation and noise.

Installation:
- Remote mount, two-way directional installation with 3 included brackets (hanger bars not included).
- Integrated 5.8 foot power cord.

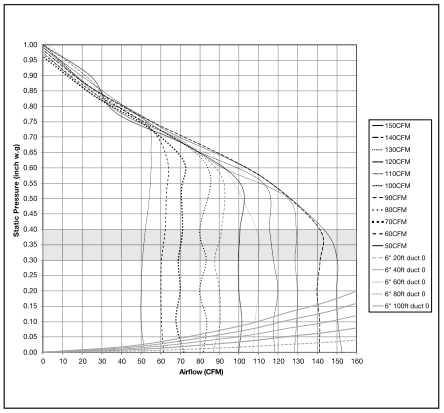
Built-In Controls:
- Adjustable relative humidity level setting from 30% to 80% Relative Humidity (RH).
- Adjustable temperature control from 15°F to 40°F to shut off in-take air from entering the house.
- Built-in Plug ‘n play module port with smart home capability.

Maintenance:
- MERV 13 filter included; MERV 8 and MERV 13 replacements available.
- Unobtrusive alarm notifies owner for filter check and maintenance.

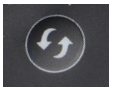
Warranty:
- ECM Motor: 6 Years from original purchase date.
- All Other Parts: 3 Years from original purchase date.

Architectural Specifications:
Inline fan shall be remote mount, ENERGY STAR® certified, with no less than customizable from 50 to 150 CFM as certified by HVI at .2 static pressure in inches water gauge. Power consumption shall be no greater than 27.3 Watts and energy efficiency rating shall be no less than 5.49 CFM/Watt at 0.2 static pressure. The motor shall be totally enclosed, four pole condenser type engineered to run continuously. Power rating shall be 120v/60Hz with ENERGY STAR® Most Efficient designation. MERV 13 is a superior filter and is required in many cases by code or IAQ program recommendations. Housing shall be insulated to reduce condensation. Duct diameter shall be no less than 6". Fan shall be UL and cUL listed for tub/shower enclosure when GFCI protected. Brackets shall be provided for joist, truss or suspension installations. Can be used to comply with ASHRAE 62.2, LEED and CA Title 24.

Performance Curve 6" duct



HVI-Certified performance with MERV 13 filter installed



Reset Button

Convenient light indicator and unobtrusive alarm signal on the access panel help inform the homeowner when it’s time to check and clean the (MERV 8/MERV 13) filter. Button resets every time customer changes filter.



CFM

Can be selected for 50/60/70/80/90/100/110/130/150 CFM (9 settings).



Humidity Setting

Customized fresh air supply based on humidity conditions of incoming air. Fan will automatically shut off (or not turn on) when the outside relative humidity is higher than the setting on the humidity dial (from 30% to 80% RH).



Temperature Setting

Customized low temperature setting will shut fan off when incoming supply air is too cold. Fan will turn off (or not turn on) when the outside temperature is lower than the setting value. (From 15°F to 40°F). Fan automatically stops operating when the incoming air is higher than 95°F.

For complete Installation Instructions visit **us.panasonic.com/ventfans**

Model	Quantity	Comments	Project:
			Location:
			Architect:
			Engineer:
			Contractor:
			Submitted by:
			Date:

*Sone level not certified by Home Ventilation Institute.

Panasonic

Specification Submittal Data / Panasonic Fresh Air Supply Fan

(Continued)



ECM Motor Technology

When supply fan senses static pressure, its speed is automatically increased to ensure that the desired CFM is not compromised, which allows the supply fan to perform as rated.

Specifications: **WhisperFresh Select** FV-15NLFS1		6" Duct										
Ventilation Fan Characteristics (HVI Certified Data)	Static Pressure in inches w.g.	0.2										
	Air Volume (CFM)	150	140	130	120	110	100	90	80	70	60	50
	Power Consumption (watts)	27.3	24.8	22.6	19.4	16.7	15.3	13.5	12.4	10.0	9.3	8.2
	Energy Efficiency (CFM/Watt)	5.49	5.65	5.75	6.19	6.59	6.54	6.67	6.45	7.00	6.45	6.10
	Speed (RPM)	1314	1265	1235	1201	1152	1121	1086	1067	1033	1012	989
	Current (amps)	0.41	0.26	0.33	0.29	0.25	0.23	0.20	0.18	0.16	0.15	0.13
	MAX. Current (amps)	0.46										
	Power Rating (V/Hz)	120/60										
	ENERGY STAR rated	Yes										

HVI-Certified performance with MERV 13 filter installed

Specifications: **WhisperFresh Select** FV-15NLFS1		6" Duct										
Ventilation Fan Characteristics (HVI Certified Data)	Static Pressure in inches w.g.	0.3										
	Air Volume (CFM)	150	140	129	118	110	100	88	80	69	60	50
	Power Consumption (watts)	32.0	29.0	25.0	23.0	20.0	18.0	15.0	14.0	13.0	11.0	10.0
	Energy Efficiency (CFM/Watt)	-	-	-	-	-	-	-	-	-	-	-
	Speed (RPM)	-	-	-	-	-	-	-	-	-	-	-
	Current (amps)	0.46	0.42	0.38	0.34	0.31	0.28	0.25	0.22	0.21	0.18	0.16
	MAX. Current (amps)	0.46										
	Power Rating (V/Hz)	120/60										
	ENERGY STAR rated	Yes										

HVI-Certified performance with MERV 13 filter installed

Specifications: **WhisperFresh Select** FV-15NLFS1		6" Duct										
Ventilation Fan Characteristics (HVI Certified Data)	Static Pressure in inches w.g.	0.4										
	Air Volume (CFM)	130	130	130	116	109	100	90	80	70	60	50
	Power Consumption (watts)	-	-	-	-	-	21.0	19.0	17.0	15.0	14.0	12.0
	Energy Efficiency (CFM/Watt)	-	-	-	-	-	-	-	-	-	-	-
	Speed (RPM)	-	-	-	-	-	-	-	-	-	-	-
	Current (amps)	-	-	-	-	-	0.32	0.29	0.26	0.24	0.22	0.21
	MAX. Current (amps)	0.46										
	Power Rating (V/Hz)	120/60										
	ENERGY STAR rated	Yes										

HVI-Certified performance with MERV 13 filter installed

Panasonic Life Solutions Company of America
IAQ Division
Two Riverfront Plaza
Newark, NJ 07102

us.panasonic.com/ventfans

IAQ20188ST-r5

Panasonic

SECTION 23 0500

GENERAL MECHANICAL

PART 1 GENERAL

1.01 SUMMARY

A. Drawings and general provisions of the Contract, including General and Special Conditions and all Division 01 Specification Sections, apply to this Section.

B. This Section includes the following:
1. General requirements specifically applicable to all Division 23 Sections
2. Some piping material and installation instructions common to most piping systems
3. Mechanical demolition (when indicated on the Drawings)
4. Concrete bases
5. Supports and anchorages
6. Pipe and equipment identification
7. Basic electrical requirements
8. Electric motors

C. This Section applies to all work of Division 23.

1.02 QUALITY ASSURANCE

A. Regulatory compliance: All work performed under Division 23 shall comply with the latest currently adopted editions of all codes, ordinances, and regulations, and all requirements of the Authorities Having Jurisdiction. Comply with provisions of the following, except as otherwise shown or specified.
1. California Building Code (CBC)
2. California Code of Regulations Titles 8, 17, 19, 20, 21 & 22
3. California Electric Code (CEC)
4. California Energy Code
5. California Energy Conservation Code (Title 24)
6. California Fire Code (CFC)
7. California Green Building Standards Code
8. California Mechanical Code (CMC)
9. California Occupational Safety & Health Administration (CAL-OSHA)
10. California Plumbing Code (CPC)
11. California State Fire Marshall (CSFM)
12. City Fire Marshal requirements
13. National Fire Protection Association
14. Other applicable state laws.

B. Where material or equipment is specified to conform to referenced standards, the most recent edition of the standard in effect at the time of bid shall be used.
1. Air Moving and Control Association, Inc. (AMCA)
2. American Gas Association (AGA)
3. American National Standards Institute (ANSI)
4. American Society of Mechanical Engineers (ASME)
5. American Society of Heating, Refrigerating, and Air Conditioning Engineers (ASHRAE)
6. American Society for Testing and Materials (ASTM)
7. Air-Conditioning and Refrigeration Institute (ARI)
8. Associated Air Balance Council (AABC)

9. Canadian Standards Association International (CSA)
10. National Electrical Manufacturers Association (NEMA)
11. National Fire Protection Association (NFPA)
12. Office of Statewide Health Planning and Development (OSHPD)
13. Sheet Metal and Air Conditioning Contractors Nation Association (SMACNA) Standards
14. Underwriters Laboratories (UL)
15. Comply with all ADA requirements for disabled access.

C. Minimum requirements: The requirements of these are the minimum that will be allowed unless such requirements are exceeded by applicable codes or regulations, in which the regulatory codes or regulation requirements shall govern.

D. When the Contract Documents call for materials or construction of a higher standard than is required by the above, the Contract Document requirements shall take precedence over the requirements of the said laws, rules, and/or regulations, accepting that nothing in the Contract Documents shall be interpreted as permitting work in violation of said laws, rules, and/or regulations. The Contractor for this work shall furnish any additional materials and/or labor as may be required for compliance with these laws, rules, and/or regulations though such materials and/or labor are not specifically set forth in the Contract Documents, with no additional charges to Owner.

E. Seismic construction and restraints shall be in accordance with the requirements of Title 24 of the California Code of Regulations. All equipment mounts, isolators, and hanging systems must meet local authority requirements.

F. Comply with the Safety Orders issued by Cal-OSHA and any other regulations of the State of California and any districts having jurisdictional authority.

1.03 CONTRACT DRAWINGS

A. The Contract Drawings indicate diagrammatically the general layout of the mechanical systems and other related work. The data given herein and on the Drawings are as exact as could be reasonably secured, but absolute accuracy is not guaranteed. Field verification of scaled dimensions taken from the Drawings is required. Exact locations, distances, elevations, etc. will be governed by shop drawings, the building itself, and actual field conditions.

B. The Contractor shall review and compare the Architectural, Structural, Plumbing, Mechanical, and Electrical Drawings and all Owner supplied equipment Drawings and adjust their work to be in conformity with the conditions indicated thereon. Discrepancies between different Drawings, between Drawings and actual field conditions, or between Drawings and Specifications, shall be brought to the attention of the Architect promptly for a determination of the modifications to be affected.

C. Provide offsets, fittings, and accessories required to meet project conditions, even when not shown.

D. Minor changes in locations of equipment, piping, ducts, etc., from locations shown shall be made when directed by the Architect at no additional cost to the Owner, providing such change is ordered before such items of work, or work directly connected to same are installed and providing no additional material is required.

1.04 SUBMITTALS

A. General:
1. All submittals shall be in accordance with the requirements of the General Conditions and Division 01 Sections for Submittal Procedures and Product Requirements.

2. Before any fixtures, materials, or equipment are purchased, the Contractor shall submit to the Architect for approval, a complete list of materials, fixtures, and equipment, giving the manufacturers' names, catalog number, capacity, size, power requirements, and other pertinent data. Submittal lists and drawings shall be specifically applicable to this project, shall include identifying marks assigned by Specifications and Drawings, and shall not contain extraneous material or optional choices.
3. Product names referenced in the specifications are used as standards of quality. Other materials shall not be used unless approved in writing. Review is required even though the term "or equal" is used. Review of submittals will be only for general conformance with design concept. Review will not include quantities, dimensions, construction methods, or coordination with the work of other trades.
4. The Contractor shall submit for the approval of the Architect, shop drawings of proposed material and equipment that differ from the specified materials and equipment, and of any specified materials and equipment with special conditions and/or arrangements. These drawings shall show necessary modifications of Owner, plumbing, electrical and mechanical work required by the proposed materials and equipment.
5. Refer to Division 01 for substitutions requirements. Submittal of substitutions shall be limited to one proposal for each type or kind of item. If the first proposed product submittal is rejected, the Contractor shall then submit the first named or scheduled product. Installation of reviewed substitution is Contractors' responsibility. Any mechanical, electrical, structural, or other changes required for installation of substituted equipment or material must be made by Contractor without additional cost to Owner. Review by Architect of substituted equipment or material will not waive these requirements.
6. Contractor shall make all necessary field measurements and investigations to assure that the equipment and assemblies will meet contract requirements. Review of drawings and other material submitted shall not be construed as a complete check or constitute a waiver of the requirements of the Drawings and Specifications but will indicate that the material submitted is acceptable in quality and utility. This review shall not relieve the Contractor of the responsibility to fit the proposed materials to the spaces provided and to affect necessary rearrangement or construction of other work.

B. Submit shop-wiring diagrams of temperature controls and air conditioning unit controls for approval. Furnish approved wiring diagrams and assistance to Electrician.

C. Seismic Shop Drawing Submittal:
   1. Provide submittal for seismic supports, anchorages, and restraints indicated to comply with performance requirements and design criteria.
      a. Calculations performed for use in the selection of seismic supports, anchorages, and restraints shall utilize criteria indicated in Structural Contract Documents.
      b. Supports, anchorage, and restraints for piping, ductwork, and equipment shall be an OSHPD pre-approved system such as Mason OPM #0043-13. Pipes, ducts, and equipment shall be seismically restrained according to the requirements of the current edition of the California Building Code. The system shall have a current OPM number and shall meet additional requirements of the Authority Having Jurisdiction. Provide supporting documentation required by the reviewing authority and the Architect and Engineer. Provide layout drawings showing piping, ductwork, and restraint locations.
      c. Bracing of Piping, Ductwork, and Equipment: Specifically state how bracing attachment to the structure is accomplished. Provide shop drawings indicating seismic restraints, including details of anchorage to the building. In-line equipment must be braced independently of piping and ductwork, and in conformance with applicable building codes. Provide calculations to show that pre-approval numbers

have been correctly applied in accordance with general information notes of pre-approval documentation.

1.05 WARRANTIES

A. In accordance with Division 01 and as follows. Refer to specific items of equipment specified for warranty duration if different from that specified in Division 01.
   1. Equipment warranties shall be provided for all equipment, with all necessary information filled in, except purchase date, in favor of the Owner.
   2. Provide new materials, equipment, apparatus, and labor to repair or replace that determined to be defective or faulty.

1.06 DELIVERY, STORAGE, AND HANDLING

A. The Contractor shall be responsible for the delivery, storage, protection, and placing of all equipment and materials.

B. The Contractor shall protect the work and materials from damage during construction. Equipment stored at the job site shall be protected from dust, water, or other damage, and be covered if the equipment is exposed to weather. Protect interiors of new equipment and piping systems against entry of foreign matter. Clean both inside and outside before painting or placing equipment in operation.

C. Any items damaged shall be repaired or replaced, at no additional cost to the Owner.

D. Cleanliness of Piping and Equipment Systems:
   1. Exercise care in storage and handling of equipment and piping material to be incorporated in the work. Remove debris arising from cutting, threading, and welding of piping.
   2. Piping systems shall be flushed, blown, or pigged as necessary to deliver clean systems.
   3. The Contractor shall be fully responsible for all costs, damage, and delay arising from failure to provide clean systems.

1.07 COOPERATION WITH OTHER TRADES

A. Coordinate HVAC work with other trades doing work on the project as may be necessary for the proper completion of the project. Refer to the Structural, Plumbing, and Electrical Drawings for details of the building structure and equipment installation that will tend to overlap, conflict with, or require coordination with the work of this Section, and schedule this work accordingly.

B. Priority of right of way in space shall be as follows, in decreasing order of authority:
   1. Electrical lights, electrical panels, and drain piping.
   2. Ductwork.
   3. Fire protection piping, domestic hot water, domestic cold water, and condenser water piping.

C. Any work done without regard for other trades shall be moved, replaced, or redone as required, without extra charges to the Owner.

1.08 FEES AND PERMITS

A. Obtain and pay for permits and services required in the installation of the Work. Arrange for required inspections and secure approvals from authorities having jurisdiction. Comply with requirements of Division 01.

1.09 UTILITY CONNECTIONS

A. Arrange for all utility connections, determine their exact requirements, and pay all costs incurred. Send proper notices, make necessary arrangements, and perform other services required for care and maintenance of all utilities, and assume all responsibility concerning same. Observe all rules and regulations of the respective utilities in executing the work.

1.10 ELECTRICAL REQUIREMENTS

A. Electrical work in this Section shall conform to the requirements of Division 26. Equipment shall conform to the standards of the National Electric Manufacturer's Association. Electrical equipment shall bear the label of Underwriters' Laboratories, Inc. where examination and listing service is available for such materials. Motors and motor control equipment shall be as specified herein.

B. Refer to Division 26 for conduit fittings and devices, service voltage and power feed wiring, and control and interlock wiring for equipment specified under this Section. The Contractor shall have a responsibility to verify that the electrical services provided are adequate and compatible with equipment requirements.

C. Electrical work shall include the furnishing of:
1. Duct mounted smoke detectors;
2. Motor starters, 3-phase;
3. Disconnects/circuit breakers, unless specifically called for in equipment schedules or specifications to be factory installed with equipment;
4. Smoke control interlocks to HVAC fans;
5. Electrical systems;
6. Power wiring, including raceway, fittings, wire, boxes and related items, all voltages, that is not part of Controls Contractor work;
7. Control & interlock wiring that is not part of Controls Contractor work.

D. Electrical work shall include the installing of:
1. All smoke detectors, except duct-mounted;
2. Smoke control interlocks to HVAC fans;
3. Variable speed drives, field mounted;
4. Motor starters, 3-phase;
5. Disconnects/circuit breakers, unless specifically called for in equipment schedules or specifications to be factory installed with equipment;
6. Electrical systems;
7. Low voltage wiring, line voltage "interlock" wiring, control wiring for safety devices, alarms, and refrigeration.

E. Controls Contractor shall furnish and install:
1. Refrigerant leak detectors, including control & interlock wiring;
2. Control system network backbone;
3. Window switches;
4. Control panels;
5. Control devices;
6. Control damper actuators;
7. Terminal box control transformer panels;
8. Digital controller and damper actuator;
9. Air-flow measurement transducer and piping;
10. Wall sensor modules.

F. Controls Contractor shall furnish, and Mechanical Contractor shall install:

1. Automatic isolation and control valves;
2. Sensor wells, meters, and other pipe-mounted control devices.

G. Wiring includes all connections to devices, and all wiring shall be installed in conduit.
1. Conduit fittings and devices shall be as specified in the basic electrical materials section of Division 26.
2. Line voltage work (in equipment assemblies) shall be as specified in Division 26.

H. Devices shall be installed in NEMA enclosures of the type required for the location.

I. Electrical Controls:
1. Refer to Electrical, Fire Protection, Plumbing, and Mechanical documents for work and devices required.

J. The following work will be furnished and installed under Division 26.
1. Disconnect switches, remote switches, motor starters, relays, and test switches that are not mounted as an integral part of equipment assemblies or in temperature control panels.
2. All line voltage controls and interlocks, all other controls, circuits from electric panel board to disconnect switches, starters, motors, switches and/or other motor controls, to temperature controls and safety devices.

1.11 DAMAGE BY LEAKS

A. The Contractor shall be responsible for any damage to work of other Contractors that is caused by leaks in any temporary or permanent piping systems due to pipe rupture, disconnected pipes or fittings, or by overflow of equipment.

B. Patching and replacing of damaged work shall be done by the Contractor who installed the work, as directed by the Architect, but the cost of same shall be paid by the Contractor who is responsible for the damage.

1.12 LICENSING REQUIREMENTS

A. All work of Division 23 shall be performed by an appropriately licensed contractor. The licenses shall be current, valid through the term of the contract, and in the name of the Contractor.
1. HVAC work that includes warm air heating systems and water heating pumps, ventilating systems, air conditioning systems, and ductwork, registers, flues, humidity, and thermostatic controls in connection with these systems, shall be performed by a C-20 - Warm-Air Heating, Ventilating, and Air-Conditioning Contractor.
2. HVAC work that includes boiler, hot-water heating, and steam fitting shall be performed by a C-4 Boiler, Hot-Water Heating, and Steam Fitting Contractor. The C-4 Contractor installs, services, and repairs power boiler installations, hot-water heating systems, and steam fitting, including firetube and water-tube steel power boilers and hot-water heating low-pressure boilers, steam fitting and piping, fittings, valves, gauges, pumps, radiators, convectors, fuel oil tanks, fuel oil lines, chimneys, flues, heat insulation, and all other equipment, including solar heating equipment, associated with these systems.
3. All air and water balancing shall be performed by a D-62 air and water balancing contractor. An air and water balancing contractor installs any device and performs any work related to providing a specified flow of air in all types of existing heating and cooling systems.

PART 2 PRODUCTS

2.01 PRODUCTS CRITERIA

A. All materials, appliances, and equipment shall be new and best of their respective kinds, free from defects, and of the make, brand or quality specified or as accepted by the Architect.

B. Multiple Units: When two or more units of materials or equipment of the same type or class are required, these units shall be products of one manufacturer.

C. Apply and install all items according to the manufacturer's written instructions. Refer conflicts between the manufacturer's instructions and the contract drawings and specifications to the Architect for resolution.

D. All fixtures, materials, and equipment equal in quality and utility to these herein mentioned will be accepted. When specific names are used in describing fixtures, materials, and equipment they are mentioned as standards only, but this implies no right on the part of the Contractor to use other fixtures, materials, and equipment, or methods unless approved as equal in quality and utility by the Architect. The decision of the Architect shall govern as to what fixtures, materials, and equipment are equals to those mentioned, but the burden of proof as to the quality of any proposed fixtures, materials, or equipment shall be upon the Contractor. If any tests are necessary to determine the quality of proposed fixtures, materials, or equipment, an unbiased laboratory satisfactory to the Architect shall make such tests at the expense of the Contractor.

2.02 HANGERS, SUPPORTS

A. Piping - General
   1. Select size of hangers and supports to exactly fit pipe size for bare piping, and to exactly fit around piping insulation with saddle or shield for insulated piping. Provide copper-plated hangers and supports for un-insulated copper piping systems.
   2. Hangers and supports shall be designed and manufactured in conformance with ANSI/MSS SP-58. Selection and application shall be according to ANSI/MSS SP-69.
   3. All piping shall be supported with Superstrut, B-Line, Anvil, Mifab, or approved equal pipe hangers and supports. Select size of hangers and supports to exactly fit pipe size for bare piping, and to exactly fit around piping insulation with shield for insulated piping.
   4. All hangers shall be electro-chromate or corrosion-resistant finished. Hanger rods shall have electro-galvanized finish.

B. Rooftop pipe supports
   1. MiFab "C-Port" series or B-Line "Dura-Block" or approved equal.
      a. Model C rubber support series with 14-gauge galvanized channel.
      b. Seismic: Model CZ rubber base with 14-gauge galvanized channel

C. Copper tubing:
   1. B-Line 3690, Superstrut C-711 or Anvil Figure 67 "J" pipe hangers or approved equal, complete with isolator.
   2. Isolators: B-Line "Vibra Cushion" B1999, Type L & K for copper tubing, Superstrut C-716 isolator for copper, Anvil Figure CT-769 or approved equal

D. Insulated pipe:
   1. Hangers: B-Line 3690 "J" pipe hanger, Superstrut C -711, or Anvil Figure 67 fitted to outside of insulation or approved equal
   2. Pipe Shields: B-Line 3151 insulation protection shield, Superstrut C-790, or Anvil Figure 167 or approved equal

E. Point of support connectors:
   1. Wood construction:
      a. Stationary pipes: B-Line B3060, Superstrut 540 or Anvil Figure 206 side beam hanger clip or approved equal
      b. Pipes subject to movement: B-Line B-756 or Superstrut S-541 beam clamp swing connector or approved equal
   2. New concrete construction: B-Line B2501 light duty spot inserts or Superstrut 452-TB spot inserts or approved equal.
      Existing concrete construction: Red-Head "Trubolt", Hilti "Kwik-Bolt" KB1 or Simpson "Strong Bolt" SB2, drilled-in, concrete expansion anchors.
   3. Steel beams: Series 500 beam brackets.
   4. Plywood decks: machine bolts, nuts, and washers.

F. Vertical pipe risers:
   1. Riser clamps: Superstrut C-720 extension riser clamps anchored to construction
   2. Bare cold water pipe: Superstrut C-720P, PVC coated to prevent corrosion

G. Insulated pipe supports: K.B. Enterprises "Snapp Itz".

H. Pipes through studs or joists shall be isolated from the structure with properly sized Hubbard "Hold-Rite" suspension clamps or LSP "Acousto-Plumb" system.

I. Ductwork
   1. Hanger Rods for Noncorrosive Environments: Cadmium-plated steel rods and nuts.
   2. Hanger Rods for Corrosive Environments: Electrogalvanized, all-thread rods or galvanized rods with threads painted with zinc-chromate primer after installation.
   3. Strap and Rod Sizes: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Table 5-1, "Rectangular Duct Hangers Minimum Size," and Table 5-2, "Minimum Hanger Sizes for Round Duct."
   4. Steel Cable End Connections: Steel assemblies with brackets, swivel, and bolts designed for duct hanger service; with an automatic-locking and clamping device.
   5. Duct Attachments: Sheet metal screws, blind rivets, or self-tapping metal screws; compatible with duct materials.
   6. Trapeze and Riser Supports:
      a. Supports for Galvanized-Steel Ducts: Galvanized-steel shapes and plates.
      b. Supports for Stainless-Steel Ducts: Stainless-steel shapes and plates.
      c. Supports for Aluminum Ducts: Aluminum or galvanized steel coated with zinc chromate.

2.03 PIPE LABELS

A. Brady, Seton, Graphic Products, or approved equal pipe labels. Preprinted, color-coded, with lettering indicating service, and showing flow direction.

B. Self-Adhesive Pipe Labels: Printed plastic with contact-type, permanent adhesive backing.

C. Pipe Label Contents: Include identification of piping service using same designations or abbreviations as used on Drawings, pipe size, and an arrow indicating flow direction.

D. Flow-Direction Arrows: Integral with piping system service lettering to accommodate both directions, or as a separate unit on each pipe label to indicate flow direction.

E. Label Sizes (per ANSI A13.1 / ASME A13.1-2015 Standards):
   1. For pipes or covering with outside diameter ¾ to 1¼", minimum length of the label: 8", minimum height of letters: ½".
   2. For pipes or covering with outside diameter 1½ to 2", minimum length of the label: 8",

minimum height of letters: ¾".

3. For pipes or covering with outside diameter 2 ½ to 6", minimum length of the label: 12", minimum height of letters: 1¼".

F. Pipe Label Color Schedule: (per ANSI A13.1 / ASME A13.1-2015)
   1. Potable, Cooling, Boiler Feed, and other Water Piping:
      a. Background Color: Green.
      b. Letter Color: White.
   2. Fire Quenching Fluids:
      a. Background Color: Red.
      b. Letter Color: White.
   3. Toxic or Corrosive Fluids
      a. Background Color: Orange.
      b. Letter Color: Black
   4. Flammable or Oxidizing Fluids:
      a. Background Color: Yellow.
      b. Letter Color: Black.
   5. Combustible Fluids:
      a. Background Color: Brown.
      b. Letter Color: White
   6. Compressed Air:
      a. Background Color: Blue.
      b. Letter Color: White.

G. Duct Markers:
   1. Self-adhesive duct markers with an arrow indicating the flow direction

2.04 ELECTRIC MOTORS

A. With exception of motors in UL labeled equipment, motors for HVAC blowers and fans, pumps, and other general-purpose applications using an adjustable speed drive shall be Baldor Premium Efficient Super-E®, three-phase, foot mounted, Class H insulated motor with AEGIS shaft grounding ring installed internally, re-greasable ball bearings, and dynamically balanced rotors.

B. Motors shall be certified for quiet operation and shall bear a label so stating. Motors shall be drip-proof frame, 1.15 minimum service factor, and in 104°F ambient windings specially impregnated and epoxy-coated for outdoor service.

C. Torque characteristics of motors shall be as required to accelerate the machine to 100% full load speed within 10 seconds. Motors shall be dynamically balanced to maximum deflection as follows:
   1. 15 HP and larger: 0.0003 inches.
   2. 10 HP and smaller: 0.0002 inches.

D. Motors shall be Inverter duty, meet NEMA MG-1, parts 30 and 31, and shall be guaranteed to satisfactorily operate at ± 10% voltage shown on Drawings. Transformers of adequate capacity shall be provided, if necessary, to satisfy this requirement.

E. All 3-phase motors shall be provided with phase and brown-out protection to shut down all motors in the unit if the phases are more than 10% out of balance on voltage or the voltage is more than 10% under design voltage.

F. Fractional horsepower fan motors (¼ hp, ½ hp, ¾ hp) shall be Greenheck "Vari-Green" series motors, DC electronic commutation type, specifically designed for fan applications. Motors

shall be permanently lubricated with heavy-duty ball bearings to match the fan load and pre-wired to the specific voltage and phase. Internal motor circuitry shall convert AC power supplied to the fan to DC power to operate the motor. Motor shall be controllable down to 20% of the full speed (80% turndown). Speed shall be controlled by either a potentiometer dial mounted at the motor or by a 0-10 VDC signal. Motor shall be a minimum of 85% efficient at all speeds.

G. Provide fan drives rated at 150% of motor horsepower. Drives shall be adjustable sheave type unless specified otherwise. Listed fan speeds are only approximate; select and/or change drives to operate at the approximate midpoint of adjustable range after final balancing.

PART 3 EXECUTION

3.01 INSTALLATION, GENERAL

A. Provide all necessary sleeving, core drilling, carpentry, cutting, and patching required for proper installation of material and equipment specified.

B. No structural members shall be drilled, bored, or notched in a manner that will impair their structural capacity. No structural cutting or drilling shall be done without the approval of the Architect and DSA.

C. All penetrations of concrete or masonry shall be made with core drills.

3.02 VERIFICATION OF EXISTING CONDITIONS AND DEMOLITION

A. Before commencing the work of this Section, the Contractor shall inspect the installed work of other trades and verify that their work is sufficiently complete to permit the start of work under this Section and that the completed work will be in complete accordance with the original design. In the event of a discrepancy, immediately notify the Architect and proceed as directed.

B. Before installation of any new work, verify the location, size, and other conditions at all points of connection to services or other existing piping, and at all locations where new work will cross or pass near existing piping, electrical, or other facilities.

C. Information shown relative to existing services is based upon available records and data during the preparation of the Drawings but shall be verified. Make reasonable deviations found necessary to conform with actual locations and conditions, without extra charge.

D. Remove piping, controls, fixtures, and equipment that is not to remain in service as shown on the Drawings or as required. This includes the removal of associated appurtenances and supports.

E. If pipe, insulation, or equipment to remain is damaged in appearance or is unserviceable, remove damaged or unserviceable portions and replace them with new products of equal capacity and quality.

F. Patch, cap, or repair existing works affected by this demolition in concealed spaces within 6" of a live main or branch.

G. Deliver removed material to the Owner as directed by the Architect. Dispose of all other removed material offsite.

3.03 POLLUTANT CONTROL

A. At the time of rough installation or during storage on the construction site and until the initial

startup of the heating and cooling equipment, all duct and other related air distribution component openings shall be covered with tape, plastic, sheet metal, or other methods acceptable to the enforcing agency to reduce the amount of dust or debris which may collect in system.

B. During construction, protect all filters upstream of air handling units with blankets of 2" fiberglass filter media or 2" disposable panel filters. UL Class 2 listed.

C. Systems shall not be operated without properly installed filters. Filters used during construction shall be removed and replaced with new filters after construction is completed and the systems are ready for final acceptance by the owner.

3.04 EQUIPMENT

A. Equipment shall operate quietly and without objectionable vibration. Such problems, other than from equipment operating at optimum conditions, shall be the Contractor's responsibility and shall be eliminated at the direction of the Architect.

B. Install equipment to provide a good appearance, easy access, and adequate space to allow replacement and maintenance. Provide bases, supports, anchor bolts, and other items required to achieve this. Installation shall be level, above moisture level, and adequately braced.

C. Extend ¼" schedule 40 black steel lubrication pipes from hard-to-reach locations to the front of equipment or to access doors. Terminate with proper lubrication fittings.

D. Move equipment into the building through available openings. Dismantle equipment where it is necessary to accomplish this. After reassembly, test equipment to verify its satisfactory operating condition.

E. Thoroughly lubricate equipment before operating. Repair of damage resulting from failure to comply with this requirement shall be the Contractor's responsibility.

F. Piping connections shall be secured and properly aligned and all utility and control connections shall be properly isolated from the building structure using vibration isolators and flexible connections. Any equipment not meeting this requirement will be modified and properly reinstalled at no expense to the Owner.

3.05 ACCESS

A. All items that require access, such as for operating, cleaning, servicing, maintenance, and calibration shall be easily and safely accessible by persons standing at floor level, or standing on permanent platforms, without the use of portable ladders. Examples of these items include but are not limited to all types of valves, filters, and strainers, transmitters, and control devices. Prior to commencing installation work, refer conflicts between this requirement and contract Drawings to Architect for resolution.

3.06 MECHANICAL SERVICES

A. Terminals and services weighing no more than 20 pounds, may be supported directly on the runners of a heavy-duty grid system but in addition, they must have a minimum of (2) #12-gauge slack safety wires attached at diagonally opposite corners and anchored to the structure above.

3.07 CONCRETE EQUIPMENT BASES

A. Concrete work that is part of the mechanical installations, as such is shown and/or detailed on the Drawings, shall conform to the requirements of the Concrete Section of these

Specifications.

B. Concrete bases: Anchor equipment to a concrete base according to equipment details on mechanical and structural Drawings. Construct concrete bases of dimensions indicated, but not less than 4 inches larger in both directions than the supported unit.

C. Bases shall be neatly finished, have rounded corners, and have a smooth trowel finish.

3.08 PAINTING

A. Properly prepare work to be painted per the requirements of Division 09, except preservative and special painting as described herein. Priming shall conform to Division 09 requirements and be of a material compatible with paint for finish painting.

B. All equipment and materials shall be cleaned of grease, wax, oil, rust, or dirt in preparation for finish painting. Any prime coated surfaces showing signs of rust before being finish painted shall be thoroughly cleaned and a new prime coat applied.

C. Equipment in equipment rooms and like spaces shall be furnished with a factory-applied baked-on prime coat or at the Contractor's option, a standard factory baked enamel finish in approved colors. Machinery such as fans or motors shall be furnished with a factory-applied baked-on prime coat, or at the Contractor's option, a standard paint finish (air-dried or baked enamel) in approved colors. Mechanical equipment in other locations shall be furnished with a factory-applied baked-on prime coat unless noted otherwise.

D. Paint interior of ductwork at air outlets with one coat of flat black paint.

E. Prime paint both sides of flashings before installation.

F. Furnish can of touch-up paint with each factory-finished piece of equipment.

G. Paint all piping in mechanical rooms. Color as selected by the Architect.

H. Black steel piping exposed to the environment shall be painted with rust-inhibiting paint. Color as selected by Architect.

3.09 IDENTIFICATION OF SYSTEMS

A. Nameplates
   1. Nameplate bearing manufacturer's name or identifiable trademark shall be securely affixed in a conspicuous place on equipment, or name or trademark cast integrally with equipment, stamped or otherwise permanently marked on each item of equipment.

B. Piping
   1. All piping shall be identified. Attach arrows at one or both ends of the marker to indicate flow direction
   2. If the pipe being labeled contains multiple hazards, determine which has the greatest hazardous risk and label accordingly.
   3. Locate pipe labels where piping is exposed or above accessible ceilings in finished spaces, machine rooms, accessible maintenance spaces such as shafts, tunnels, and plenums, and exterior exposed locations as follows:
      a. Adjacent to all valves and flanges
      b. Near each branch connection, excluding short takeoffs for fixtures and terminal units. Where flow pattern is not obvious, mark each pipe at the branch.
      c. At both sides of wall or floor penetrations.
      d. Before and after all wall, floor, and ceiling penetrations and inaccessible enclosures.
      e. Adjacent to changes in direction.

f. At access doors, manholes, and similar access points that permit view of concealed piping.
g. Near major equipment items and other points of origination and termination.
h. Spaced at maximum intervals of 25 feet along each run. Reduce intervals to 20 feet in mechanical rooms and other areas of congested piping and equipment, in spaces.
i. On piping above removable acoustical ceilings. Omit intermediately spaced labels.

C. Ductwork
1. Locate labels near points where ducts enter into concealed spaces and at maximum intervals of 25 **feet** in each space where ducts are exposed or concealed by a removable ceiling system.
a. Exposed ductwork shall be identified every 20 feet in mechanical rooms. with removable ceilings, and at each access door in spaces with hard ceilings.

D. Valves
1. For identification and the Owner's maintenance records, all valves shall be numbered and identified with clearly stamped 1¼" diameter brass tags, in accordance with drawings and service performed.
2. Control valves shall be also marked whether normally open (N.O.) or normally closed (N.S.).

E. Equipment
1. All equipment shall be labeled with 1" high stencils showing the identifying mark noted on drawings and usage.
2. Warning signs shall be placed on machines driven by electrical motors that are controlled by fully automatic starters, per California Code of Regulations, Title 8, Subchapter 7 - General Industry Safety Orders, Article 7, Section 3320.

F. A typewritten schedule of all nameplates and valve tags used, with identification, shall be framed and posted in mechanical rooms, at locations as directed.

3.10 SEISMIC RESTRAINT

A. Equipment:
1. Each piece of equipment installed under these sections shall be constructed and anchored to structural supports to resist a seismic force of 150% of the equipment's operating weight in any direction. Supports, anchors, and braces shown shall be minimum.
2. The equipment manufacturer shall design, construct, and certify that his equipment satisfies the special minimum seismic resistance requirements and shall submit calculations or test results supporting his certification.

B. Vibration
1. All rotating mechanical equipment and associated piping and ductwork shall be mounted by vibration isolators as required to minimize transmission of vibrations and noise to building structures or spaces.
2. All rotating equipment shall be balanced both statically and dynamically.
3. To minimize alignment problems, all motors over 5 hp must be designed to be solidly attached to a common base with the driven unit.
4. To minimize vibration, solid sheaves, and band belts shall be designed to be used in multiple V-belt driven equipment over 15 hp

C. Isolation of Equipment
1. Isolation shall be designed to be stable during starting and stopping of equipment without any transverse and eccentric movement of equipment that would damage or adversely affect the operation of the equipment or appurtenances.

2. Isolation shall be designed for the operating speed of the equipment.
3. Isolators, including springs, exposed to the weather shall be hot-dipped galvanized after fabrication. Hot dipped zinc coating shall comply with ASTM Method A-123 and shall not be less than 2 oz per square foot.
4. Isolators shall be selected and located to produce uniform loading and deflection even when equipment weight is not evenly distributed.
5. Isolation equipment includes neoprene pads, hanger spring and neoprene, travel limited floor spring and neoprene, inertia base, flexible duct connections, flexible pipe connections, thrust limits, grommets, and snubbers.

D. Seismic Control and Restraint
1. Brace or anchor mechanical equipment to resist horizontal forces acting in any direction using the latest editions of the CBC and ASCE.
2. Seismic-restraint devices shall meet CBC seismic restraint requirements, shall have horizontal and vertical load testing and analysis, and shall bear anchorage preapproval OPM number from OSHPD, preapproval by ICC-ES, or preapproval by another agency acceptable to authorities having jurisdiction, showing maximum seismic-restraint ratings.
3. Seismic restraints for mechanical equipment shall be installed per the details on the approved plans. Ductwork shall be installed such that the requirements for seismic exemption are met, per the approved plans.

E. Ductwork:
1. All ductwork shall be supported in accordance with the recommendations and requirements of the SMACNA Duct Construction Standards, latest Edition, except strap hangers and trapeze hangers, which shall have bracing capable of resisting a seismic force equal to 100% of the weight of the duct system in any direction. (Seismic force shall be in addition to static loading.)

F. Cable Bracing
1. Cables shall be pre-stretched galvanized 7x19 strand core aircraft cable, with no limit to their installed length. Cables meet the following specifications: MIL-DTL-83420M with Amendment 2, Type 1 non-jacketed cable.
2. Cables shall be installed slightly slack, so as not to support gravity loads.
3. Cables shall connect the braced item to a building structural element. Cables shall have a bracket at each end to make the connections. The cable assembly with connection brackets shall be Mason Industries "SCB" or "SCBH". The cable is held to end brackets with one or two bolts. Cable bolts shall be tightened to the torque values stated in the details or, in the case where break-off nuts are provided, tighten until the nut breaks off.
4. The Mason Industries "SCBH" component can be used for connection directly to the threaded vertical hanger rod used for supporting system gravity loads as detailed in Section D of OPM-0043-13.
5. The "SCB" bracket and cable (Ref. X1.0), "SCBH" bracket and cable (Ref. X1.1), and "UCC" rod stiffener clamp (Ref. X3.0) manufactured by Mason Industries, are included (with accompanying hardware) in the kit options provided in Section D of OPM-0043-13.

G. Piping:
1. The flexibility of piping systems must be maintained by using flexible devices at critical points at junctions of separate building structures. Braces or anchors shall be designed to damp oscillations or check excessive movement. Flexible devices for piping of gas shall be loops or offsets. Flexible devices for other piping may be loops, Victaulic grooved, or roustabout couplings.
2. Piping at tops and bottoms of risers are critical points where flexibility is required, as well

as at changes in direction on long runs of piping 4" and larger. Tops of risers shall be restrained from motion in a horizontal direction, and midpoints shall be anchored in all directions.

3.11 INSTALLATION - HANGERS AND SUPPORTS

A. Pipe supports shall be spaced according to CMC 2019, Table 313.3, and sufficiently close to support pipes properly without the formation of pockets. Hangers shall be installed at the ends of mains and branches.

B. Refrigerant piping shall be supported per CMC 1105.2 and 1109.6.

C. Install hangers and supports complete with necessary attachments, inserts, bolts, rods, nuts, washers, and other accessories.

D. No valve or piece of equipment shall be used to support piping.

E. 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 the action of expansion joints, expansion loops, expansion bends, and similar units.

F. Install lateral bracing with pipe hangers and supports to prevent swaying.

G. Install building attachments within concrete slabs or attach to structural steel. Install additional attachments at concentrated loads, including valves, flanges, and strainers, 2-½ inches and larger and at changes in direction of piping. Install concrete inserts before concrete is placed; fasten inserts to forms and install reinforcing bars through openings at top of inserts.

H. Metal Pipe-hanger Installation: Install hangers, supports, clamps, and attachments as required to properly support piping from the building structure.

I. Metal Trapeze Pipe-Hanger Installation: Support together and space trapezes for smallest pipe size or install intermediate supports for smaller diameter pipes as specified for individual pipe hangers.

J. Thermal-Hanger Shield Installation: Install in pipe hanger or shield for insulated piping.

K. Load Distribution: Install hangers and supports so that piping live and dead loads and stresses from movement will not be transmitted to connected equipment.

L. Insulated Piping:
   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 the insert.

M. Do not exceed pipe stress limits allowed by ASME B31.9 for building services piping.

N. Ductwork
   1. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Chapter 5, "Hangers and Supports."
   2. Support vertical ducts with steel angles or the channel secured to the sides of the duct with welds, bolts, sheet metal screws, or blind rivets. Support at each floor at maximum intervals of 16 feet.
   3. Install upper attachments to structures. Select and size upper attachments with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.

3.12 PIPE WELDING

A. All hot and chilled water, steam and steam condensate, compressed air, and vacuum piping shall be installed, examined, inspected, and tested in accordance with the requirements of ASME B31.9, Building Services Piping, current edition.

B. Before any welding is performed, the contractor shall submit to the Architect, copies of any welding procedure specifications and their supporting procedure qualification records for review and acceptance. Copies of welder qualification records shall be made available for review to the owner or his representative at the construction site.

C. Weld all pipe 2.5 inches and larger. Use the following procedure. All welders must be AWS certified. AWS B2.1 SMAW 6G Pipe Welding Procedure Specifications

Welding process: SMAW	Grove Angle: 60 degrees
Position: 6G Fixed position	Material/Spec: A 106
Weld Progression: Up	Thickness (pipe/tube): Groove (in) .280
Backing: No	Notes: Sch. 40 Pipe
Current/Polarity: DCEP	Filler Metal Class: E6010Rt/E7018F1
Root Opening: 1/16 to 1/8	Other Filler Metal Class: Rt. 1/8, 3/32 Filler

D. Welded joints shall be beveled and butt-welded. Reductions of pipe shall be made with forged steel welding fittings. Branch reductions of two or more pipe sizes smaller than the main shall be Bonney "Weld-O-Let" fittings, or equal. Job fabricated reductions and branches shall not be used. All pipe burrs shall be reamed out. Welding rods shall be as follows, or approved equal:

Pipe Size	Arc Welding	Gas Welding
2" and larger	Fleetweld #5	Oxweld #1 or Page Hi-Test M
1½" and smaller	None	Oxweld #1 or Page Hi-Test M

3.13 INSTALLATION, PIPING

A. Installation of piping shall be such that damage cannot result through thermal expansion or contraction, to piping, building, or pipe hangers and supports. Anchors shall be installed at midpoints of all runs in main piping for localizing pipe expansion or prevention of creepage.

B. Rough-in shall proceed as rapidly as general construction will permit. All rough-in shall be complete, at locations verified by Architect and Owner, and tested and inspected before installation of concrete, lath, plaster, gypsum wallboard, or other finishes.

C. All piping shall be concealed in finished rooms, installed in furred walls and partitions. Where furred or suspended ceilings occur, the piping shall be installed in the concealed space at points adjacent to beams and/or other structural members and coordinated with ductwork and equipment. Where exposed piping occurs, it shall be installed parallel to or at right angles to building walls, unless specifically shown otherwise on the Drawings.

D. All pipelines shall be installed free from traps and air pockets, true to line and grade, with suitable supports properly spaced. All piping shall be installed without undue stresses and with provision for expansion and contraction.

E. All piping shall be new and free from foreign substances. American standard pipe threads shall be used for IPS threaded work. Joints in threaded piping shall be made up with Teflon tape applied to the male threads only. No screwed pipe joints shall be caulked or packed with rope or other packing materials. Pipe shall be free from tool marks, threads cut accurately with not more than two threads showing beyond fitting. Friction wrenches shall not be used with plated, polished, or soft metal piping. All changes in pipe size shall be made with reducing fitting. Bushings will not be permitted.

F. Protect unattended openings in piping during construction.

G. Install piping in concealed locations, unless otherwise indicated and except in equipment rooms and service areas.

H. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.

I. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.

J. Install piping to permit valve servicing.

K. Install piping free of sags and bends.

L. Install fittings for changes in direction and branch connections.

M. Install piping to allow application of insulation.

N. Install escutcheons for penetrations of walls, ceilings, and floors according to the following. Use one-piece escutcheons wherever possible in new construction. Split-casting units are acceptable for installation on existing piping systems.

O. No valve or piece of equipment shall be used to support piping.

P. Fire-Barrier Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at pipe penetrations. Seal pipe penetrations with firestop materials. Refer to Division 7 Section "Through-Penetration Firestop Systems" for materials.

Q. All copper tubing shall be formed in a workmanlike manner according to the Pipe and Tube Bending Handbook of the Copper and Brass Research Association. A tube bender giving support to the periphery of the tube shall be used. The tubing shall be protected against flatting or other injuries.

R. All copper connections and joints shall be made according to the Copper Tube Handbook, Copper and Brass Research Association. No swaged connections will be permitted. All valves, pumps, and similar equipment shall be connected to copper piping through union or flange adapter fittings.

S. Valves, cocks, etc., shall be installed to allow convenient accessibility and operation.

T. Unions and flanges shall be installed to allow convenient replacement of all equipment and cleaning tubes.

U. A union connection shall be installed downstream from all valves, at equipment connections, and at other locations as required or directed.

V. Shut-off valves shall be provided in all main services and where required to permit proper servicing of equipment. Valves of one type shall be of one manufacturer.

W. All valves shall be of the same size as the pipelines in which they are installed unless specifically sized on the Drawings. All hand-controlled line valves shall be ball valves, except where throttling control or frequent operation is required, in which case globe or angle valves shall be used. Globe valves in horizontal lines shall be installed with the stem horizontal to permit line draining. All globe and angle valves shall be installed to close against pressure. Disc valves shall have discs suitable for the services for which they are to be used.

X. All valves shall be accessible and shall not be installed with the stems below the horizontal plane. Provide access panels at walls, ceilings, or floors.

Y. Provide chrome plated escutcheon plates at all points where exposed piping penetrates finished wall ceilings or floors.

Z. Cutting or boring of joists or other structural members shall be done only when alternative routing is impossible and only upon written approval of the Architect or Owner.

3.14 CLEANING OF PIPING

A. All new piping shall be thoroughly cleaned of rust, scale, etc., before enclosing and placing in operation. Water shall be forced through pipes until the systems are free from foreign substances.

3.15 CLEANUP

A. Upon completion of the work, remove all material, debris, and equipment associated with or used in the performance of this work.

END OF SECTION

SECTION 23 0593

TESTING, ADJUSTING, AND BALANCING FOR HVAC

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. Section Includes:
   1. Balancing Air Systems
   2. Additional Tests:
      a. Duct leakage testing

1.03 SCOPE

A. The Testing, Adjusting, & Balancing (T&B) Agency will provide the following services:
   1. Provide all supervision, personnel, instruments, calibration equipment, and all other materials necessary to perform balancing and testing, and compile test data including calculations and services necessary for the heating, ventilating, and air conditioning systems for this project, all in accordance with the project Drawings and Specifications and as specified herein.
   2. The T&B Agency shall be responsible for inspecting, balancing, adjusting, testing, and logging the data of the performance of fans, all dampers in the duct systems, all air distribution devices or heat exchangers, and the flows of water through all coils.
   3. The T&B Agency shall balance, test, and adjust the systemic components to obtain optimum conditions in each conditioned space in the building. If construction deficiencies are encountered which preclude obtaining optimum conditions, the deficiencies will be recorded and given to the Owner's Representative. The T&B Agency is advised that deficiencies in the HVAC construction are often encountered during final T&B services and should include in the bid an amount deemed advisable to compensate for time in identifying the deficiencies.

B. During construction, the T&B Contractor shall inspect the installation of pipe systems, sheet metal work, temperature controls, and other component parts of the HVAC systems. Inspections shall be conducted a minimum of three times. Typically, this is performed when 60% of the ductwork and piping are installed and again when 90% of the total system is installed and prior to insulation. A copy of the written report is to be issued to the Mechanical Engineer for review.

1.04 SUBMITTALS

A. Strategies and Procedures Plan: Within 30 days of Contractor's Notice to Proceed, submit T&B strategies and step-by-step procedures.

B. System Readiness Checklists: Within 30 days of Contractor's Notice to Proceed, submit system readiness checklists for use by systems installers in verifying system readiness for T&B.

C. Examination Report: Within 30 days of Contractor's Notice to Proceed, provide a summary report of any issues that are discovered that may preclude the proper testing and balancing of the systems.

D. Certified T&B reports: Within 30 days of completion of balancing work, submit AABC-certified T&B report.
   1. Submit one copy of the final T&B Report directly to the Architect. Provide five additional copies to the Contractor.

1.05 QUALITY ASSURANCE

A. T&B Contractor Qualifications:
   1. General Contractor will employ a T&B Agency that is certified by the Associated Air Balancing Council (AABC). The T&B Agency will have experience in the field of air and hydronic system balancing, possess calibrated instruments, and employ qualified Supervisors and skilled Technicians to perform all required tests. The T&B Agency shall have a minimum of 10 years of experience in the Testing, Adjusting, and Balancing field.

B. T&B technician shall perform the following:
   1. Review field data reports to validate accuracy of data and to prepare certified T&B reports.
   2. Certify that the T&B team complied with the approved T&B plan and the procedures specified and referenced in this Specification.
   3. Certify the T&B report

C. T&B Conference: If requested by the Architect or Construction Manager after approval of the T&B Agency's submittals, meet to develop a mutual understanding of the details
   1. Agenda Items:
      a. The examination report.
      b. The Strategies and Procedures plan.
      c. Systems readiness checklists.
      d. Coordination and cooperation of trades and subcontractors.
      e. Coordination of documentation and communication flow.

D. Approved Test and Balance agencies in the area:

RS Analysis, Inc.
1035 Suncast Lane, Suite 130
El Dorado Hills, CA 95762
(916) 358-5672

National Air Balance Company, Inc.
4171 Business Center Drive
Fremont, CA 94538
(510) 623-7000

Raglen System Balance, Inc.
1121 University Terrace
Reno, NV 89502
(775) 747-0100

Pacific Test & Balance, Inc.
4771 Mangels Blvd.
Fairfield, CA 94534
(707) 696-2444

E. T&B Report Forms: Use standard T&B contractor's forms.

F. Instrumentation Type, Quantity, Accuracy, and Calibration: As described in "AABC National Standards for Total Systems Balance."

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.01 EXAMINATION & REVIEW

A. Examine the Contract Documents to become familiar with Project requirements and to discover conditions in systems' designs that may preclude proper T&B of systems and equipment.

B. Examine systems for installed balancing devices, such as test ports, gage cocks, thermometer wells, flow-control devices, balancing valves and fittings, and manual volume dampers. Note the locations of devices that are not accessible for testing and balancing.

C. Review the Contractor shop drawing submittals for their effect on the test and balance process and overall performance of the HVAC system. Submit recommendations for enhancements or changes to the system.

D. Review location and type of volume damper inlet conditions to air terminals, air valves, and HVAC equipment.

E. Review location of pressure sensors in the air distribution system.

F. Review automatic control systems as they affect the test and balance procedure.

G. Review sheet metal and piping shop drawings to verify the installation of flow control devices.

H. Review the approved submittals for HVAC systems and equipment.

I. Examine ceiling plenums and underfloor air plenums used for supply, return, or relief air to verify that they are properly separated from adjacent areas.

J. Review equipment performance data including fan curves.

K. Examine HVAC equipment and verify that bearings are greased, belts are aligned and tight, clean permanent filters are installed, and controls are ready for operation.

L. Examine terminal units, such as variable-air-volume boxes, and verify that they are accessible and their controls are connected, configured by the Controls contractor and functioning.

M. Examine strainers to verify that Mechanical Contractor has replaced startup screens with permanent screens and that all strainers have been cleaned.

N. Examine two-way valves for proper installation and function.

O. Examine three-way valves for proper installation for their intended function of diverting or mixing fluid flows.

P. Examine heat-transfer coils for correct piping connections and for clean and straight fins.

3.02 PREPARATION

A. Prepare a T&B plan that includes:
1. Equipment and systems to be tested.
2. Strategies and step-by-step procedures for balancing the systems.
3. Instrumentation to be used.
4. Sample forms with specific identification for all equipment.

B. Prepare system-readiness checklists, as described in the *AABC National Standards for Total System Balance*, for use by contractors in verifying system readiness for T&B. These shall include, at a minimum:
   1. Airside:
      a. All ductwork is complete with all terminals installed.
      b. All volume, smoke and fire dampers are open and functional.
      c. Clean filters are installed.
      d. All fans are operating, free of vibration, and rotating in correct direction.
      e. VFD start-up is complete and all safeties are verified.
      f. Automatic temperature-control systems are operational.
      g. Ceilings are installed.
      h. Windows and doors are installed.
      i. Suitable access to balancing devices and equipment is provided.

3.03 GENERAL PROCEDURES FOR TESTING AND BALANCING

A. Perform testing and balancing procedures on each system according to the procedures contained in AABC's "National Standards for Total System Balance" and in this Section.

B. Cut insulation, ducts, pipes, and equipment cabinets for installation of test probes to the minimum extent necessary for T&B procedures.

C. Mark equipment and balancing devices, including damper-control positions, valve position indicators, fan-speed-control levers, and similar controls and devices, with paint or other suitable, permanent identification material to show final settings.

D. Take and report testing and balancing measurements in inch-pound (IP) units.

3.04 GENERAL PROCEDURES FOR BALANCING AIR SYSTEMS

A. Prepare test reports for both fans and outlets. Obtain approved submittals and recommended testing procedures. Crosscheck the summation of required outlet volumes with required fan volumes.

B. Prepare single-line schematic diagram of systems for the purpose of identifying HVAC components.

C. For variable-air-volume systems, develop a plan to simulate diversity.

D. Determine the best locations in main and branch ducts for accurate duct-airflow measurements.

E. Locate start-stop and disconnect switches, electrical interlocks, and motor starters.

F. Verify that motor starters are equipped with properly sized thermal protection.

G. Check condensate drains for proper connections and functioning.

H. Check for proper sealing of air-handling-unit components.

3.05 PROCEDURES FOR CONSTANT-VOLUME AIR SYSTEMS

A. Adjust fans to deliver total indicated airflows within the maximum allowable fan speed listed by fan manufacturer.
   1. Measure total airflow.
      a. Set outside air, return air and relief air dampers for proper position that simulates minimum outdoor air conditions.

b. Where duct conditions allow, measure airflow by Pitot-tube traverse. If necessary, perform multiple Pitot-tube traverses to obtain total airflow.
c. Where duct conditions are not suitable for Pitot-tube traverse measurements, a coil traverse may be acceptable.
d. If a reliable Pitot-tube traverse or coil traverse is not possible, measure airflow at terminals and calculate the total airflow.

2. Measure fan static pressures as follows:
   a. Measure static pressure directly at the fan outlet or through the flexible connection.
   b. Measure static pressure directly at the fan inlet or through the flexible connection.
   c. Measure static pressure across each component that makes up the air-handling system.
   d. Report any artificial loading of filters at the time static pressures are measured.
3. Do not make fan-speed adjustments that result in motor overload. Consult equipment manufacturers about fan-speed safety factors. Modulate dampers and measure fan-motor amperage to ensure that no overload will occur. Measure amperage in full-cooling, full-heating, economizer, and any other operating mode to determine the maximum required brake horsepower.

B. Adjust volume dampers for main duct, submain ducts, and major branch ducts to indicated airflows.
1. Measure airflow of submain and branch ducts.
2. Adjust sub-main and branch duct volume dampers for specified airflow. Re-measure each sub-main and branch duct after all have been adjusted.

C. Adjust air inlets and outlets for each space to indicated airflows.
1. Set airflow patterns of adjustable outlets for proper distribution without drafts.
2. Measure airflow at all inlets and outlets.
3. Adjust each inlet and outlet for specified airflow.
4. Re-measure each inlet and outlet after all have been adjusted.

D. Verify final system conditions.
1. Re-measure and confirm minimum outdoor air, return and relief airflows are within design. Readjust to design if necessary.
2. Re-measure and confirm total airflow is within design.
3. Re-measure all final fan operating data, rpms, volts, amps, static profile.
4. Mark all final settings.
5. Test system in economizer mode. Verify proper operation and adjust, if necessary.
6. Measure and record all operating data.

E. Record final fan-performance data

3.06 PROCEDURES FOR VARIABLE-AIR-VOLUME SYSTEMS

A. Adjust the variable-air-volume systems as follows:
1. Verify that the system static pressure sensor is located 2/3 of the distance down the duct from the fan discharge.
2. Verify that the system is under static pressure control.
3. Select the terminal unit that is most critical to the supply-fan airflow. Measure inlet static pressure and adjust system static pressure control setpoint so the entering static pressure for the critical terminal unit is not less than the sum of the terminal-unit manufacturer's recommended minimum inlet static pressure plus the static pressure needed to overcome terminal-unit discharge system losses.
4. Calibrate and balance each terminal unit for maximum and minimum design airflow as follows

a. Adjust controls so that terminal is calling for maximum airflow (note some controllers require starting with minimum airflow. Verify calibration procedure for specific project).
b. Measure airflow and adjust calibration factor as required for design maximum airflow. Record calibration factor.
c. When maximum airflow is correct, balance the air outlets downstream from terminal units.
d. Adjust controls so that terminal is calling for minimum airflow.
e. Measure airflow and adjust calibration factor as required for design minimum airflow. Record calibration factor. If no minimum calibration is available, note any deviation from design airflow.
f. When in full cooling or full heating, ensure that there is no mixing of hot deck and cold deck airstreams unless so designed.
g. On constant volume terminals, in critical areas where room pressure is to be maintained, verify that the airflow remains constant over the full range of full cooling to full heating. Note any deviation from design airflow or room pressure.

5. After all terminals have been calibrated and balanced, test and adjust system for total airflow. Adjust fans to deliver total design airflows within the maximum allowable fan speed listed by fan manufacturer.
   a. Set outside air, return air and relief air dampers for proper position that simulates minimum outdoor air conditions.
   b. Set terminals for maximum airflow. If system design includes diversity, adjust terminals for maximum and minimum airflow so that connected total matches fan selection and simulates actual load in the building.
   c. Where duct conditions allow, measure airflow by Pitot-tube traverse. If necessary, perform multiple Pitot-tube traverses to obtain total airflow.
   d. Where duct conditions are not suitable for Pitot-tube traverse measurements, a coil traverse may be acceptable.
   e. If a reliable Pitot-tube traverse or coil traverse is not possible, measure airflow at terminals and calculate the total airflow.
6. Measure fan static pressures as follows:
   a. Measure static pressure directly at the fan outlet or through the flexible connection.
   b. Measure static pressure directly at the fan inlet or through the flexible connection.
   c. Measure static pressure across each component that makes up the air-handling system.
   d. Report any artificial loading of filters at the time static pressures are measured.
7. Set final return and outside airflow to the fan while operating at maximum return airflow and minimum outdoor airflow.
   a. Balance the return-air ducts and inlets the same as described for constant-volume air systems.
   b. Verify all terminal units are meeting design airflow under system maximum flow.
8. Re-measure the inlet static pressure at the most critical terminal unit and adjust the system static pressure setpoint to the most energy-efficient setpoint to maintain the optimum system static pressure. Record setpoint and give to controls contractor.
9. Verify final system conditions as follows:
   a. Re-measure and confirm minimum outdoor air, return and relief airflows are within design. Readjust to design if necessary.
   b. Re-measure and confirm total airflow is within design.
   c. Re-measure all final fan operating data, rpms, volts, amps, static profile.
   d. Mark all final settings.
   e. Test system in economizer mode. Verify proper operation and adjust, if necessary. Measure and record all operating data.
   f. Verify tracking between supply and return fans.

3.07 TOLERANCES

A. Set HVAC system's air flow rates within the following tolerances:
   1. Supply, Return, and Exhaust Fans and Equipment with Fans: Plus or minus 10 percent.
   2. Air Outlets and Inlets: Plus or minus 10 percent.
   3. Minimum Outside Air: Zero to plus 10 percent.

B. Maintaining pressure relationships as designed shall have priority over the tolerances specified above.

3.08 ADDITIONAL TESTS

A. Duct Leakage Test
   1. All ductwork shall be tested for leaks, using necessary instruments before insulating any ductwork. Conduct test as follows and as recommended in SMACNA Balancing Manual.
      a. Seal all openings in duct section and plenum to be tested.
      b. Connect test apparatus to test section of cuts, using a flexible duct connection or hose (fitting provided by Mechanical Contractor).
      c. Close damper on blower suction side, to prevent excessive build-up of pressure.
      d. Start blower and gradually open damper on suction side of blower.
      e. Determine amount of air leakage and make repairs as required.
      f. Leakage factor allowable shall be 5% based on the total operating cfm of the section of duct under testing.
      g. Tested sections of ductwork shall be visually marked with certification sticker and initials of field test inspector. Tests shall be made before duct sections are concealed.
   2. Witness the duct pressure testing performed by the mechanical/installing contractor.
   3. Verify that proper test methods are used and that leakage rates are within specified tolerances.
   4. Report any deficiencies observed.

3.09 FINAL TEST AND BALANCE REPORT

A. The report shall be a complete record of the HVAC system performance, including conditions of operation, items outstanding, and any deviations found during the T&B process. The final report also provides a reference of actual operating conditions for the owner and/or operations personnel. All measurements and test results that appear in the reports must be made on site and dated by the AABC technicians or test and balance engineers.

B. The report must be organized by systems and shall include the following information as a minimum:
   1. Title Page:
      a. AABC certified company name
      b. Company address
      c. Company telephone number
      d. Project identification number
      e. Location
      f. Project Architect
      g. Project Engineer
      h. Project Contractor
      i. Project number
      j. Date of report
      k. AABC Certification Statement
      l. Name, signature, and certification number of AABC TBE

2. Table of Contents.
3. AABC National Performance Guaranty.
4. Report Summary:
   a. The summary shall include a list of items that do not meet design tolerances, with information that may be considered in resolving deficiencies.
5. Instrument List:
   a. Type.
   b. Manufacturer.
   c. Model.
   d. Serial Number.
   e. Calibration Date.
6. T&B Data:
   a. Provide test data for specific systems and equipment as required by the most recent edition of the "AABC National Standards."
7. Print or sketch, reduced in size, showing all supply, return and exhaust air outlets for easy reference to report data.

C. One copy of the final test and balance report shall be sent directly to the Mechanical Engineer of record. Provide five additional copies to the contractor.

D. An approved copy of the balancing report shall be included in the maintenance manual submittal.

3.10 FINAL ACCEPTANCE

A. At the time of final inspection, the T&B Agency shall recheck, in the presence of the Owner's Representative, specific and random selections of data and air quantities recorded in the Certified Report.

B. Points and areas for recheck shall be selected by the Owner's Representative.

C. Measurement and test procedures shall be the same as approved for work forming basis of Certified Report.

D. Selections for recheck, specific plus random, will not normally exceed 25% of the total number tabulated in the report, except that special air systems may require a complete recheck for safety reasons.

E. If random tests elicit a measured flow deviation of 10% or more from that recorded in the Certified Report listings, by 10% or more of the selected recheck stations, the report shall be automatically rejected. In the event the report is rejected, all systems shall be readjusted and tested, new data recorded, new Certified Report submitted, and new inspection tests made, all at no additional cost to the Owner.

F. Following final acceptance of the Certified Report by the Owner's Representative the settings of all valves, splitters, dampers, and other adjustment devices shall be permanently marked by the T&B Agency, so that adjustment can be restored if disturbed at any time. Devices shall not be marked until after final acceptance.

END OF SECTION

SECTION 26 0500
BASIC ELECTRICAL REQUIREMENTS

PART 1 - GENERAL

1.01 WORK INCLUDED

A. Work included in this Section: All materials, labor, equipment, services, and incidentals necessary to provide and install the Electrical Work as shown on the drawings and as specified hereinafter, including, but not limited to the following:
   1. Demo and/or relocation of existing electrical, lighting, and low voltage systems in the way of the new project, including exterior underground relocations.
   2. Electrical and telecommunications service provisions (from the existing adjacent building) as outlined on the drawings.
   3. Branch Panel, existing panel modifications, circuit breakers, transformer, and feeders.
   4. Branch circuit wiring, wiring devices and connections to all equipment requiring electrical service.
   5. Lighting fixtures completely lamped, including switches, raceways and wiring.
   6. Telecommunications system extensions.
   7. Fire Alarm system extensions.
   8. Mechanical equipment power connections.
   9. Low voltage lighting control system and programming.
   10. Clock/Speaker system extensions.
   11. All required incidental work, such as wall penetrations, electrical testing, title 24 acceptance testing, and temporary power.
   12. Any other electrical work as might reasonably be implied as required, even though not specifically mentioned herein or shown on the the drawings.
   13. It is the intent of the drawings and specifications that systems be complete and, except as otherwise noted, be ready for operation.

1.02 RELATED WORK

A. Division 1 - General Requirements

B. Division 9 - Finishes

C. Division 23 - Mechanical

D. Section 07270 - Firestopping

1.03 INCORPORATED DOCUMENTS

A. Requirements of the General Conditions, Supplementary Conditions, and Division 1 Sections apply to all work in this Section, unless modified herein.

B. Published specifications, standard tests or recommended methods of trade, industry or government organizations apply to work of this Section where cited by abbreviations noted below, unless modified herein.
   1. 2019 California Code of Regulations.
   2. 2019 California Building Standards Administrative Code, Part 1, Title 24, C.C.R.
   3. 2019 California Building Code (CBC), Part 2, Title 24, C.C.R. (Based on 2018 International Building Code with 2016 California Amendments).
   4. 2019 California Electrical Code (CEC), Part 3, Title 24, C.C.R. (Based on 2017 National Electrical Code with 2019 California Amendments).
   5. California Energy Code, Part 6, Title 24, C.C.R.
   6. 2019 California Fire Code (CFC), Part 9, Title 24, C.C.R. (Based on 2018 International Fire Code with 2019 California Amendments).
   7. 2019 California Green Building Standards (CALGreen) Code, Part 11.

8. American Society of Civil Engineers 7-16 (ASCE/SEI), Minimum Design Loads for Buildings and Other Structures.
9. Underwriters' Laboratories, Inc. (UL).

C. All State and Municipal Codes and Ordinances.

1.04 CONDITIONS AT SITE:

A. Visit to site is required of all bidders prior to submission of bid. All will be held to have familiarized themselves with all discernible conditions and no extra payment will be allowed for work required because of these conditions, whether specifically mentioned or not.

B. Lines of other services that are damaged as a result of this work shall promptly be repaired at no expense to the Owner to the complete satisfaction of the Owner.

1.05 QUALITY ASSURANCE

A. Conformance:
1. All work shall conform to the applicable requirements of Article 1.03 above.
2. The Contractor shall notify the Architect, prior to submission of bid, about any part of the design, which fails to comply with abovementioned requirements.
3. If after contract is awarded, minor changes and additions are required by aforementioned authorities, even though such work is not shown on the drawings or covered in the specifications, they shall be included at Contractor's expense.

B. Coordination:
1. The Contractor shall become familiar with the conditions at the job site, and with the drawings and specifications and plan the installation of the electrical work to conform with the existing conditions and that shown and specified so as to provide the best possible assembly of the combined work of all trades.
2. The Contractor shall work out in advance all "tight" conditions, involving all trades and if found necessary, supplementary drawings shall be prepared by this Contractor, for the Architect's approval, before work proceeds in these areas. No additional costs will be considered for work, which must be relocated due to conflicts with the work of other trades.
3. The Contractor shall coordinate and verify all backbox, device, lighting fixture, or equipment mounting requirements with the devices or equipment to be installed, prior to rough in.

1.06 SUBMITTALS

A. Product Data:
1. Comply with the provisions of Section 01 33 00 - Submittals.
2. Within 15 days after award of the Contract, submit:
   a. Complete electrical, lighting, and signal systems material list of all items proposed to be furnished and installed under this Division. Provide manufacturers data sheets for all devices, raceways, fixtures, equipment, and related products to be used for the Division 26, 27, and 28 work.
   b. Manufacturers' specifications and other data required demonstrating compliance with the specified requirements.
   c. Manufacturers' recommended installation procedures which, when approved by the Architect, shall become the basis for inspecting and accepting or rejecting actual installation procedures used on the work.
3. Shop Drawings: Furnish shop drawings and/or equipment cuts for the following:
   a. Light fixtures including lamps and drivers.
   b. Panel boards and transformer. Panel board submittals shall include diagrams of the circuit breaker arrangements in the panels. Arrange circuit breakers in panels exactly as shown on the panel schedules in the construction documents.

c. Fire alarm system
d. Telecommunications system
e. Disconnect switches
f. Low voltage lighting control system
g. Clock/Speaker system.

4. Test Reports:
   a. Factory Tests: As specified for specific equipment.
   b. Field Tests: Performance tests as specified for specific equipment.
   c. Megger Tests: As specified under TESTING.
   d. When series rated circuit breakers are used, provide a letter from the manufacturer of the equipment confirming that U.L. series rating exists for all protective devices. State the available fault current from the Utility Company and indicate that the overcurrent devices exceed the available fault current at the respective point of protection.
5. Maintenance and Operating Manuals:
   a. Systems Description: Description of operating procedures.
   b. Controls: Diagrams and description of operation of each system.
   c. Equipment: Manufacturer's brochures, ratings, certified shop drawings, maintenance data, and parts lists with part numbers. Mark each sheet with equipment identification number and actual installed condition.
   d. Materials and Accessories: Manufacturer's brochures, parts lists with part numbers, and maintenance data where applicable. Mark each sheet with identification number of system and location of installation.
   e. The Maintenance and Operation Manual shall be presented in a three ring binder that has tabbed sections as stated below. Provide all information in each section as stated below.
      1) 26 2700:
         (a) Insert the approved submittals for the new panelboard and transformer.
         (b) Provide the names, addresses and telephone numbers of the manufacturer and the two closest manufacturer's representatives of the equipment.
      2) 26 5101:
         (a) Insert the approved submittals for the light fixtures.
         (b) Highlight the lamp type that was installed for each light fixture.
         (c) Provide the names, address and telephone numbers of the manufacturer and the closest manufacturer's representative for each light fixture.
      3) 26 5101:
         (a) Insert the approved submittals for the motion sensing light control equipment.
         (b) Insert all operating instructions.
         (c) Provide the names, address and telephone number of the manufacturer and the closest manufacturer's representative of the equipment.
         (d) Include the manufacturer's recommended maintenance of the equipment.
      4) 27 0000:
         (a) Insert the approved submittals for the telecommunications system.
         (b) Provide the names, address and telephone number of the manufacturer and the closest manufacturer's representative of the equipment.
         (c) Include the manufacturer's recommended maintenance of the equipment.
      5) 28 3101:
         (a) Complete the “Record Of Completion” entirely.
         (b) In the “Download File” indicate the exact equipment that the Monitor Modules are monitoring. i.e. fire sprinkler flow switches, tamper switches, etc..

(c) Simplify the Download File so that it coincides with the submitted and approved fire alarm single line diagram.
(d) Provide the names, address and telephone number of the manufacturer and the closest manufacturer's representative of the equipment.
(e) Include the manufacturer's recommended maintenance of the equipment.
(f) Insert an abbreviated data sheet that states how to test, reset and silence the fire alarm system.
(g) Insert the name and telephone number of the Central Station that receives the alarms, and the proper sequence to follow during an alarm.

6) 26 0800:
(a) Insert all systems testing results.

6. Record Documents: "As-builts": As specified under Paragraph 3.2 of this Section.

1.07 DELIVERY, STORAGE AND HANDLING

A. Protection: Use all means necessary to protect the materials of this Section before, during, and after installation and to protect the work and materials of all trades.

B. Delivery and Storage: Deliver all materials to the job site in their original containers with all labels intact and legible at time of use. Store in strict accordance with approved manufacturers' recommendations.

C. Replacements: In the event of damage, immediately make all repairs and replacements necessary to the approval of the Architect and at no additional cost to the Owner.

D. This Contractor shall personally, or through an authorized representative, check all materials upon receipt at jobsite for conformance with approved shop drawings and/or plans and specifications.

1.08 SCHEDULING/SEQUENCING

A. Place orders for all equipment in time to prevent any delay in construction schedule or completion of project. If any materials or equipment are not ordered in time, additional charges made by equipment manufacturers to complete their equipment in time to meet the construction schedule, together with any special handling charges, shall be borne by this Contractor.

B. The Contractor shall coordinate production and delivery schedule for all Owner-supplied equipment with the equipment suppliers to ensure that all Owner-supplied equipment is delivered to site in coordination with the construction schedule and in such a manner as to cause no delays in completion of the Contract as scheduled.

1.09 REQUIREMENTS

A. The contract drawings indicate the extent and general arrangements of the conduit wiring systems, etc. If any departures from the contract drawings are deemed necessary by the Contractor, details of such departures and the reasons therefore shall be submitted as soon as practicable, and within thirty-five (35) days after award of the electrical contract.

B. Unless material list and data is received as a complete and all-inclusive submittal within the stipulated time all items shall be provided as specified, with no deviations permitted.

C. Any and all additional costs incurred by the substitution of electrical material or equipment, or installation thereof, whether architectural, structural, plumbing, mechanical or electrical, shall be borne by the Contractor under this Section.

D. Burden of proof of equality of any substitution for a specified product is the responsibility of this Contractor.

E. Where required by Architect to ascertain equality of substitute product, Contractor may be requested to provide the specified item and the submitted substitution for comparison, at no additional cost to the Owner.

1.10 DESCRIPTION OF DEMOLITION AND REPLACEMENT WORK

A. This project includes the demolition of existing systems and installation of new at an existing campus. As such, the project scope for this contractor shall include all associated electrical, lighting, and signal system upgrades and demolition/removal work at the existing building, the ceramics container structure, and the site. The intent is that all systems will be complete and functional at the completion of this contract and that all old systems, equipment, feeders, circuits, wiring, and related devices (no longer used) be completely and neatly removed. Where discrepancies between the drawings and existing conditions are noted, the Architect or Owner shall be notified immediately for resolution.

B. As with every renovation project, the electrical work will include (and require) exploration and other field work on a daily basis to complete the new designed equipment and connections within the constraints of the existing building and existing site conditions.

C. The contractor shall include as part of the base bid, sufficient labor hours to provide such exploration and field work throughout the duration of the project. Change orders for miscellaneous coordination of existing conditions will not be approved unless specific and latent conditions are uncovered that warrant such additional compensation or require additional work not shown on the drawings or included in the specifications, or implied by the designed conditions.

D. New raceways and wiring to new and renovated equipment are to be installed unless otherwise noted. Where raceways are installed in accessible concealed locations (i.e. unfinished spaces or electrical / mechanical / attic spaces), EMT with wire shall be used. Where new wiring is required to be routed through existing walls and ceilings that cannot readily be accessible for new conduit, MC cable or flex conduit and wiring may be installed, fished through and secured in each space as required by Code. Non-metallic sheathed cable shall not be utilized on this project.

E. All new raceways shall be installed concealed and all new equipment installed flush, unless otherwise noted on the drawings or in these specifications.

1.11 GUARANTEE

A. This Contractor shall guarantee that all work executed under this Section will be free from defects of materials and workmanship for a period of one (1) year or as per the General Conditions of this project, whichever is longer. Dates shall be from the date of final acceptance of the building. The contractor shall further guarantee that he will, at his own expense, repair and replace all such defective work, and all other work damaged thereby, which becomes defective during the term of the guarantee. Such repair or replacement shall be guaranteed for one (1) year from the date of repair or replacement.

1.12 IDENTIFICATION

A. Panels and feeder circuit breakers therein, branch panels, disconnect switches, transformers, motor disconnect switches, cabinets, and other apparatus used for the operation of, or control of circuits, appliances or equipment, shall be properly identified by means of engraved laminated plastic descriptive nameplates mounted on apparatus using stainless steel screws. Nameplates shall have white letters with black background and be submitted to the Architect for approval. Cardholders in any form are not acceptable.

B. Provide p-touch style labeling of circuit designations for all receptacles on the project.

C. Each branch circuit of panel boards to have a permanently fixed number with load directory, mounted under celluloid on inside of cabinet door, showing circuit numbers and typewritten

description of equipment supplied by breakers. Where changes are made to existing panelboards, newly typewritten circuit directories shall be prepared to replace existing directories.

D. Provide silk-screened or engraved identification labels on all switch box covers identifying specific loads that are not readily apparent to the user, including exhaust fans, etc.. Submit proposed labels to Architect for approval prior to manufacture of labels.

PART 2 - PRODUCTS

2.01 GENERAL

A. Refer to applicable Division 26, 27, and 28 Sections for complete products specifications.

2.02 MATERIALS

A. Materials of the same type or classification, used for the same purpose, shall be the product of the same manufacturer.

2.03 ACCEPTABLE MANUFACTURERS

A. Materials shall be of make mentioned elsewhere in this specification. All materials shall be the best of their several kinds, perfectly new and approved by the Underwriters' Laboratories.

B. Where material, equipment, apparatus or other products are specified by manufacturer, brand name, type or catalog number, such designation is to establish standards of desired quality, style and utility and shall be the basis of the bid. Materials so specified shall be furnished under the contract unless changed by written approval of the Architect. Where two or more designations are listed, choice shall be optional with this Contractor, but this Contractor must submit his choice for final approval.

2.04 POSTED OPERATING INSTRUCTIONS

A. Furnish approved operating instructions for systems and equipment where indicated in the technical sections for use by operation and maintenance personnel. The operating instructions shall include wiring diagrams, control diagrams, and control sequence for each principal system and equipment. Print or engrave operating instructions and frame under glass or in approved laminated plastic. Post instructions as directed. Attach or post operating instructions adjacent to each principal system and equipment including startup, proper adjustment, operating, lubrication, shutdown, safety precautions, procedure in the event of equipment failure, and other items of instruction as recommended by the manufacturer of each system or equipment. Provide weather-resistant materials or weatherproof enclosures for operating instruction exposed to the weather. Operating instruction shall not fade when exposed to sunlight and shall be secured to prevent easy removal or peeling.

2.05 CATALOGED PRODUCTS/SERVICE AVAILABILITY

A. Materials and equipment shall be current products by manufacturers regularly engaged in the production of such products. Products shall have been in satisfactory commercial or industrial use for 2 years prior to bid opening. The 2-year period shall include applications of equipment and materials under similar circumstances and of similar size. The 2-year period shall be satisfactorily completed by a product for sale on the commercial market through advertisements, manufacturers' catalogs, or brochures. Products having less than a 2-year field service record will be acceptable if a certified record of satisfactory field operation for not less than 6,000 hours, exclusive of the manufacturers' factory or laboratory tests, is furnished. The equipment items shall be supported by service organizations which are reasonable convenient to the equipment installation in order to render satisfactory service to the equipment on a regular and emergency basis during the warranty period of the contract.

PART 3 - EXECUTION

3.01 INSPECTION

A. Examine the areas and conditions under which the work of this Section will be installed. Correct conditions detrimental to the proper and timely completion of the Work. Do not proceed until unsatisfactory conditions have been corrected.

3.02 PREPARATION

A. Drawings:
   1. The general arrangement and location of wiring and equipment is shown on the electrical drawings and shall be installed in accordance therewith, except for minor changes required by conflict with the work of other trades.
   2. The Contractor shall coordinate and verify all backbox, device, lighting fixture, or equipment mounting requirements with the devices or equipment to be installed, prior to rough in.
   3. Drawings indicate the circuit and panel which supplies each device or fixture. Provide and install conduit and conductors to make all connections from panel to nearest device and from first device to additional devices on same circuit. Conduit size and fill shall satisfy NEC requirements. Two or three different phases supplied by a 3-phase panel may share a single neutral only if circuit positions are adjacent in the panel. Do not exceed 4 #12 or 3 #10 conductors in a ½" conduit, 7 #12 or 5 #10 in a 3/4" conduit, and 11 #12 or 9 #10 in a 1" conduit, unless otherwise noted. Provide common handle-tie on breakers for multi-wire branch circuits (with common neutral), per NEC. If more than three current carrying conductors are installed in one conduit, conductor size shall be increased as required per NEC. Do not share neutrals for branch circuit runs to electronic equipment or where noted on the drawings.
   4. Drawings indicate the location of all light switches. Where fixtures in a room are controlled by more than one switch, the same lower case letter is drawn adjacent to a switch and each fixture controlled by that switch. Where no lower case letter is adjacent to a switch, all fixtures in the room are controlled by that switch. Provide and install conduit and wire from fixture to switch and between fixtures as required to accomplish switching shown. Do not route branch circuit wiring for light fixtures through switch boxes. Where dimming controls are specified, provide required dimming control wiring in addition to power wiring from control device to all controlled light fixtures. Provide separate conduit for dimming control wiring unless otherwise indicated on the drawings.
   5. Drawings indicate location of all signal outlet boxes. Provide and install conduit system as required and complete system wiring, unless otherwise noted.
   6. Control wiring is generally not shown on the plans. Contractor shall refer to control diagrams and provide and install all wiring and raceways required to make all interconnections.
   7. All branch circuit wiring No. 12 or No. 10 as noted, all control wiring No. 14, except as noted next to "slash marks" on the drawings, or as noted under "Wire," as specified herein.
   8. All dimensions, together with locations of doors, partitions, etc. are to be taken from the Architectural Drawings, verified at site by this Contractor.
   9. Maintain "as-built" records at all times, showing the exact location of concealed conduits and feeders installed under this contract, and actual numbering of each circuit. Upon completion of work and before acceptance can be considered, this Contractor must forward to the Architect, updated CAD plans, corrected to show the electrical work as actually installed.
   10. Branch circuit conductors shall be #12 minimum and #10 minimum for runs longer than 150 feet.

B. Measurements: Before ordering any material or closing in any work, verify all measurements on the job. Any differences found between dimensions on the drawings and actual measurements shall be brought to the Architect's attention for consideration before proceeding.

3.03 FIELD QUALITY CONTROL

A. All workmanship shall be first class and carried out in a manner satisfactory to and approved by the Architect.

B. This Contractor shall personally, or through an authorized and competent representative, constantly supervise the work and so far as possible keep the same foreman and workmen on the job throughout.

3.04 INSTALLATION/APPLICATION/ERECTION

A. All electrical raceways and devices shall be installed concealed (for raceways) and/or flush mounted (for devices), unless otherwise noted. Provide cut-in boxes and "fish" flexible MC or flex conduit and wire through existing walls to remain, unless shown otherwise on plans. Cut and patch to facilitate such installation to match adjacent and original finish.

B. All cutting, repairing and structural reinforcing for the installation of this work shall be done by the General Contractor in conformance with the Architect's requirements.

3.05 EMERGENCY POWER SOURCES

A. All emergency source circuits shall be installed in separate raceways (from normal power), per 2017 NEC 700.10(B), or the applicable code at the time of permitting.

3.06 TEMPORARY LIGHTING AND POWER

A. Provide and install temporary lighting and power systems for the duration of construction, of adequate size to accommodate the required lighting and power loads. Coordinate with other trades to insure adequate sizing.

B. Provide distribution equipment as required to support all construction activities.

3.07 FIRE STOPPING AND FIRE RATED PENETRATIONS

A. All electrical equipment mounted in, on, or through fire rated construction shall be installed to maintain the fire rating of the construction.

B. Provide fire rated pads (or other suitable assembly) around all electrical junction boxes in fire rated walls/ceilings/floors to maintain the fire rating.

C. Provide fire rated construction around all recessed light fixtures and/or panel board / cabinets mounted flush in fire rated walls to maintain the fire rating. Coordinate depth of construction with other trades to avoid conflicts.

D. Conduit sleeves shall be provided as a means of routing cables through fire-rated walls or floors. Openings in sleeves and conduits used for system cables and those which remain (empty) spare shall be sealed with an approved fireproof, removable sagging material. Sleeves which pass vertically from floor to floor shall be sealed in a similar manner using an approved re-enterable system. Additional penetrations through rated assemblies necessary for passage of tel/data wiring shall be made using an approved method and permanently sealed after installation of cables.

3.08 ADJUSTING AND CLEANING

A. All electrical equipment, including existing equipment not "finish painted" under other sections, shall be touched up where finished surface is marred or damaged.

B. All equipment, lighting fixtures, etc., shall be left in clean condition, with all shipping and otherwise unnecessary labels removed there from.

3.09 SCHEDULES

A. Coordination: Coordinate installation of electrical items with the schedule for other work to prevent unnecessary delays in the total Work.

3.10 WARNING SIGN MOUNTING

A. Provide the number of signs required to be readable from each accessible side, but space the signs a maximum of 30 feet apart.

3.11 PAINTING OF EQUIPMENT

A. Factory Applied: Electrical equipment shall have factory-applied painting systems which shall, as a minimum, meet the requirements of NEMA ICS 6 corrosion-resistance test, except equipment specified to meet requirements of ANSI C37.20 shall have a finish as specified in ANSI C37.20.

B. Field Applied: Paint electrical equipment as required to match finish or meet safety criteria. Painting shall be as specified in the respective equipment section.

3.12 TESTS

A. Testing and inspection: See Section 26 08 00 - Testing.

END OF SECTION

SECTION 26 0800
TESTING

PART 1 - GENERAL

1.01 WORK INCLUDED

A. Work Included in This Section: All materials, labor, equipment, services, and incidentals necessary to perform the testing and inspection of the electrical work, including but not limited to the general systems noted below:
   1. Grounding system.
   2. Lighting system.
   3. Distribution system.
   4. Fire Alarm system.
   5. Lighting control system.
   6. Telecommunications system.
   7. Title 24 Acceptance Testing.
   8. Any other electrical work as might reasonably be implied as required, even though not specifically mentioned herein or shown on the drawings.
   9. All work shall comply with Sections 26 05 00 and 26 27 00.
   10. In addition to the general system tests and inspections indicated above, the Contractor shall perform the following inspections and tests. The Contractor shall provide all material, equipment, labor, and technical supervision to perform such tests and inspections:
      a. System Grounding.
      b. Panelboards.
      c. Feeders.
   11. The purpose of these tests is to assure that all tested electrical equipment is operational and within industry and manufacturer's tolerances and is installed in accordance with design specifications.

1.02 APPLICABLE CODES, STANDARDS, AND REFERENCES

A. All inspections and tests shall be in accordance with the International Electrical Testing Association - Acceptance Testing Specifications ATS-2021 (referred to herein as NETA ATS-2021).

1.03 QUALIFICATIONS

PART 2 - PRODUCTS

2.01 THIS ARTICLE DOES NOT APPLY TO TESTING.

PART 3 - EXECUTION

3.01 GENERAL

A. Final test and inspection to be conducted in presence of the Authority having Jurisdiction (AHJ) or Inspector of Record (IOR). Test shall be conducted at the expense of, and managed by, the Contractor, at a mutually agreed time. Submit written test report of all tests, with test result values and overall outcome.

B. All portions of the electrical installation shall be inspected and tested to ensure safety to building occupants, operating personnel, conformity to code authorities and Contract Documents, and for proper system operation.

3.02 INSPECTIONS AND TESTS

A. Tests: Field tests shall be performed and reports submitted, as per Section 26 05 00, Part 1.

1. Final Inspection Certificates: Prior to final payment approval, deliver to the Owner, with a copy to the Architect, signed certificates of final inspection by the appropriate local authority having jurisdiction.
2. Grounding System:
   a. All ground connections shall be checked and the entire system shall be checked for continuity. The resistance of grounding electrodes in the system shall be measured using a 3 point fall-of-potential method. The maximum ground resistance shall be three ohms. If the measured ground resistance exceeds three ohms, install (1) additional ground rod, bonded and interconnected with the grounding electrode system.
   b. Ground tests shall meet or exceed the requirements of the National Electric Code.
3. Lighting Systems:
   a. The interior and exterior lighting systems shall be checked for proper local controls and operation of entire installation, including the operation of the low voltage lighting control system.
4. Power Distribution System:
   a. Test panel boards for grounds and shorts with mains disconnected from feeders, branch circuits connected and circuit breakers closed, all fixtures in place and permanently connected and grounding jumper to neutral lifted and with all wall switches closed.
   b. Test each individual circuit at each panelboard with equipment connected for proper operation. Inspect the interior of each panel.
   c. Check verification of color coding, tagging, numbering, and splice make-up.
   d. Verify that all conductors associated with each circuit are in same conduit.
   e. Demonstrate that all lights, jacks, switches, outlets, and equipment operate satisfactorily and as called for.
   f. Perform megger tests of all new distribution system feeders prior to energizing. All Cables failing megger tests or with evidence of damage shall be removed and replaced in their entirety (no splices), at no cost to the Owner. Damaged cables may not be field repaired without specific approval of the Architect.
5. Fire Alarm System: Verify that all equipment, components, and devices function as specified. Refer to Section 28 3101 for additional testing requirements.
6. Clock/Speaker System: Verify that all equipment, components, and devices function as specified.
7. Lighting Control System: Verify that all equipment, components, and devices function as specified. Refer to Section 26 5101 for additional testing requirements.
8. Telecommunications System: Verify that all equipment, components, and devices function as specified. Refer to Section 27 0000 for additional testing requirements.

B. Title 24 Acceptance Testing: Contractor shall complete the requirements for Title 24 Acceptance Testing, as per CA Title 24, Part 6.
   1. Perform testing requirements as per Title 24 Lighting Acceptance requirements. Testing shall include construction inspection of installed controls, occupancy / motion sensor testing, manual daylighting controls testing, automatic time switch controls testing, and demand response system interface, as applicable.
   2. Complete and submit all required forms for complete Acceptance Testing.
   3. Obtain required review and approval of Acceptance Forms to allow final certificate of occupancy to be granted.

END OF SECTION

SECTION 26 2700

BASIC ELECTRICAL MATERIALS AND METHODS

PART 1 - GENERAL

1.01 WORK INCLUDED

A. Work included in this Section: All materials, labor, equipment, services, and incidentals necessary to install the electrical work as shown on the drawings and as specified hereinafter, including but not limited to the work listed below:
   1. Raceways, feeders, branch circuit wiring, wiring devices, safety switches and connections to all equipment requiring electric service.

B. Any other electrical work as might reasonably be implied as required, even though not specifically mentioned herein or shown on the drawings.

C. All work shall comply with Section 26 05 00.

1.02 RELATED WORK

A. Division 09 - Finishes

B. Division 23 - Motors and Mechanical Equipment Installation

1.03 SUBMITTALS

A. Comply with the provisions of Section 26 05 00.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Refer to Section 26 05 00, Basic Electrical Requirements, Part 2 - Products.

B. List of Equipment Manufacturers:

C. Conduit and Conduit Fittings
   1. Allied Tube and Conduit, Wester Tube and Conduit, LTV Steel Tubular, National Electric Products, AFC, Republic Steel Corporation, Rome Cable Corporation, United States Steel Corporation, Killark Electric Manufacting Company, Raco, VAW Aluminum Company, Bridgeport, Steel City, Thomas & Betts, Carlon, O.Z. Gedney, Appleton, Regal.

D. Wire and Cable (600V)
   1. American Wire Company, General Wire and Cable Corporation, Okonite Company, Rome Cable Corporation, Cerrowire, American Insulated Wire, AFC Cable Systems, Essex, Simplex Wire and Cable Company, Southwire.

E. Solderless Lugs and Grounding Connections
   1. Burndy Engineering Company Inc, O.Z. Gedney Company Inc, Penn Union Electric Corporation, Thomas and Betts Company Inc.

F. Pull Boxes, Gutters, Special Cabinets
   1. Schneider-Square D Company, Columbia Electric Manufacturing Company, General Electric Company, Eaton Inc.

G. Outlet Boxes
   1. Appleton Electric Company, Killark Electric Manufacturing Company, Lew Electric Fittings Company, National Electric Products Corporation, Raco, Steel City Electric Company, Carlon, Bowers.

H. Wiring Devices
   1. Leviton, Arrow-Hart, Cooper, Hubbell, Lutron, Bryant.

I. Conduit Racks, Hangers

1. General Electric Company, Killark Electric Manufacturing Company, Caddy, National Electric Products Corporation, Republic Steel Corporation, Rome Cable Corporation, United States Steel Corporation, VAW Aluminum Company, Superstrut, B-Line.

J. Safety Switches (Disconnect and Fusible)
1. Schneider-Square D Company, Eaton-Cutler Hammer Inc, General Electric Company.

K. Fuses
1. Bussman Manufacturing Company, Chase-Shawmut Company.

L. Firestopping
1. 3M, Nelson.

2.02 MATERIALS

A. Grounding:
1. Provide and install grounding system as noted on the drawings.
2. Grounding electrode conductor: bare stranded copper type, #2 minimum.
3. Install ground wires in rigid conduit.
4. All grounding electrode conductor connections "thermite" or "cad-weld" welded.
5. Use approved pressure type solderless connector or use fusion welding for all connections to and bonding of grounding electrode system. All connections shall be visible, readily accessible for testing purposes. Grounding electrode conductor between the grounding electrode and service equipment: Minimum #4/0.
6. Furnish and install solid copper or copper-clad 5/8" x 10'-0" ground rod(s). Where multiple ground rods are shown, install a minimum of 20'-0" apart. Install ground rods in accessible boxes with covers. Furnish and install 2-#4/0 bare copper cables between multiple ground rods and main switchboard ground bus.
7. Terminate grounding conduits at equipment with ground bushing, with ground wire connected through bushing.
8. Provide No. 12 stranded (green) THHN conductor from outlet box to ground screw of every receptacle.
9. Ground all isolated sections of metallic raceways.
10. Provide #12 minimum stranded (green) THHN conductor sized per NEC, or as noted, connected continuously throughout branch circuit for all circuits, bonded to panel ground bus, and to all electrical devices and equipment enclosures.
11. Grounding electrode installed as follows:
    a. Place #4/0 bare copper cable in foundation trench; tensioned, supported in such a manner that it cannot be less than two (2) inches from bottom or side of concrete when foundation concrete is poured; not less than one hundred feet of conductor. Embed in foundation with a loop at approximate center, brought out at top of foundation at location of building service equipment for connection to service equipment and for bonding to other parts of the grounding electrode system.
    b. Use approved pressure type solderless connector or use fusion welding for all connections to grounding electrode. Connection visible, readily accessible for testing purposes. Grounding electrode conductor between the grounding electrode and service equipment: Minimum #4/0.
    c. Connect grounding electrode system to metallic water service entry metallic cold water pipe (if available) with nonferrous clamp and bare copper cable (sized as required) in conduit. Connection shall be accessible for inspection.
    d. Connect grounding electrode system to effectively grounded building steel as indicated on the drawings. Use exothermic weld, connection shall be accessible for inspection.

e. After installation, test system using the three-point fall of potential method only. Record results and submit to Architect for approval. If resistance to ground exceeds three ohms, install an additional ground rod, bonded and interconnected to the grounding electrode system.
f. Connect ground bar of separately derived systems (e.g all dry-type transformers) to effectively grounded building steel at the closest possible accessible location, or if building is concrete, or the steel is not effectively grounded, to the main switchboard ground bus: Use #4/0 copper conductor for all connections.

B. Panelboards:
1. Surface (or flush where indicated on the drawings) mounted, with branch circuits as indicated on the drawings.
2. Enclosures: code gauge galvanized sheet steel with welded full flange end pieces, stretcher- leveled steel trim, backpan and door.
3. Bussing of copper with silver-plated contact surfaces.
4. Trims on surface-mounted cabinets secured with nickel-plated screws with cup washers, bottom of all trims to have lugs for resting on cabinet flange.
5. Panels shall be 20 inches minimum in width, provided with approved gutter space, barriers and adjustable supports. Doors mounted with concealed hinges provided with combination spring latch and lock. Doors and trims and surface mounted cabinets primed and finished with one coat baked on gray enamel. All visible panel enclosures and covers in finished (occupied) areas shall be painted to match adjacent wall finish.
6. Breakers on same phase to be aligned horizontally. Each panel provided with quantity (5) spare handle locks. Install handle locks on all breakers serving fire alarm equipment.
7. Each branch circuit of panelboards to have a permanently fixed number with one word directory, mounted under celluloid on inside of cabinet door, showing circuit numbers and typewritten description of outlets controlled by breakers. Color code mains and each breaker terminal, same as conductor insulation.
8. Each panel shall be equipped with a copper ground bus.
9. All panels shall be fully bussed to accept future circuit breakers, with breaker hardware provided where indicated on the drawings.
10. Panel board submittals shall include diagrams of the circuit breaker arrangements in the panels. Arrange circuit breakers in panels exactly as shown on the panel schedules in the construction documents - no deviations permitted.

C. Circuit Breakers:
1. General: Circuit breakers shall be molded case rated for 480 or 240 volts, multiple or single pole and amperage rating as shown on the drawings, bolt on, manually operated with "de-ion" arc chutes.
2. Distribution circuit breakers shall be rated for the amps interrupting capacity noted on the drawings or U.L. series rated with the main circuit breaker.
3. Branch circuit breakers shall be rated for the amps interrupting capacity or U.L. series rated with the distribution and main circuit breakers, General Electric type THQB or equal, minimum 10,000 A.I.C for 120/208 volt; type TEY or equal, minimum 14,000 A.I.C for 277/480 volt.
4. Where mechanical equipment is U.L. listed for overcurrent protection with fuses or HACR type circuit breakers, provide fuses where a fused switch is shown. Where the overcurrent protection is a circuit breaker provide HACR, (Heating, Air-Conditioning and Refrigeration) type.

D. Dry-Type Transformers:
1. Ventilated type.

2. Dry-type general distribution transformers shall meet the California Title 24 requirements for energy efficiency standards and DOE 10 - CFR, Part 431 (2016) for energy efficient transformers.
3. Transformer shall be 3 phase, 60 Hertz. Primary winding shall be Delta connected and secondary winding shall be Wye connected. The temperature rise at rated voltage and full load shall not exceed 150 degrees C with a 220 degrees C U.L. Component Recognized Insulation System. The windings shall be aluminum or copper.
4. The higher voltage winding shall have quantity (6) 2.5% taps - (2) FCAN and (4) FCBN. Set secondary voltage for 120/208V.
5. Transformer terminals shall be front connected for ease of installation and maintenance.
6. Where the transformers are installed outdoors provide weatherproof drip cover, rodent screen and a weathertight rating of the enclosure.

E. Raceways: Only the raceways specified below shall be utilized on this project. Substitutions shall be pre-approved in writing. All bare conduit ends (stub-ups or stub-outs) shall be provided with bushed ends or manufactured insulated throat connectors:
1. Rigid Type - hot dip galvanized or sherardized steel, use on all exterior locations, below grade or in concrete slab, and to 18" on either side of structural expansion joints in floor slabs, with completely watertight, threaded fittings throughout. Compression fittings are not acceptable.
   a. All rigid steel conduit couplings and elbows in soil or concrete or under membrane to be ½ lap wrapped with Scotch #50 tape and threaded ends coated with T&B #S.C.40 rust inhibitor prior to installation of couplings.
   b. ½ lap wrap all rigid steel conduit stub-ups from slab or grade to 6" above finished grade level with Scotch #50 tape.
2. In lieu of rigid steel conduit for power and control raceways and branch circuit conduits in soil or concrete slabs, "Schedule 40" PVC with Schedule 80 PVC conduit elbows and stub-ups may be used with code size (minimum No. 12) ground wire. A “stub-up” is considered to terminate 6" above the finished surface.
   a. Schedule 80 PVC conduit shall be used in all concrete footings or foundations and to 18" of either side of footings or foundation walls.
   b. Schedule 80 PVC conduit shall be used in all concrete masonry unit (CMU) walls or columns.
   c. All conduit runs in concrete floor slabs (where allowed) shall be installed to comply with all applicable CBC and structural codes to maintain the structural integrity of the floor slab. Where conflicts occur, alternate routing shall be provided at no additional cost to the Owner.
   d. Where schedule 80 PVC is coupled to schedule 40 or other raceways with differing interior dimensions, each end shall be reamed with a reaming tool to reduce the edge profile for protection of the passing conductors during the pull.
3. Electrical metallic tubing shall be used exposed in interior electrical and mechanical rooms, in interior unfinished spaces, and in interior concealed and furred spaces, made up with steel watertight or steel set screw type fittings and couplings. EMT shall not be used in under-building crawl spaces or other areas subject to moisture. Set screws shall have hardened points. Die-cast zinc fittings are unacceptable.
4. Use flexible conduit for all motor, transformer and recessed fixture connections, minimum ½"; "Seal tite" type used outdoors and in all wet locations, provide with code size (minimum No. 12) bare ground wire in all flexible conduit.
5. All conduit cuts (factory or field cut) shall be perfectly square to the length of the conduit and cut ends shall be reamed with a reaming tool to provide a smooth edge to the passing conductors and to remove all burs and scrapes. Use of a hand file is not acceptable.

6. All electrical raceways shall be installed concealed, unless otherwise noted. Cut and patch to facilitate such installation to match adjacent and original finish. All exposed conduits, where required, shall be installed parallel to building members.
7. All emergency source circuits shall be installed in separate raceways (from normal power), per 2017 NEC 700.10(B), or the applicable code at the time of permitting.
8. Where existing conditions preclude the installation of EMT in existing walls to remain, provide and install cut-in type boxes and "fish" flexible MC or flex conduit and wire through existing walls to remain, unless shown otherwise on plans.
9. Fasten conduits securely to boxes with locknuts and bushings to provide good electrical continuity.
10. Provide chrome escutcheon plates at all exposed wall, ceiling and floor conduit penetrations.
11. Support individual suspended conduits with heavy malleable strap or rod hangers; supports for ½ inch or 3/4 inch conduit placed on maximum 7-foot centers; maximum 10-foot centers on conduits 1 inch or larger.
12. Support multiple conduit runs from Kindorf B907 channels with C-105 and C-106 straps.
13. Conduit bends - long radius.
14. Flash conduits through roof, using approved roof jack; coordinate with General Contractor.
15. To facilitate pulling of feeder conductors, install junction boxes as shown or required.
16. Where conduits pass through structural expansion joints in floor slab, rigid galvanized conduit shall be used 18" on either side of joint, complete with Appleton expansion couplings and bonding jumpers, or equal. All above grade expansion joint crossings shall also utilize expansion joint couplings or flex conduit transitions as required for each particular installation. Installed condition shall allow for a minimum deflection of raceway and wire (in any direction) equal to the structural expansion joint dimension (building to building). No solid conduits shall be allowed to cross expansion joints without proper provisions for building and seismic movement.
17. Minimum cover of conduits in ground outside of building - 24 inches, unless otherwise noted.
18. Provide and install exterior wall conduit seals and cable seals in the locations listed below. Coordinate installation and scheduling with other trades:
    a. Conduit seals through exterior wall or slab (below grade): O.Z. Gedney series “FSK" in new cast in concrete locations, series "CSM" in cored locations.
    b. Conduit seals through exterior wall or slab (above grade): O.Z. Gedney series "CSMI."
    c. Cable seals at first interior conduit termination after entry through exterior wall or slab: O.Z. Gedney series "CSBI." Coordinate quantity of conductors at each location.

F. Outlet Boxes and Junction Boxes. Verify all backbox requirements with devices to be installed prior to rough-in.
1. One piece steel knockout type drawn boxes, unless otherwise noted, sized as required for conditions at each outlet or as noted.
2. Flush-mounted boxes equipped with galvanized steel raised covers for device mounting flush with finished surface. Provide extension rings as required on all acoustical or additional wall treatment areas to bring top of cover flush with finished surface (coordinate with architectural drawings). Devices shall be capable of being tightly mounted to boxes without distorting or bending device or mounting hardware.
3. Boxes for fixture outlets: 4-inch octagon or larger as required, or as noted.
4. Switch and receptacle outlets - not smaller than 4-inch-square in furred walls, with raised cover for single device; ganged where required.

5. Outlet and switch boxes for wet locations, cast aluminum FS or FD type with cast aluminum gasketed spring lid cover. Weatherproof "Bell" type boxes are not acceptable.
6. All connectors from conduit to junction or outlet boxes shall have insulated throats. Connectors shall be manufactured with insulated throats as integral part. Insertable insulated throats are unacceptable.
7. Outlet boxes for telecommunications, 4" square or larger as required or noted, multi-ganged for voice, data, and other services where indicated on the drawings.
8. Conduit Bodies: Malleable iron type, with lubricated spring steel clips over edge of conduit body, O-Z/Gedney type EW, or equal.
9. Pull boxes: All site pull boxes shall be flush in-ground concrete, with engraved covers identifying service use (i.e. electrical, communications, etc.). Boxes shall be Nema 250, Type 6, outside flanged, with recessed cover for flush mounting, by Christy or equal, with required depth to provide box and conduit depths shown or required.
    a. Provide concrete covers for all boxes in planted or paved areas (up to available concrete cover size).
    b. Provide galvanized steel covers for all larger boxes (when concrete is not available), or in traffic areas. No cast iron covers.
    c. Provide bolted covers and slab bottoms (with grouted perimeter) or vault type boxes for all electrical distribution and signal system pull boxes used for site distribution, to prevent rodent entry. No collar type boxes with dirt or gravel bottoms
    d. Provide drain hole at bottom of all vault type boxes, with loose aggregate base below, for proper drainage.
    e. All covers to be completely flush with finished adjacent surfaces.
    f. Provide galvanized steel H20 rated covers and installation of box rated for H20 in all traffic areas.
    g. Provide pullboxes per utility company specifications for all electrical primary and secondary services and for telecommunications service runs. Verify exact size and type prior to order with each utility company.

G. Wire and Cable (line voltage and signal systems):
1. 600-volt class where used for or run with line voltage power wiring, insulation color coded, minimum No. 12 AWG for power branch circuits, No. 14 for power control circuits, and wiring size and type as directed by signal system manufacturer for each signal system.
2. All conductors shall be copper.
3. Size and insulation type:
    a. Standard locations: #12 to #1 AWG: THWN for wet locations and THHN for dry locations. #1/0 through #4/0 AWG: XHHW (55 Mils). 250MCM and larger: XHHW (65 Mils). All wire sizes used shall be based on a 75 degree insulation rating, unless specifically used with 90 degree rated breakers and devices.
    b. All wiring (power and signal) installed underground between buildings, or in wet or damp locations, shall be outside listed and rated for wet locations.
    c. High temperature and non-standard locations: Provide wire type and insulation category suitable for area of use as defined in NEC table 310-13.
4. Conductors No. 8 and larger and as otherwise noted on drawings shall be stranded. Power conductors No. 12 and No. 10 shall be solid or stranded. Power conductors No. 14 or smaller shall be solid.
5. Provide signal system wiring for each system to meet the system manufacturers requirements and recommendations for each device or equipment type. Signal wiring systems shall be provided with shielding and/or insulation type and cable quantities as directed by the manufacturer, and meet all NEC requirements for locations used.

6. Install all wiring branch circuits and feeders (low voltage and line voltage) in conduit unless noted otherwise on the drawings. Contractor shall mandrel all feeders and pass a "sock" (or utilize other suitable means) through each raceway prior to pull to remove all water and construction debris. All raceways shall be completely clear of any obstructions or debris and all cut ends shall be reamed, prior to pull. Utilize pulling compound on all runs to insure minimum friction and pulling tension.
7. Megger test all feeders prior to energizing. See section 26 08 00 for additional information.
8. Approximately balance branch circuits about the neutral conductors in panels.
9. Connections to devices from "thru-feed" branch circuit conductors to be made with pigtails, with no interruption of the branch circuit conductors.
10. Neutral conductor identified by white outer braid, with different tracers of "EZ" numbering tags used where more than one neutral conductor is contained in a single raceway.
11. Neatly arrange and "marlin" wires in panels and distribution panelboards with "T and B Ty-rap" or approved equal plastic type strapping.
12. All wire and cable shall bear the Underwriters' Label, brought to the job in unbroken packages; wire color-coded as follows:

	Voltage	Phasing	A	B	C	N
b.	120/208	3PH4W	Black	Red	Blue	White
c.	2083PH	3W	Black	Red	Blue	--
d.	277/480	3PH4W	Brown	Orange	Yellow	White
e.	4803PH	3W	Brown	Orange	Yellow	--

13. The equipment grounding conductor shall be insulated copper; where it is insulated, the insulation shall be colored green.
14. Label each wire of each electrical system in each pull box, junction box, outlet box, terminal cabinet, and panelboard in which it appears with "EZ" numbering tags indicating the connected circuit numbers.
15. Provide permanently affixed adhesive labels with machine printed lettering (min. 1/8" high) at junction boxes serving fixtures that are supplied by (2) electrical sources (i.e. normal and emergency lighting). Label to read "CAUTION - This light fixture is powered by (2) separate sources. The normal power source breaker and the emergency power source breaker must be turned off before servicing this light fixture."
16. Install feeder cables in one continuous section unless splices are approved by Architect. Exercise care in pulling to avoid damage or disarrangement of conductors, using approved grips. No cable shall be bent to smaller radius than the spool on which it was delivered from the manufacturer. Color code feeder cables at terminals. Provide identifying linen tags in each pullbox.

H. Switches: Model numbers are Hubbell, color to be selected by architect, unless otherwise noted. All switches to utilize screw terminals for wire connections - no plug-in terminations:
1. Single Pole - No. HBL1221
2. Two Pole - No. HBL1222
3. Three Way - No. HBL1223
4. Momentary contact - No. HBL1557
5. Momentary contact Keyed - No. HBL1556L
6. Keyed, - No. HBL1221L
7. Pilot Light (on with load on) - Hubbell No. 1221-PLC
8. Motor Rated Double Pole (30A) - Hubbell No. 7832
9. Motor Rated Three Pole (30A) - Hubbell No. 7810.
10. Low voltage Data line switches - Refer to lighting control system (for compatibility)

I. Receptacles: Mounting straps and contacts shall be one piece design, constructed of minimum .050" solid brass. Base shall be high strength, heat resistant, glass reinforced nylon. Device shall accept up to #10 wire, side or back wired with screw terminals - no plug-in terminations. Hubbell, Leviton, Pass & Seymore, or equal. Color to be selected by architect, unless otherwise noted. Numbers listed below are Hubbell:
   1. 15A 3PG 125 volt duplex - No. HBL5262
   2. 20A 3PG 125 volt duplex - No. HBL5362
   3. 20A 3PG 125 volt ground fault interrupter receptacle; GFI receptacles shall conform to the 2006 UL requirements to a) interrupt power to the unit in the event of internal failure, or b) provide an audible or visual indication of internal failure of the GFI; No. GF20 or equal. Through wiring to down stream GFI designated receptacles is not acceptable.
   4. 15A 3PG 125 volt half controlled duplex receptacle - No. BR15C1(color), with permanent "controlled" marking, factory applied.
   5. 20A 3PG 125 volt half controlled duplex receptacle - No. BR20C1(color), with permanent "controlled" marking, factory applied.
   6. 15A 3PG 125 volt full controlled duplex receptacle - No. BR15C2(color), with permanent "controlled" marking, factory applied.
   7. 20A 3PG 125 volt full controlled duplex receptacle - No. BR20C2(color), with permanent "controlled" marking, factory applied.
   8. GFI Module (blank face), no indicator light, 20A - No. GFBF20 or equal.
   9. All receptacles located in exterior or wet locations shall be corrosion resistant with UV stabilized body.

J. Plates: Leviton, or equal, except as noted:
   1. The color of all faceplates shall match the color of the devices installed under/in the faceplate, except as specifically noted otherwise.
   2. For flush outlet boxes, for switches, and receptacles: nylon, color to be selected by architect, unless otherwise noted.
   3. Plates for surface-mounted outlets: galvanized steel unless otherwise noted.
   4. Weatherproof duplex receptacle plates for exterior locations with ground fault interrupter receptacles in type FS or FD boxes - Hubbell #WPFS26 or compatible equal. Verify cover compatibility with box type and device installed.
   5. Weatherproof "in-use" cover, vertical or horizontal mount, for exterior with GFCI receptacles. Die-cast metal alloy, TayMac MX series or equal with openings to match installed devices.
   6. Plates for flush tele/data boxes: white nylon or as otherwise directed - provide and install at each tele/data outlet plate to match duplex power outlet plate, for jack installation under Section 27 00 00. Where the power and tele/data outlet boxes are shared the plate shall be continuous in multi-gang locations. See drawings.

K. Equipment Disconnects: All disconnects shall be located to allow proper code required clearance in each area. Locations shown on drawings are diagrammatic only. The contractor shall coordinate exact locations in the field (with other trades) prior to rough-in to insure proper clearances.
   1. Motor Disconnect Switches and Safety Switches: General Electric Company Heavy Duty Type "THD", cover interlocked with operating handle so that cover cannot be opened with switch in closed position and switch cannot be closed with cover in open position. 240V or 480V rating, single or multi-pole as required or as noted on drawings, in Nema 1 enclosure indoors or Nema 3R enclosure outdoors unless otherwise noted. Provide dual element motor circuit fuses sized as recommended by equipment manufacturer (for final equipment actually installed).

2. Code required disconnects: Provide a local disconnect in addition to the branch circuit protection device for all equipment as required by code (whether shown or not). Disconnects shall consist of a motor rated switch (or disconnect) for all motor loads less than 3/4HP or other suitable disconnect sized to match branch circuit conductors and load current of equipment, with number of poles as required.

L. Lugs and Connectors: Thomas and Betts "lock-tite", for No. 4 and larger wire; 3M "Scotchlock" fixed spring screw-on type wire connectors with insulator for No. 6 and smaller wire.
   1. All splices shall be made up with screw-on type connectors - no plug-in or push-in style connectors acceptable. Wires shall be solidly twisted together with electricians pliers before screw-on connector is installed to ensure a proper connection in the event of wire nut failure. No exceptions.
   2. Connectors listed or labeled for “no wire twisting required” are not an acceptable substitute for actual wire twisting.
   3. Utilize porcelain type connectors in all high temperature environments (above 105 degrees Celsius).

M. Splice Insulation: "Scotch" electrical tape with vinyl plastic backing or rubber tape with protective friction tape for interior work.
   1. Splices in electrical cables of 600 volt insulation class in underground system duct shall be made only in accessible locations such as pullboxes, light pole handholes, etc., using a compression connector on the conductor and by insulating and waterproofing (for exterior and underground locations) by one of the following methods:
      a. Cast type splice insulation shall be provided by means of a molded casting process employing a thermosetting epoxy resin insulating material which shall be applied by a gravity poured method or by a pressure injected method. The component materials of the resin insulation shall be in a packaged form ready for convenient mixing after removing from the package. Do not allow the cables to be removed until after the splicing material has completely set.
      b. Gravity poured method shall employ materials and equipment contained in an approved commercial splicing kit which includes a mold suitable for the cables to be applied. When the mold is in place around the joined conductors, the resin mix shall be prepared and poured into the mold. Do not allow cables to be moved until after the splicing materials have completely set.

N. Identification: Refer to Section 26 05 00.

O. Firestopping: as manufactured by 3M Fire Protection Products or equal.
   1. Fire-rated and smoke barrier construction: Maintain barrier and structural floor fire and smoke resistance ratings including resistance to cold smoke at all penetrations, connections with other surfaces or types of construction, at separations required to permit building movement and sound vibration absorption, an at other construction gaps.
   2. Systems or devices listed in the UL Fire Resistance Directory under categories XHCR and XHEZ may be used, providing that it conforms to the construction type, penetration type, annular space requirements and fire rating involved in each separate instance, and that the system be symmetrical for wall penetrations. Systems or devices must be asbestos free.

PART 3 - EXECUTION

3.01 REFER TO BASIC ELECTRICAL REQUIREMENTS - SECTION 26 05 00 FOR WORK UNDER THIS SECTION.

3.02 TESTS

A. Testing and Inspection: See Section 26 08 00 - Testing.

END OF SECTION

SECTION 26 5101
LIGHTING

PART 1 - GENERAL

1.01 WORK INCLUDED

A. Luminaires (i.e., lighting fixtures): Refer to the Luminaire Schedule and provide a complete and working building Lighting System. Catalog numbers in the Luminaire Schedule are design series references and may not represent the exact catalog number as specified or as required for particular installations. Provide complete luminaires to correspond with the number of LEDs, power supply, wattage, mounting hardware, ceiling type, trim, size, and special requirements as specified in the Luminaire Schedule for each luminaire type. Additional features, accessories, and options specified, described, scheduled, or necessary for installation shall be included.

B. LEDs and power supplies.

C. Lighting controls, including occupancy sensors. See Section 26 57 00 for Low Voltage Lighting Control System.

D. Supports for outlet boxes and luminaires, including seismic restraint slack wires for recessed luminaires in suspended ceilings per code and backing in walls as required to keep luminaires secure and level.

1.02 INCORPORATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this section.

B. Section 26 05 00 and 26 27 00 apply to all work in this section.

C. Division 09: Painting and Finishes (cutting of holes in finished surfaces for recessed luminaires).

1.03 RELATED WORK

A. Ceiling Access panels where required for access to equipment, outlets, transformers, etc., located above suspended ceilings, sheet rock or plaster ceilings. Coordinate with the Architect and other trades.

1.04 SUBMITTALS

A. Submit under provisions of Division 1 and Section 26 05 00.

B. Submit (6) six sets of submittals for review by the project team unless otherwise noted in these specifications. The submittals shall include the following information:

1. Product Index: The following information shall be included in the product index.
    a. Luminaire Type. The index shall list, in alphabetical order, each luminaire type per the Luminaire Schedule.
    b. Manufacturer’s Catalog Number. Outstanding information required to make a complete catalog number shall be clearly identified in the index.
    c. LED Data. Provide the Manufacturer’s name for each LED array including wattage, color temperature, lumen output, and color rendering index.
2. Manufacturer's literature for every luminaire listed on the Luminaire Schedule.
    a. Catalog Information:
        1) Luminaire Data Sheet: The manufacturer’s cut sheet shall include the following:
            (a) Photometrics: Candlepower distribution curve or table with horizontal readings at 0, 22.5, 45, and 90 degrees and vertical readings from 0 to 180 degrees in 5 degree increments in accordance with the Illuminating Engineering Society published test procedures.

(b) Catalog Number Nomenclature
(c) Coefficient of Utilization Tables
(d) Luminaire Line Drawing
(e) Power supply (each type)

3. Data sheets for electronic power supplies. Indicate luminaire types on applicable ballast/power supply data sheets.
4. Data sheets for wallbox controls and other products specified in this section.

C. For Any Luminaires Substituted For Those Specified:
1. Refer to Division 1 - Product Requirements, for all substitution procedures.
2. Provide Independent Testing Laboratories, Inc., or equal, photometric test report for each Luminaire type and lamp combination listed on the Luminaire Schedule. Test reports shall be based on Illuminating Engineering Society published test procedures and shall contain polar coordinate candlepower distribution curves in five lateral planes for luminaires with asymmetric distributions and luminaire luminance data for vertical angles above 45 degrees from nadir. Test results shall indicate luminaire efficiency for the lamp and aperture assembly specified. luminaires with efficiencies more than 2% below the values of specified luminaires are not acceptable and will be rejected.
3. Provide photometric calculations for each room or area where a substituted luminaire is proposed. Such calculations shall be made using comprehensive lighting software, such as AGi32, and include point-by-point illuminance values at IES recommended heights, average illuminance, and maximum-to-minimum and average-to-minimum uniformity ratios. Room dimensions, configurations (including sloping ceilings), room surface reflectances, light loss factors, and heights of suspended luminaires shall match the heights specified in the contract documents.
4. Due to the variety of lumen outputs and light distributions of LED Luminaires, substitutions will require additional review on the part of the Engineer or Architect to ascertain the equivalency of the substituted luminaires. Substitutions will be reviewed to determine their aesthetic, construction, and photometric equivalency to maintain similar design impact and performance in their intended environment. The Engineer and Architect have not included such unknown and unquantifiable review time in their scope of work and are not compensated by the Owner for such services. The Contractor shall reimburse the Engineer and Architect for labor costs to review substitutions.
5. Prior approval does not guarantee final approval by the Engineer. The Contractor shall be responsible for providing luminaires that meet or exceed the quality and performance of the specified products in their entirety. All deviations in quality and performance from the specified products must be listed and individually signed off by the engineer.
6. The Owner reserves the right to reject a proposed substitution based on their agent’s professional judgment as to the utility, quality, performance, visual appropriateness, or finish of substitutions.

1.05 OCCUPANCY SENSORS

A. Equipment Qualification
1. Wall switch products must be capable of withstanding the effects of inrush current. Submittals shall clearly indicate the method used.
2. Contractor's work to include all labor, materials, tools, appliances, control hardware, sensor, wire, junction boxes and equipment necessary for and incidental to the delivery, installation and furnishing of a completely operational occupancy sensor lighting control system, as described herein.
3. Contractor and Contractor's Supplier shall examine all general specification provisions and drawings for related electrical work required as work under Division 26.

4. Contractor shall coordinate all work described in this section with all other applicable plans and specifications, including but not limited to wiring, conduit, luminaires, HVAC systems and building management systems.

1.06 DELIVERY, STORAGE, AND HANDLING

A. Deliver products to site and store in unopened cartons in protected location. Inspect products immediately and report all damage accordingly.

1.07 GUARANTEE AND WARRANTIES

A. All work performed under this section must be guaranteed to be free of defects in products or workmanship for one year after date of acceptance by Owner, unless noted otherwise in General Conditions.

B. Warranties:
   1. Electronic power supplies must be warranted against failure for at least five years after date of substantial completion.

PART 2 - PRODUCTS

2.01 GENERAL

A. Provide luminaires as indicated in Luminaire Schedule; if conflict exists between Luminaire Schedule and Specifications, the more stringent requirement shall take precedence.

B. Provide luminaires new and complete with mounting accessories, junction boxes, trims, and lamps.

C. Provide products with UL labels appropriate to intended installation conditions, or with labels from other testing laboratories whose results are acceptable to local inspector, showing compliance with UL standards. Labels must be concealed from normal viewing angles.

D. All products of same type by same manufacturer.

2.02 SOLID STATE LUMINAIRES

A. Housing, where applicable:
   1. Steel bonderized or equal rust protected, or aluminum, rigid construction. Minimum gauge thickness shall be as follows:
      a. Interior locations: No. 20-gauge steel, No. 16-gauge aluminum.

B. Finish:
   1. Baked enamel finish (except when otherwise specified).
      a. Concealed interior surfaces (this applies to interior hardware, circuit boards, etc.) matte black.
      b. Concealed exterior surfaces: matte black.
      c. Visible surfaces: color and texture as specified below for each luminaire type or as selected.

C. Light Emitting Diode (LED) requirements:
   1. Correlated color temperature (CCT) for phosphor-coated white LEDs must have one of the following designated CCTs, as specified on the Luminaire Schedule, and fall within the following binning standards.
      a. 3000K defined as 3045 +/- 175K
      b. 3500K defined as 3465 +/- 245K
      c. 4000K defined as 3985 +/- 275K
   2. Color spatial uniformity shall be limited to variations in chromaticity for different directions (i.e. changes in viewing angle) within 0.004 from the weighted average point on the CIE 1976 (u',v') diagram.

3. Color maintenance shall be limited to a maximum change in chromaticity of 0.007 on the CIE 1976 (u',v') diagram over the lifetime of the product.
    a. Color rendering index: Color rendering index to be determined using ANSI C78.377-2008 and applicable IESNA standards.
    b. Laboratory tests must be produced using specific module(s)/array(s) and power supply combination that will be used in production.
    c. Manufacturers must provide a test report from a laboratory accredited by NVLAP or one of its MRA signatories
4. Lumen depreciation
    a. Lumen depreciation to be measured using IESNA LM-80-08 and TM-21-11 standard for IES approved method of measuring lumen maintenance of LED light sources.
    b. Phosphor-coated white LED modules/arrays shall deliver at least 70% of initial lumens for a minimum of 50,000 hours when installed in-situ and operated at 100% output and the maximum specified operating temperature.
    c. Colored LED modules/arrays shall deliver at least 50% of initial lumens for a minimum of 50,000 hours when installed in-situ and operated at 100% output and the maximum specified operating temperature.
5. Acceptable LED manufacturers:
    a. Cree
    b. Nichia
    c. Osram Opto Semiconductors
    d. Philips Lumileds
    e. Soraa
    f. Xicato

D. Luminaire Efficacy:
1. Luminaire efficiency shall be measured using IESNA LM-79-08 standard for electrical and photometric measurements of solid state lighting products.
2. Manufacturer shall provide published luminaire efficacy, which is defined as luminaire light output divided by luminaire input power measured in a 25 degree Celsius environment. Efficacy shall include power supply, thermal, optical, and luminaire losses.

E. Thermal Management:
1. Solid state luminaire shall not exceed LED manufacturer's maximum junction temperature requirements when operated in-situ at luminaire manufacturer's maximum ambient operating temperature and 100% light output.
2. Solid state luminaires shall be thermally protected using one or more of the following thermal management techniques:
    a. Metal core board
    b. Gap pad
    c. Internal monitoring firmware
3. Solid state luminaire housing shall be designed to transfer heat from the LED board to the outside environment.

F. Power Supplies (LED Drivers) requirements:
1. Power factor of 0.90 or greater for primary application
2. Input current shall have Total Harmonic Distortion (THD) of less than 20%.
3. Minimum operating temperature of minus 20 degrees Celsius or below when used in luminaires intended for outdoor applications.
4. Operating frequency equal to or greater than 120 Hz.
5. Operate with sustained input variations of +/- 10% (voltage and frequency) with no damage to the driver.

6. Tolerate sustained open circuit and short circuit output conditions without damage and without need for external fuses or trip devices.
7. Output shall be regulated to +/- 5% across published load range.
8. Class A sound rating.
9. Outputs shall have current limiting protection.
10. Operate LEDs at constant and regulated current levels. LEDs shall not be overdriven beyond the diode manufacturer's specified nominal voltage and current.
11. Inrush currents not exceeding peak currents specified in NEMA 410.

G. Solid State Lighting Controls:
1. Control interface to dimmable power supplies shall consist of one of the following:
a. Line Voltage Dimming. Controls to be rated for magnetic or electronic low voltage transformer operation.
b. Low voltage (0-10V) control. Controls to be compatible with either current sink or current source operation.
c. DMX control
2. Dimmable LED power supplies shall use pulse width modulation (PWM) or constant current reduction (CCR) to regulate power to LEDs.
a. PWM power supplies shall have 12-bit or greater resolution to obtain flicker-free operation throughout their dimming range.
b. PWM power supplies shall be provided in luminaires that will be dimmed lower than 40% and must maintain consistent color temperature.
c. CCR power supplies shall be provided in areas that have strict electromagnetic interference (EMI) requirements, high motion activity, or rotating machinery.

H. System Installation
1. Hardwired connections to solid state luminaires shall be reverse polarity protected and provide high voltage protection in the event connections are reversed or shorted during the installation process.
2. All solid state luminaires (100% of each lot) shall undergo a minimum eight-hour burn-in test during manufacturing. Solid state lighting installations shall be UL Listed as a low-voltage lighting system including, but not limited to, luminaire, power supply, controller, keypad, and wiring.

I. Warranty
1. Luminaires, drivers, and controllers for solid state lighting systems shall be covered by a five-year warranty against defects in workmanship or material. Warranty shall include in-warranty service program providing for payment of authorized labor charges incurred in replacement of inoperative in-warranty equipment.

2.03 LUMINAIRE CONSTRUCTION

A. Sheet metal: materials and thicknesses shall be 20 gauge (0.7 mm or 0.027") min., free of dents, scratches, oil-can, or other defects.

B. Painted luminaires: exposed weld marks, joints, and seams shall be filled and sanded smooth before finishing.

C. All edges cleaned and dressed to remove sharp edges or burrs.

D. Extrusions: 1/10" min. wall thickness, smooth and free of tooling lines, with cast end plates that exactly match extrusion profiles.

E. Castings: smooth, free of pits, scales, gate marks, or blemishes.

F. Spinnings shall have 1/32" min. thickness, smooth, free of spinning lines or blow-back, with clean edges.

G. Welds: Follow recommendations of American Welding Society. All welds continuous and free of spatter, residue, or warping.

H. No light leaks visible in finished room. Ensure that downlight housings mounted in wood slat ceilings are not visible from below. Field paint exterior of housing with high temperature paint if necessary.

I. Exposed end plates and joiners, with concealed fasteners.

J. End-to-end mounted luminaires: Verify row configurations and provide joiners, aligning splines, and trims to suit.

K. Hardware:
   1. Steel or aluminum interior luminaires: cadmium-plated hardware.
   2. Steel or aluminum exterior luminaires: stainless steel hardware.
   3. Stainless steel luminaires: stainless steel hardware.
   4. Copper alloy luminaires: brass hardware.

L. Raceways: Where used for through wiring, luminaires must be approved for use as raceways.

2.04 TRIMS

A. Trims must fit tightly and be held in by gravity, spring clips, or mechanical fasteners. Trims must not drop out under normal conditions or seismic forces which do not exceed the design criteria of the building.

B. Aluminum parabolic cones shall be smooth, properly shaped, with Alzak finish in colors as indicated.
   1. No hot spots or lamp images visible at angles shallower than lamp shielding angle.
   2. Self-flange cones must bend parallel to ceiling and cover ceiling hole without additional trim ring. Unpainted flange, shall have the same finish as cone interior.
   3. Cones and louvers for fluorescent luminaires must have permanent anti-iridescence treatment.

C. Lenses, diffusers, and patterned glass: glass or virgin acrylic as noted, with patterns as noted.
   1. Finished thickness 2 mm (1/10") min. unless noted otherwise.
   2. Linear runs over 1200 mm (4'-0") long shall be in equal-length pieces.

2.05 FINISHES

A. Steel Reflectors: Unless otherwise specified, the reflector surface finish shall be of synthetic white enamel or polyester powder coating. Finish shall show no indication of chipping, cracking, flaking or any other sign of loss of adhesion. The initial reflection factor shall be not less than 88 percent averaging 5 randomly selected points on the reflector. After 100 hours of exposure to the radiation of a glass enclosed carbon arc lamp, such as a Fade-O-Meters, the reflectance of the exposed portion shall not be less than 5 percent and finish shall show no appreciable color change. The carbon arc lamp shall be operated at appreciable color change. The carbon arc lamp shall be operated at 13 plus or minus 0.5 amperes at 140 volts. The reflector shall be placed ten inches from the arc and the lamp so ventilated that the temperature of the exposed portion does not exceed 105 degrees F.

B. Aluminum Reflectors: Reflecting surfaces shall be provided with either a specular or diffuse finish as indicated. Reflection factors shall be not less than 83 percent for specular reflecting surfaces. Each reflecting surface shall be protected by dense coating of oxide weighing not less than 5.0 milligrams per square inch, applied by an anodic process. The reflector shall be given a sealing treatment that will prevent staining of the reflecting surface when subjected to a stain test. All aluminum reflectors & louvers shall be a low iridescent equivalent to that provided by Coil Anodizers.

C. Non-Reflecting Surfaces: Unless otherwise specified, the finish on all non-reflecting exterior surfaces shall be aluminum oxide or aluminum; white, gray or aluminum paint on steel; nickel or chromium plating on copper alloy. Fastening devices shall be nickel, chromium, cadmium or zinc plated. All painted surfaces shall be free of tears, star marks, blisters, pinholes, chipping and any other defects that may impair appearance or serviceability.

2.06 LAMPS

A. Relamp luminaires or replace LED boards and power supplies at no cost to owner if lamps or LEDs exhibit color variation, flicker, or burn out within 90 days of substantial completion date.

B. LEDs:
1. LED quantity, wattage, and color temperature as specified for each LED luminaire.
2. 3500 deg. K color temperature for interior luminaires, 3000 deg. K for exterior luminaires, unless otherwise specified.

2.07 DRIVERS AND TRANSFORMERS

A. General:
1. Verify input voltages and match to branch circuit voltages.
2. Remote drivers or transformers: Provide suitable enclosures and mounting hardware, and install in accessible, ventilated locations.
   a. Secondary wiring: provide number and size of conductors as required, with 3% max. voltage drop between transformer and last lamp.
   b. Keep transformers at least 300 mm (12”) apart and do not stack vertically.

B. LED Drivers:
1. High power factor, thermally-protected.
2. Compatible with LED lamps being used.
3. Capable of dimming LED source without perceptible flicker or stroboscopic effects.

2.08 OCCUPANCY SENSORS

A. General
1. Wall switch sensors shall be capable of detection of occupancy at desktop level up to 300 square feet, and gross motion up to 1000 square feet.
2. Wall switch sensors shall accommodate loads from 0 to 800 watts at 120 volts; 0 to 1200 watts at 277 volts and shall have 180° coverage capability.
3. Wall switch products shall utilize Zero Crossing Circuitry which increases relay life, protects from the effects of inrush current, and increases sensor’s longevity.
4. Wall switch sensors shall have no leakage current to load, in manual or in Auto/Off mode for safety purposes and shall have voltage drop protection.
5. Where specified, wall switch sensors shall provide a field selectable option to convert sensor operation from automatic-ON to manual-ON.
6. Where specified, vandal resistant wall switch sensors shall utilize a hard lens with a minimum 1.0mm thickness. Products utilizing a soft lens will not be considered.
7. Passive infrared sensors shall utilize Pulse Count Processing and Digital Signature Analysis to respond only to those signals caused by human motion.
8. Passive infrared sensors shall utilize mixed signal ASIC which provides high immunity to false triggering from RFI (hand-held radios) and EMI (electrical noise on the line), superior performance, and greater reliability.
9. Passive infrared sensors shall have a multiple segmented Lodif Fresnel lens, in a multiple-tier configuration, with grooves-in to eliminate dust and residue build-up.
10. All sensors shall be capable of operating normally with electronic ballasts, PL lamp systems and rated motor loads.

11. Coverage of sensors shall remain constant after sensitivity control has been set. No automatic reduction shall occur in coverage due to the cycling of air conditioner or heating fans.
12. All sensors shall have readily accessible, user adjustable settings for time delay and sensitivity. Settings shall be located on the sensor (not the control unit) and shall be recessed to limit tampering.
13. In the event of failure, a bypass manual override shall be provided on each sensor. When bypass is utilized, lighting shall remain on constantly or control shall divert to a wall switch until sensor is replaced. This control shall be recessed to prevent tampering.
14. All sensors shall provide an LED as a visual means of indication at all times to verify that motion is being detected during both testing and normal operation.
15. All sensors shall have UL rated, 94V-0 plastic enclosures.

B. Circuit Control Hardware - CU
1. Control Units - For ease of mounting, installation and future service, control unit(s) shall be able to externally mount through a 1/2" knock-out on a standard electrical enclosure and be an integrated, self-contained unit consisting internally of an isolated load switching control relay and a transformer to provide low-voltage power. Control unit shall provide power to a minimum of two (2) sensors.
2. Relay Contacts shall have ratings of:
   a. 13A - 120 VAC Tungsten
   b. 20A - 120 VAC Ballast
   c. 20A - 277 VAC Ballast
3. Control wiring between sensors and controls units shall be Class II, 18-24 AWG, stranded U.L. Classified, PVC insulated or TEFLON jacketed cable suitable for use in plenums, where applicable.
4. Minimum acceptable wire gauge from the circuit control hardware relays shall be #14 AWG.

PART 3 - EXECUTION

3.01 PREPARATION

A. Architectural Reflected Ceiling Plans and Elevations shall govern exact location and mounting conditions for all luminaires. Contractor shall coordinate luminaire mounting and compatibility with ceiling construction and other trades.

B. Coordinate work with other trades. Location of lighting has priority over location of new framing (except major structural members), ducts, diffusers, sprinklers, speakers, smoke detectors, and other obstructions.

C. If obstructions are encountered which prevent installation of luminaires according to drawings, notify Architect immediately and do not proceed until conflict has been resolved.

D. Coordinate the location of luminaires in mechanical or unfinished spaces. Locations shown on Drawings may be adjusted by the Contractor to suit conditions. Install luminaires to avoid obstructions and maximize light output, 2100 mm (7'-0") min. mounting height.

E. Coordinate the location of any exposed conduit used to feed luminaires with the Architect prior to installation.

3.02 INSTALLATION

A. General:
1. Contractor shall be responsible for handling and installation of luminaires including all supports, hangers and hardware necessary for a complete installation. Luminaires shall be clean, plumb, level in straight lines, without distortion. Luminaires must be installed

so they do not shift during relamping or adjustment. Remedy any light leaks which may develop after installation of recessed or enclosed luminaires.

2. Install luminaires at locations and heights as indicated, in accordance with luminaire manufacturer's written instructions, applicable requirements of NEC, NECA's "Standard of Installation", NEMA standards, and with recognized industry practices to ensure that luminaires fulfill requirements.
3. Point-source luminaires shall be located as dimensioned, or in center of tile or on tile joint as drawn; 6 mm (1/4") max. off-center tolerance.
4. Linear luminaires shall have 3 mm (1/8") max. horizontal or vertical alignment variation in any 5 m (16-ft.) portion of run.
5. Tighten connectors and terminals, including screws and bolts, in accordance with equipment manufacturer's published torque tightening values for equipment connectors. Where manufacturer's torqueing requirements are not indicated, tighten connectors and terminals to comply with tightening torques specified in UL Stds. 486 A and B, and the National Electrical Code.
6. Clean luminaires of dirt and construction debris upon completion of installation. Clean fingerprints and smudges from lenses.
7. Remove and replace luminaires that may have been damaged during construction at no additional cost to the Owner.
8. Protect installed luminaires from damage during remainder of construction period.
9. Provide equipment grounding connections for luminaires as indicated. Tighten connections to comply with tightening torques specified in UL 486 A to assure permanent and effective grounds.
10. Install luminaires, lamps, lenses, etc., after building is enclosed, weather tight and environmental conditions are nominally the same as expected for the complete spaces. All lenses, glass, reflectors, and refractors shall be clean and free of chips, cracks, and scratches.
11. All wall mounted luminaires and all ceiling mounted surface luminaires including exit lights shall be fed through a luminaire Stud/Hickey/Nipple assembly and with provisions to prevent luminaire turning.
12. Installation of exit signs shall be coordinated with other trades to ensure signs are visible as intended.
13. All junction box cover plates for the lighting branch circuit system shall be clearly marked with a permanent ink felt pen identifying the branch circuit and control relay (panel number, circuit number, lighting control cabinet designation and control relay number) contained in the box.
14. Provide permanently affixed adhesive labels with machine printed lettering (min. 1/8" high) at junction boxes serving luminaires that are supplied by (2) electrical sources (i.e. normal and emergency lighting). Label to read "CAUTION - This luminaire is powered by (2) separate sources. The normal power source breaker and the emergency power source breaker must be turned off before servicing this luminaire."

B. Ceiling-Mounted and Pendant Luminaires:
   1. Provide support for outlet boxes and suspension points so luminaires can be installed securely, including seismic supports per code.
      a. Luminaire weight less than 23 kg (50 lb) at each suspension point: hang from strap or stud on outlet box, or at non-feed points, provide 1/4"-20 stud projecting 20 mm (3/4") below ceiling.
      b. Luminaire weight 23 kg (50 lb) or more at each suspension point: hang directly from structure, either independent of outlet box or from stud extending through outlet box to structure, unless the outlet box is listed for not less than the weight to be

supported. Boxes used as the sole support of luminaires weighing more than 50 pounds must be listed and marked by the manufactuer with the maximum weight.

C. Wall-Mounted Luminaires:
   1. Mounting heights shown on Drawings are measured from finished floor to centerline of outlet box or recessed housing, unless otherwise noted.
   2. Verify luminaire weights and provide backing in wall as required. Luminaires must not droop or tilt away from wall.
   3. Wet locations: install sealant between luminaire and outlet box.
   4. In circulation areas, wall-mounted luminaires must not project more than 100 mm (4") from wall if mounted above 685 mm (27") and below 2030 mm (80").

3.03 LIGHTING CONTROLS

A. Install controls so that all operable parts are at 48 inches (1220 mm) maximum height.

B. Lighting controls to include occupancy sensors in most spaces (for local control) and timeclock control for exterior spaces as indicated on the drawings.

C. Occupancy sensors shall initially be set as follows:
   1. Maximum sensitivity.
   2. Maximum time delay (or 20 minutes).
   3. Manual-on operation.
   4. Automatic off operation.
   5. Aim all adjustable sensors to properly cover room areas.

D. Timeclock System shall initially be set to control the exterior lighting zones as follows:
   1. Assign all exterior zones for automatic on operation with the astro-dial feature, set to 30 minutes before sunset. Latitude = 37.5 degrees North / Longitude = 122 degrees West.
   2. Assign exterior zones noted as "astro-on, astro-off" for automatic off operation with the astro-dial feature, set to 30 minutes after sunrise. Latitude and Longitude as noted above.
   3. Assign exterior zones noted as "astro-on, timeclock-off" for automatic off operation with the normal timeclock feature, set to an owner determined time in the late evening.

3.04 DELIVERY, STORAGE, & HANDLING:

A. Deliver luminaires in factory-fabricated containers or wrappings, which properly protect luminaires from damage. Inspect luminaires immediately upon delivery to ensure correct shipment without damage.

B. Store luminaires in original packaging. Store inside well-ventilated area protected from weather, moisture, soiling, extreme temperatures, humidity, laid flat and blocked off ground.

C. Handle luminaires carefully to prevent damage, breaking, and scoring of finishes. Do not install damaged units or components; replace with new. Protection wrapping on louvered (parabolic) luminaires shall not be removed until luminaires are ready for operation.

3.05 SEQUENCING AND SCHEDULING:

A. General:
   1. Coordinate with other work including wires/cables, electrical boxes and fittings, and raceways, to properly interface installation of luminaires with other work.
   2. Sequence lighting installation with other work to minimize possibility of damage and soiling during remainder of construction.

3.06 PROJECT CLOSEOUT

A. Clean luminaires and remove plaster and paint spatters.

B. Clean fingerprints and dust from downlight reflectors. Refer to manufacturer’s instructions.

C. Verify that luminaires and controls are working at time of final acceptance by Owner.

1. Repair or replace lighting control devices that are inoperable.
2. Repair or replace LED modules or entire LED luminaires that are inoperable.
3. Repairs and/or replacements shall be at no additional cost to the Owner.

D. Install and aim adjustable lighting as directed by Architect.
   1. Provide personnel, lifts, ladders, and walkie-talkies as required.
   2. Aiming will occur at night, outside of normal working hours, at times as approved by the Architect.

E. Prepare two copies of a Lighting Systems Maintenance Manual consisting of the following in a hardcover binder. Deliver to Architect. After review, Architect will deliver one copy to Owner.
   1. One complete set of approved submittals, including product data and shop drawings.
   2. Luminaire cleaning instructions, including chemicals to be used or avoided.
   3. Instructions for code-required testing and maintenance of emergency lighting system.

END OF SECTION

Terra Linda High School

Ceramics Studio Kiln Room

310 Nova Albion Way
San Rafael, CA 94903

Luminaire Catalog Pages

DSA Set
December 20, 2022

O'MAHONY & MYER
ELECTRICAL ENGINEERING & LIGHTING DESIGN

4340 Redwood Hwy., Suite 245, San Rafael CA 94903

New Star
www.newstarlighting.com

Luminaire Type
AA-Series

VICTORY NARROW SERIES
VIC1N/VIC2N/VIC3N/VIC4N

FEATURES:

- Intended for Vandal Resistant applications when "TH" is specified, Public Areas, Corridors, Stairways, Underpasses, Parking Garages, Restrooms, Lobbies, Schools, and more
- Architectural linear luminaire that melds aesthetics, function and vandal resistance
- Extruded aluminum housing with cast aluminum endcaps for durability
- Wet Location (under covered ceiling) rating standard
- Available with decorative endcaps
- This product complies with the Buy American Act requirements



VIC4N

c ETL us LISTED Intertek
WET

RELATED PRODUCTS:

- Victory Narrow (VICN) Quick Ship Ordering Options
- Victory Wide (VICW)
- Stairwell Tres Series (STWL)

SPECIFICATIONS

CONSTRUCTION: Marine grade extruded aluminum frame with cast aluminum end caps. Includes knockouts for surface conduit and tandem mounting (field installation, hardware by others).

LENS: Linear ribbed clear and white polycarbonate lens available in two thicknesses. Unique swing rail design for ease of lens removal for maintenance.

LED: Available in three color temperatures 3500°K, 4000°K and 5000°K with maximum 3-step MacAdam variation allowance. Other color temperatures available, consult factory. Minimum 80 CRI standard with optional minimum 90 CRI available.

ELECTRICAL: 0-10V dimming available with 10-100% range and 1-100% range. Must specify dimming under options.

REFLECTOR: Faceted 22 gauge specular aluminum for maximum rigidity and controlled light distribution.

FASTENERS: Phillips flat head screws (3 screws on each side). Optional Torx Head screws for tamper resistance.

FINISH: White powder coat finish following multistage iron phosphate pretreatment.

GASKET: EPDM gasketing to prevent water and dust infiltration.

OPTIONS: Fixtures with SD2 and OC sensor operate at 50% when area is unoccupied, increases to 100% after motion is detected, and reverts to 50%. Fixtures with SD3 and OC sensor are set at lowest dimming level unless otherwise specified. Fixture operates at 30% when area is unoccupied, increases to 100% after motion is detected and reverts to 30% after time delay. Time delay set by user. Consult factory for different configurations.

INSTALLATION: Surface wall mount installation. Hardware by others.

WARRANTY: New Star Promise. Limited five (5) year warranty.

LABEL: Fixture is certified to UL standards by Intertek Testing Laboratories for Wet Location (under covered ceiling). DLC Approved Configuration: VIC-4N-L3401-RC-UN-WH

This product complies with the Buy American Act requirements. Specifications and dimensions are subject to change without notice. For additional options and dimensional details, please consult your New Star Lighting representative.

New Star
www.newstarlighting.com

PROJECT: _____
TYPE: _____
PRODUCT: _____
APPROVED BY: _____

VICTORY NARROW SERIES
VIC1N/VIC2N/VIC3N/VIC4N

ORDERING INFORMATION
EXAMPLE: VIC2N-L2351C-RW-UN-WH

SERIES	SIZE*	STYLE	LUMEN OUTPUT*	COLOR TEMP.	CIRCUITS	LENS
VIC		N				
	1 = 1ft.	N = Narrow	L1 = Low	35 = 3500°K	1C = 1 Circuit	RW = .09 Ribbed White Poly.
	2 = 2ft.		L2 = Standard	40 = 4000°K	2C = 2 Circuits*	RC = .09 Ribbed Clear Poly.
	3 = 3ft.		L3 = High**	50 = 5000°K		RWC = .15 Ribbed White Poly.
	4 = 4ft.				*Allows for inboard/ outboard control.	RCC = .15 Ribbed Clear Poly.
	*Nominal Size. Dimensional Data on Page 4.		*Subject to change. Performance Data on page 3. **Cannot be used with Occ Sensor.			

VOLTAGE	FINISH	OPTIONS	ACCESSORY
12 = 120V	WH = White	DM = 0-10V dimming with 10-100% range	CM = Corner Mount Bracket
27 = 277V	CC = Custom Color*	DM1 = 0-10V dimming with 1-100% range	
34 = 347V		PC = Photocell (N/A decorative end cap)*	
UN = Universal (120V-277V)	*Must specify RAL number at time of order and if antimicrobial finish is needed. Subject to set-up fees.	OC = Occupancy Sensor (N/A with L3=High Output)*	
		TM = Tandem Mount**	
		EL1 = Emerg. Bat. LED Low (10W)***	
		EL2 = Emerg. Bat. LED High (20W)***	
		SD2 = Step. Dimming Module (50-100%)	
		SD3 = Step. Dimming Module (30-70-100%)	
		LN = LED Night Light****	
		FZ1 = Fuse (120V)	
		FZ2 = Fuse (277V)	
		DE = Decorative End Caps	
		TH = Torx Head Screws	
		NAT = Natatorium Finish	
		90C = 90 CRI	

* Provided on an additional independent circuit. Refer to Specification Features if ordering with SD2 or SD3 option.
** Kit includes joining hardware for field installation. If decorative end caps are specified, only end units will have decorative end cap. Consult factory for details.
*** Consult factory for VIC1 emergency options. Provided on additional independent circuit.
**** 3500°K Night Light with integrated switch allows light levels at 100%, 70%, 40% and 10%. Provided on additional independent circuit.

This product complies with the Buy American Act requirements. Specifications and dimensions are subject to change without notice. For additional options and dimensional details, please consult your New Star Lighting representative.

PERFORMANCE DATA*

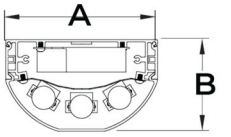
*Data is with 80 CRI chip. LEDs are frequently updated therefore values may change without notice.

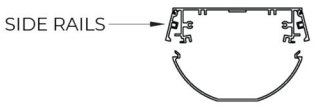
			(RC) Clear Polycarbonate Lens			(RW) White Polycarbonate Lens		
MODEL	OUTPUT	COLOR TEMP.	LUMENS DELIVERED	EFFICACY (lm/W)	INPUT POWER (W)	LUMENS DELIVERED	EFFICACY (lm/W)	INPUT POWER (W)
VIC1N	Low (L1)	3500°K	700	100	7	600	86	7
		4000°K	750	107	7	650	93	7
		5000°K	800	114	7	700	100	7
	Standard (L2)	3500°K	1400	108	13	1100	85	13
		4000°K	1500	115	13	1200	92	13
		5000°K	1600	123	13	1300	100	13
	High (L3)	3500°K	2050	108	19	1600	84	19
		4000°K	2200	116	19	1750	92	19
		5000°K	2350	124	19	1900	100	19
VIC2N	Low (L1)	3500°K	1400	108	13	1100	85	13
		4000°K	1500	115	13	1200	92	13
		5000°K	1600	123	13	1300	100	13
	Standard (L2)	3500°K	2800	112	25	2100	84	25
		4000°K	3000	120	25	2300	92	25
		5000°K	3200	128	25	2500	100	25
	High (L3)	3500°K	4200	111	38	3200	84	38
		4000°K	4500	118	38	3700	97	38
		5000°K	4800	126	38	4000	105	38
VIC3N	Low (L1)	3500°K	2050	108	19	2050	108	19
		4000°K	2200	116	19	2100	111	19
		5000°K	2350	124	19	2200	116	19
	Standard (L2)	3500°K	4100	108	38	4100	108	38
		4000°K	4400	116	38	4200	111	38
		5000°K	4700	124	38	4400	116	38
	High (L3)	3500°K	6150	108	57	6150	108	57
		4000°K	6600	116	57	6300	111	57
		5000°K	7050	124	57	6600	116	57
VIC4N	Low (L1)	3500°K	2700	108	25	2700	108	25
		4000°K	2900	116	25	2800	112	25
		5000°K	3100	124	25	2900	116	25
	Standard (L2)	3500°K	5500	110	50	5400	108	50
		4000°K	5900	118	50	5600	112	50
		5000°K	6300	126	50	5800	116	50
	High (L3)	3500°K	8300	111	75	7200	96	75
		4000°K	8800	117	75	8100	108	75
		5000°K	9400	125	75	8600	115	75

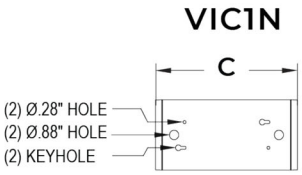
This product complies with the Buy American Act requirements. Specifications and dimensions are subject to change without notice. For additional options and dimensional details, please consult your New Star Lighting representative.

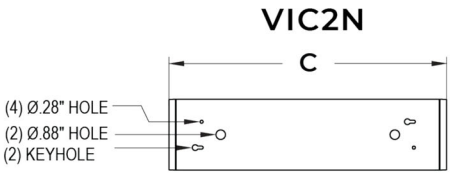
DIMENSIONAL DATA

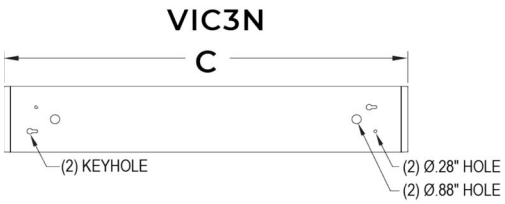
Fixture weight varies and is dependent upon chosen specifications. Consult factory for additional information. Average weight of the VIC1N is 7lb. Average weight of the VIC2N is 10lb. Average weight of the VIC3N is 12lb. Average weight of the VIC4N is 15lb.

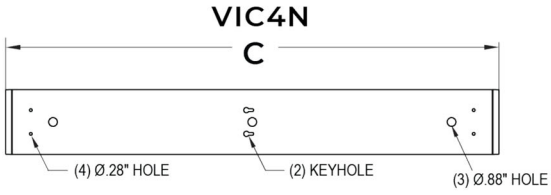












	A	B	C
VIC1N	6.50"	3.92”	13.50"
VIC2N	6.50"	3.92”	25.50"
VIC3N	6.50"	3.92”	37.50"
VIC4N	6.50"	3.92”	49.50"

This product complies with the Buy American Act requirements. Specifications and dimensions are subject to change without notice. For additional options and dimensional details, please consult your New Star Lighting representative.

GARDCO by signify

Wall Mount

LED Mini sconce

111L



Luminaire Type
BA1

Philips Gardco 111 LED mini sconce luminaires are compact in size, perfect for low mounting height wall mount applications. 111 LED luminaires are designed to integrate naturally to wall surfaces. 111 LED luminaires are available with three (3) different distribution patterns, providing full cutoff performance (in the normal downlight position) and featuring LED arrays. Luminaires provide performance excellence and advanced Philips Gardco LED thermal management technology. High performance Class 1 LED systems offer potential energy savings of 50 % or more compared to HID systems. 111 LED luminaires are also available with 0-10V Dimming.

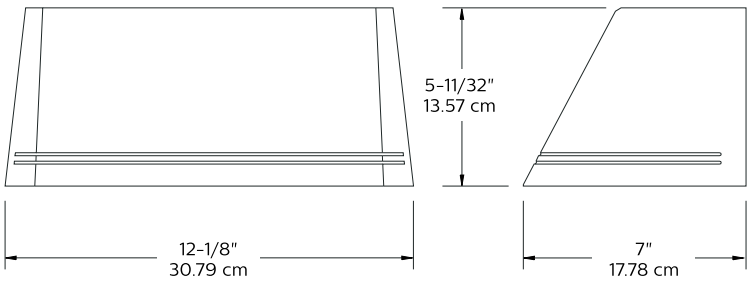
Ordering guide

example: 111L-16L-350-CW-G2-2-UNV-DD-BK

Prefix	No. of LEDs	Drive Current	Color/Generation	Distribution	Voltage	Controls	Electrical/Luminaire	Finish
111L	16							
111L Trapezoidal Wedge LED	**16L** 16 LED module	**350** 350mA **550** 550mA **750** 750mA	**CW-G2** Cool White 5700K, 70 CRI generation 2 **NW-G2** Neutral White 4000K, 70 CRI generation 2 **WW-G2** Warm White 3000K, 70 CRI generation 2	**2** Type II Wide Throw Optic, with maximized lateral throw **3** Type III Preferred Wide Throw Optic, with improved forward throw **4** Type IV Maximized forward throw optic	**UNV** 120-277V 50hz/60hz **120** 120V **208** 208V **240** 240V **277** 277V	**PCB** Photocontrol Button[2] **DD** 0-10V Dimming	**F1** Single fusing (120, 277VAC)[1] **F2** Double fusing (208, 240VAC)[1] **F3** Canadian double pull fusing (208, 240VAC)[1] **DL** Diffusing Lens **WS** Wall Mounted Box for Surface Conduit	**Textured** **BK** Black **WH** White **BZ** Bronze **DGY** Dark Grey **MGY** Medium Grey **Customer specified** **RAL** Specify optional color or RAL (ex: OC-LGP or OC-RAL7024) **CC** Custom color (must supply color chip for required factory quote)

1. Provide specific input voltage.

Dimensions



Note: Mounting plate center is located in the center of the luminaire width and 2.38" (6.03cm) above the luminaire bottom (lens down position). Splices must be made in the J-box (by others). Mounting plate must be secured by max. 1/4" (.64cm) diameter bolts (by others) structurally to the wall.

111 Mini Sconce LED

110 Line LED, Wall Mount

LED Wattage and Lumen Values

Ordering Code	Total LEDs	LED Current (mA)	Avg System Wattage[1] (W)	Type 2			Type 3			Type 4		
				Lumen Output[2]	Bug Rating	Efficacy (LPW)	Lumen Output[2]	Bug Rating	Efficacy (LPW)	Lumen Output[2]	Bug Rating	Efficacy (LPW)
111L-16L-350-NW-G2	16	350	18	1908	B1-U0-G0	106	1799	B0-U0-G0	100	1768	B0-U0-G0	98
111L-16L-550-NW-G2	16	550	29	2900	B1-U0-G0	101	2735	B1-U0-G1	95	2688	B1-U0-G1	93
111L-16L-750-NW-G2	16	750	40	3807	B1-U0-G1	95	3591	B1-U0-G1	90	3529	B1-U0-G1	88

1. Wattage and lumen output may vary by +/- 8% due to LED manufacturer forward volt specification and ambient temperature. Wattage shown is average for 120V through 277V input. Actual wattage may vary by an additional +/- 10% due to actual input voltage.
2. Tests available for luminaires with the DL option and other color temperatures. Contact outdoorlighting.applications@philips.com if any approximate estimates are required for design purposes.
3. Absolute lumens for Cool White (CW) matches the Neutral White (NW) lumen outputs. Warm White (WW) performance is reduced by 12% compared to Neutral White (NW) values shown.

Specifications

Housing

Housings are die cast aluminum. A memory retentive gasket seals the housing to the door frame to exclude moisture, dust, insects and pollutants from the optical system. A black, die cast ribbed backplate dissipates heat for longer system life. Main body cast housing and back plate made of a low copper die cast. Hinged door allows access to driver and LED compartment.

Mounting

Mounting is completed through integral back plate that features a separate recessed feature for hook and lock quick mount plate that secures with two set screws from bottom of luminaire. Luminaire ships fully assembled, ready to install.

Light Engine

Composed of 4 main components: Heat Sink/ LED Module/Optical System/Driver. Electrical components are RoHS compliant. Metal core board ensures greater heat transfer and longer lifespan.

IP Rating

Luminaires are rated IP66.

Optical systems

The advanced LED optical systems provide IES Types 2, 3, 4. Composed of high performance UV stabilized optical grade polymer refractor lenses to achieve desired distribution optimized to get maximum spacing, target lumens and a superior lighting uniformity. Performance shall be tested per LM-63, LM-79 and TM-15 (IESNA) certifying its photometric performance. Dark sky compliant with 0% uplight and U0 per IESNA TM-15.

Door Frame

A single-piece die cast aluminum door frame integrates to the housing form. The door frame is hinged closed and secured to the housing with captive stainless steel fasteners. The heat and impact resistant 1/8" (.32cm) tempered glass lens and one-piece gasket are mechanically secured to the door frame with galvanized steel retainers. A clear tempered glass lens is included. A diffuse lens is available as an option.

Thermal Management

Philips Gardco 111 LED luminaires utilize extruded aluminum integral thermal radiation fins to provide excellent thermal management critical to long LED system life.

Finish

Five standard colors offered in textured black, white, bronze, dark gray and medium gray. Color in accordance with the AAMA 2604 standard. Application of polyester powder coat paint 2.5 mils minimum. The thermosetting resins provides a discoloration resistant finish in accordance with the ASTM D2244 standard, as well as luster retention in keeping with the ASTM D523 standard and humidity proof in accordance with the ASTM D2247 standard. RAL and custom color matching available.

LED Useful Life

Luminaire Useful Life accounts for LED lumen maintenance. Refer to IES files for energy consumption and delivered lumens for each option. Based on ISTMT in situ thermal testing in accordance with UL1598 and UL8750, LED LM-80/ TM-21, expected to reach 100,000+ hours with >L70 lumen maintenance @ 25°C.

Certifications and Compliance

cULus Listed for Canada and USA suitable for wet locations when mounted downward facing. cULus Listed for Canada and USA suitable for damp locations when inverted upward facing when mounted in covered ceiling application. DesignLights Consortium qualified on models as listed on DLC QPL. Luminaire is rated for operation in ambient temperature of -40°C (-40°F) up to +40°C (+104°F)4.

Limited Warranty

5-year limited warranty. See philips.com/ warranties for details and restrictions. Visit our eCatalog or contact your local sales representative for more information.

Predicted Lumen Depreciation Data

Ambient Temperature °C	System Current	LED Current	Calculated L_{70}hrs[1,2]	L_{70} per TM21[2,3]	Lumen Maintenance @ 60,000hrs
25 °C	750 mA	750 mA	>100,000	>60,000	97%

1. Predicted performance derived from LED manufacturer's data and engineering design estimates, based on IESNA LM-80 methodology. Actual experience may vary due to field application conditions.
2. L70 is the predicted time when LED performance depreciates to 70% of initial lumen output.
3. Calculated per IESNA TM 21-11. Published L70 hours limited to 6 times actual LED test hours.

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TECH LIGHTING

Luminaire Type
BB1

ELEMENT™ 2" LED
ULTRA-SHALLOW FIXED DOWNLIGHT



SHOWN IN FLANGELESS BEVEL SQUARE

The ELEMENT 2" Ultra-Shallow Fixed Downlight is the ultimate solution for an aesthetically minimal recessed fixture to fit into the smallest of plenums. With an overall height of only 2.25", the ELEMENT 2" Ultra-Shallow Fixed Downlight is rated IC Airtight and still delivers the same performance as the rest of the ELEMENT 2" platform.

- 2.25" overall housing height
- 2-step standard
- Lensed and shower aperture includes Solite Soft Focus lens
- Interchangeable optics: 20°, 30°, 40°, or 60°
- Flangeless in wood ceiling installation available

LUMEN MULTIPLIER (CRI/CCT)

CCT	80 CRI MULTIPLIER	90 CRI MULTIPLIER
2700K	0.95	0.80
3000K	1.00	0.85
3500K	1.05	0.90

Lumen output will vary by CCT and CRI.
See photometric charts for output information.

SPECIFICATIONS

	STATIC WHITE				WARM DIM	TUNABLE WHITE	
	HIGH OUTPUT		LOW OUTPUT		LOW OUTPUT	HIGH OUTPUT (5000K)	HIGH OUTPUT (4000K)
DELIVERED LUMENS	1500	1250	1163	930	850	919	830
WATTS	17	17	12	12	12	16	16
EFFICACY	88	73	97	77	71	57	52
CRI	80+	90+	80+	90+	90+	90+	
CBCP	20° - 5,136 | 30° - 4,644 | 40° - 3,050 | 60° - 1,764						
CCT	2700K, 3000K, or 3500K				3000K - 1800K	5000K - 2700K	4000K - 1800K
COLOR CONSISTENCY	2-step				3-step	2-step	
VOLTAGE	120V or 277V						
DIMMING[1]	Standard reverse-phase, forward-phase, TRIAC, and 0-10V dimming (down to 1%) eldoLED 0-10V or DALI-2 (down to 0.1%) Lutron has placed their LTEA (2-Wire) and 0.1% PEQ eco drivers on indefinite hold. Please consult Factory for alternative Lutron drivers (e.g. LDE 1%) or other driver solutions.					eldoLED 0-10V or DALI-2 (down to 0.1%)	
POWER SUPPLY	Constant current driver with +.9 power factor and +80% efficiency						
OPTICS	20°, 30°, 40°, or 60°						
CEILING APPEARANCE	Flanged, flangeless, flangeless in wood ceiling						
CEILING THICKNESS	Flanged, flangeless, flangeless in wood ceiling 1/2" to 1 1/4"						
CEILING APERTURE	2-3/4" ceiling cutout						
HOUSING	IC Airtight, Chicago Plenum. IC suitable up to R60 spray foam insulation. Sauna/steam-room use available only with combination of H shower trim, LO low output housing, and I IC housing rating.						
CONSTRUCTION	Housing: Heavy-gauge, cold-rolled steel Trim: Die-cast aluminum						
FINISH	Housing: Black powder coat Trim: Antique Bronze, Black, Satin Nickel, or White (paintable)						
GENERAL LISTINGS	ETL Listed. Damp Location. Shower version Wet Listed.						
CALIFORNIA TITLE 24	Registered CEC appliance database. Complies with CEC 2019 Title 24 Part 6 (JA8-2016, JA8-2019) (for 90 CRI versions).						
L70	50,000 hours min						
WARRANTY[2]	5 years						

Data in chart reflect 3000K/80 CRI values unless noted.
Custom output/custom RAL/custom CCT available, contact Quotes Department.
Ordering grids available on page 2.
[1]See ELEMENT-Lighting.com for dimmer compatibility.
[2]Visit ELEMENT-Lighting.com for specific warranty limitations and details.

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UPDATED 10/31/22

TECH LIGHTING

ELEMENT™ 2" LED

ULTRA-SHALLOW FIXED DOWNLIGHT

ORDERING GRIDS

HOUSING

PRODUCT	CEILING APPEARANCE	OUTPUT	CRI/CCT	BEAM SPREAD	FUNCTION	HOUSING RATING	DRIVER
E2R ELEMENT 2" ROUND **E2S** ELEMENT 2" SQUARE	**L** FLANGELESS[1] **F** FLANGED **WC** WOOD CEILING[2]	**-LH** HIGH OUTPUT, 17W[3] **-LO** LOW OUTPUT, 12W[4]	**827** 80 CRI, 2700K, 2-STEP **830** 80 CRI, 3000K, 2-STEP **835** 80 CRI, 3500K, 2-STEP **927** 90 CRI, 2700K, 2-STEP **930** 90 CRI, 3000K, 2-STEP **935** 90 CRI, 3500K, 2-STEP **9WD** 90 CRI, 3000K-1800K, WARM DIM, 3-STEP[5] **9TW52** 90 CRI, 5000K-2700K, TUNABLE WHITE, 2-STEP[6] **9TW41** 90 CRI, 4000K-1800K, TUNABLE WHITE, 2-STEP[6]	**20** 20° **30** 30° **40** 40° **60** 60°	**DS** DOWNLIGHT	**I** IC AIRTIGHT **C** CHICAGO PLENUM	**INTEGRATED DRIVERS 120V/277V** UNIVERSAL PHASE/0-10V 1% (LEAVE BLANK)[7] **REMOTE DRIVERS 120V/277V[8]** **-ELD0** ELDOLED 0.1% 0-10V LINEAR **-ELD0A** ELDOLED 0.1% 0-10V LOGARITHMIC **-ELDD** ELDOLED 0.1% DALI-2 **-ELT0** ELDOLED TUNABLE WHITE 0.1% 0-10V LINEAR[6] **-ELTD** ELDOLED TUNABLE WHITE 0.1% DALI-2[6]
		-			DS		

Trims are required and must be ordered separately.
See dimmer compatibility chart.

Lutron has placed their LTEA (2-Wire) and 0.1% PEQ eco drivers on indefinite hold. Please consult Factory for alternative Lutron drivers (e.g. LDE 1%) or other driver solutions.

[1]L - Flangeless housings do not utilize collars.
[2]WC - Flangeless in wood ceiling accommodates flangeless trims only.
[3]LH - High output is available for Wet Rated. Not rated for sauna/steam-room.
[4]LO - Sauna/steam-room use available only with combination of H shower trim, LO low output housing, and I IC housing rating.
[5]9WD - Warm dim 90 CRI only. Only available LO low output.
[6]9TW52/9TW41 - Tunable white only available as LH high output, only available with ELT0 (0-10V, Linear) or ELTD (DALI-2). For 0-10V logarithmic dimming consult Quotes Department.
[7]Universal dimming is reverse-phase, forward-phase, TRIAC and 0-10V dimming. 277V is only compatible with 0-10V dimming.
[8]Remote drivers ship in 4.3" x 1.8" x 2.3" black enclosure for remote location mounting.

TRIM

PRODUCT	CEILING APPEARANCE	STYLE	APERTURE	FINISH
E2R ELEMENT 2" ROUND **E2S** ELEMENT 2" SQUARE	**L** FLANGELESS[1] **F6** FLANGED TRIM EXTENDER, 0.500" - 0.625" CEILING THICKNESS[2] **F7** FLANGED TRIM EXTENDER, 0.625" - 0.750" CEILING THICKNESS[2] **F8** FLANGED TRIM EXTENDER, 0.750" - 0.875" CEILING THICKNESS[2] **F1** FLANGED TRIM EXTENDER, 0.875" - 1.000" CEILING THICKNESS[2]	**B** BEVEL **F** FLAT	**-O** NO LENS **-H** SHOWER[3,4] **-L** LENSED[4]	**W** WHITE (PAINTABLE) **B** BLACK **Z** ANTIQUE BRONZE **S** SATIN NICKEL
			-	

[1]L - For use with L flangeless or WC flangeless in wood ceiling housing.
[2]F6/F7/F8/F1 - Flanged trims with extenders for use with ceiling thickness greater than 0.500".
[3]H - Sauna/steam-room use available only with combination of H shower trim, LO low output housing, and I IC housing rating.
[4]H, L - Lensed products come with Solite Soft Focus lens.

LENSES/LOUVERS[1]

PRODUCT	TYPE
MOC	**GG** PLAIN GLASS **SF** SOFT FOCUS **LL** LINEAR SPREAD **EC** EGGCRATE LOUVER **LS1** 1" LONG SNOOT **LS12** 1/2" LONG SNOOT
MOC	

[1]Lenses/louvers mounted to lamp assembly only (max 2).

REPLACEMENT OPTICS

PRODUCT	BEAM SPREAD
353LEDGATOPT	**20** 20° **30** 30° **40** 40° **60** 60°
353LEDGATOPT	

PLASTER PLATES

PRODUCT	
150E2RCL	2" PLASTER PLATE ROUND SHEET METAL
150E2SCL-A	2" PLASTER PLATE SQUARE SHEET METAL

Plaster plates are used to convert flanged housings into flangeless housings.
Ships standard with flangeless housings.

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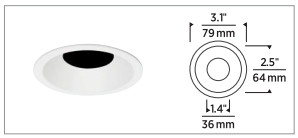
TECH LIGHTING

ELEMENT™ 2" LED

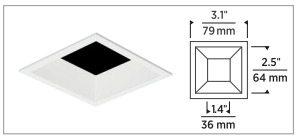
ULTRA-SHALLOW FIXED DOWNLIGHT

TRIMS

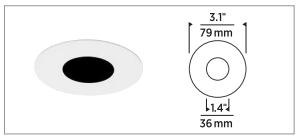
FLANGED



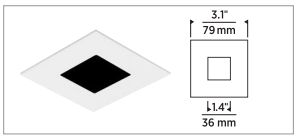
ROUND BEVEL



SQUARE BEVEL

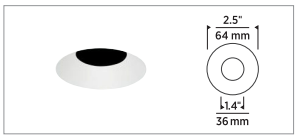


ROUND FLAT

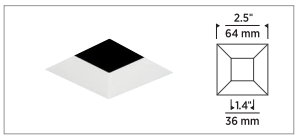


SQUARE FLAT

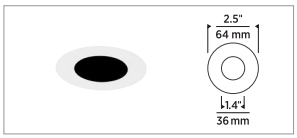
FLANGELESS



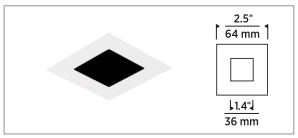
ROUND BEVEL



SQUARE BEVEL



ROUND FLAT



SQUARE FLAT

FINISH


ANTIQUE BRONZE


BLACK

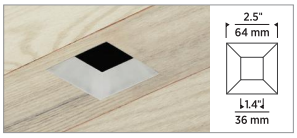

SATIN NICKEL


WHITE (PAINTABLE)

FLANGELESS IN WOOD CEILING



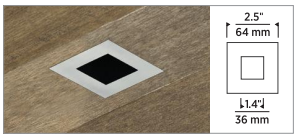
ROUND BEVEL (ANTIQUE BRONZE)



SQUARE BEVEL (SATIN NICKEL)



ROUND FLAT (ANTIQUE BRONZE)



SQUARE FLAT (SATIN NICKEL)

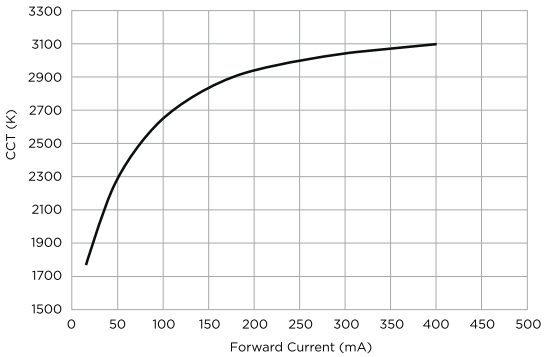
LENS OPTION


SHOWN WITH AND WITHOUT A LENS (SQUARE FLANGED BEVEL)


SHOWN WITH AND WITHOUT A LENS (ROUND FLANGELESS BEVEL)

WARM DIM CURVE

CCT vs. Forward Current, T_c=25°C



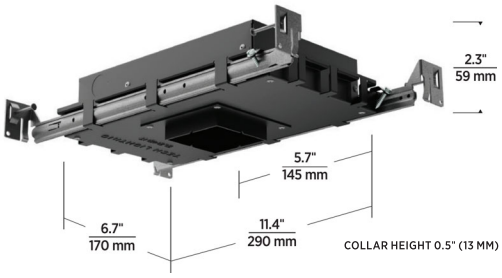
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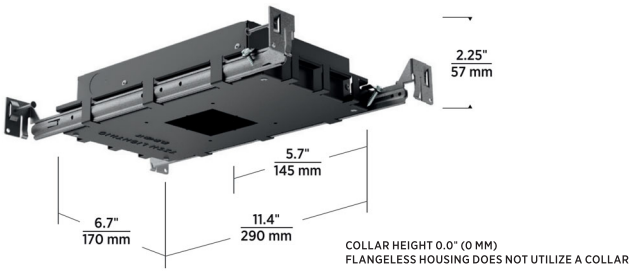
ELEMENT™ 2" LED

ULTRA-SHALLOW FIXED DOWNLIGHT

HOUSING

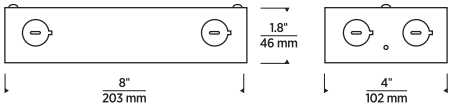


IC AIRTIGHT/ CHICAGO PLENUM
FLANGED

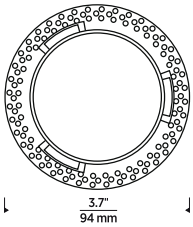


IC AIRTIGHT / CHICAGO PLENUM
FLANGELESS / FLANGELESS IN WOOD CEILING

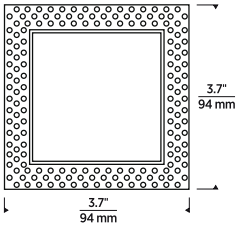
REMOTE DRIVER J-BOX



MUD/PLASTER PLATES



ROUND SHEET METAL
MUD/PLASTER PLATE IS
INCLUDED FOR FLANGELESS
INSTALLATION

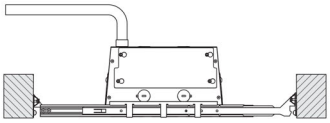


SQUARE SHEET METAL
MUD/PLASTER PLATE IS
INCLUDED FOR FLANGELESS
INSTALLATION

FLANGELESS IN WOOD CEILING INSTALLATION

IMPORTANT:
READ INSTALLATION INSTRUCTIONS
THOROUGHLY PRIOR TO INSTALL

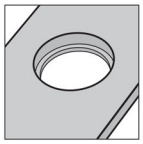
Assemble housing to joists.



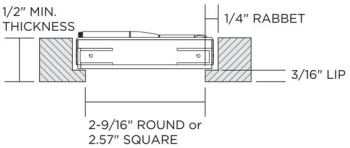
PREPARE WOOD CEILING

Use a 2-9/16" hole saw (round) or mill a 2.57" square opening in the wood. The wood must be at least 1/2" thick for the trims to hold firmly in place.

Use a 1/4" rabbet router bit to create a larger opening on the top side of the wood. The rabbet must cut to adepth that leaves 3/16" of wood above the ceiling level.

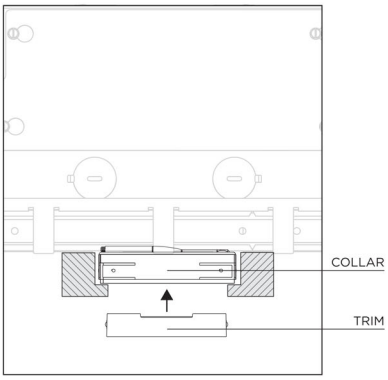


ROUTER CUT DETAIL



INSERT TRIM INTO THE COLLAR

Align the trim with the inner edge of the collar. Push the trim into the collar so that it snaps into place.



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ELEMENT™ 2" LED

ULTRA-SHALLOW FIXED DOWNLIGHT

ELEMENT Specular Reflectors reduce glare while creating a clean, quiet ceiling appearance. These beautiful trim accessories have been specifically designed to minimize any effect on light performance, color, and output. Specular Reflectors are available for both adjustable and fixed downlights, and are compatible with ELEMENT 2" trims and housings.

- Can be easily installed or removed
- Assembles to existing trim
- Compatible with fixed and adjustable Housings

COMPATIBLE TRIMS	NON-SLOTTED (FOR FIXED)
2" round, flanged, bevel	E2TREFNS3B
2" round, flanged, flat	E2TREFNS2B
2" round, flangeless, bevel	E2TREFNS3B
2" round, flangeless, flat	E2TREFNS2B
2" square, flangeless, bevel	E2TREFNS1B
2" square, flanged, bevel	E2TREFNS1B[1]

Not compatible with lensed trims.
[1]Not compatible with flanged trim extenders F6, F7, F8, F1.

ORDERING GRID

E2 TRIM MOUNTED REFLECTORS[1]

PRODUCT	STYLE	FINISH
E2TREF	**NS1** NON-SLOTTED **NS2** NON-SLOTTED **NS3** NON-SLOTTED	**B** ANODIZED BLACK
E2TREF		B

[1]Not compatible with lensed trims. Reflectors are placed on top of the inside of the trim or affixed via screws (only if provided).



BELOW CEILING VIEW



SHOWN MOUNTED TO TRIM



REFLECTOR ONLY

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ELEMENT™ 2" LED

ULTRA-SHALLOW FIXED DOWNLIGHT

PHOTOMETRICS

Description:	2" LED Module 20° Beam - 0° Tilt, 3000K
Model:	E2 Ultra-Shallow Fixed 20° High Output
Input Power (Watts):	18.7
Input Power Factor:	0.98
Absolute Luminous Flux (Lumens):	1206
Lumen Efficacy (Lumens per Watt):	64.5

Description:	2" LED Module 30° Beam - 0° Tilt, 3000K
Model:	E2 Ultra-Shallow Fixed 30° High Output
Input Power (Watts):	18.7
Input Power Factor:	0.98
Absolute Luminous Flux (Lumens):	1414
Lumen Efficacy (Lumens per Watt):	75.5

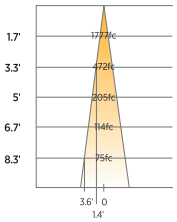
Description:	2" LED Module 40° Beam - 0° Tilt, 3000K
Model:	E2 Ultra-Shallow Fixed 40° High Output
Input Power (Watts):	18.7
Input Power Factor:	0.98
Absolute Luminous Flux (Lumens):	1565
Lumen Efficacy (Lumens per Watt):	83.7

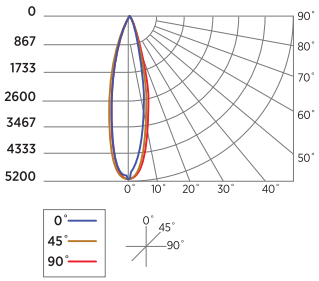
Output difference between CCTs - 5%, CRIs - 15%.

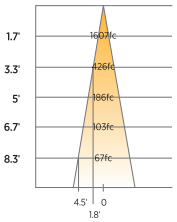
ANGLE	0°	45°	90°
0°	5136	5136	5136
5°	4054	4347	4616
10°	2654	2956	3278
15°	1383	1756	1896
20°	627	878	924
25°	249	326	393
30°	81	128	151
35°	24	65	50
40°	6	30	12
45°	3	6	4
50°	1	2	2
55°	1	1	1
60°	0	1	0
65°	0	1	0
70°	0	1	0
75°	0	1	0
80°	0	0	0
85°	0	0	0
90°	0	0	0

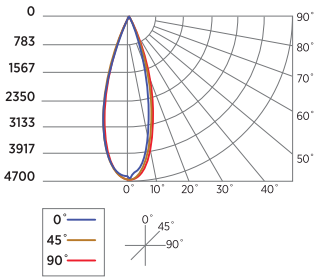
ANGLE	0°	45°	90°
0°	4644	4644	4644
5°	4184	4322	4434
10°	3249	3454	3698
15°	1948	2286	2488
20°	933	1178	1304
25°	342	428	544
30°	87	161	176
35°	27	68	52
40°	7	27	12
45°	2	5	4
50°	1	2	1
55°	0	1	0
60°	0	1	0
65°	0	1	0
70°	0	0	0
75°	0	0	0
80°	0	0	0
85°	0	0	0
90°	0	0	0

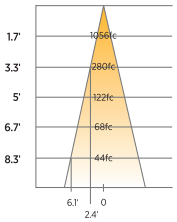
ANGLE	0°	45°	90°
0°	3050	3050	3050
5°	2774	2892	2971
10°	2436	2549	2701
15°	1847	2085	2260
20°	1188	1460	1594
25°	571	776	959
30°	216	353	411
35°	84	142	154
40°	30	53	55
45°	11	18	20
50°	1	7	4
55°	0	2	0
60°	0	0	0
65°	0	0	0
70°	0	0	0
75°	0	0	0
80°	0	0	0
85°	0	0	0
90°	0	0	0

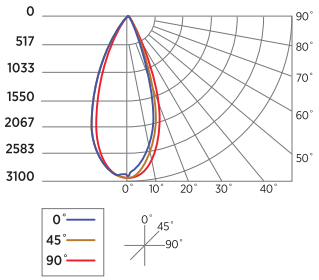












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TECH LIGHTING®

ELEMENT™ 2" LED

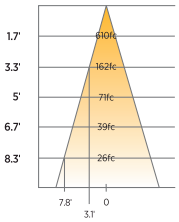
ULTRA-SHALLOW FIXED DOWNLIGHT

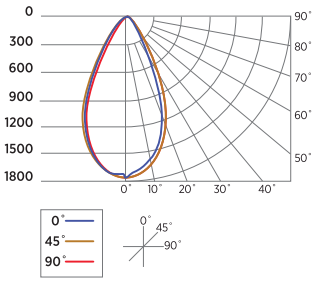
PHOTOMETRICS

Description:	2" LED Module 60° Beam - 0° Tilt, 3000K
Model:	E2 Ultra-Shallow Fixed 60° High Output
Input Power (Watts):	18.7
Input Power Factor:	0.98
Absolute Luminous Flux (Lumens):	1382
Lumen Efficacy (Lumens per Watt):	73.7

Output difference between CCTs - 5%, CRIs - 15%.

ANGLE	0°	45°	90°
0°	1764	1764	1764
5°	1667	1724	1721
10°	1562	1612	1629
15°	1380	1445	1483
20°	1109	1233	1235
25°	718	921	923
30°	442	638	542
35°	310	377	350
40°	208	239	238
45°	83	142	139
50°	1	70	26
55°	1	6	1
60°	0	1	0
65°	0	0	0
70°	0	1	0
75°	0	0	0
80°	0	0	0
85°	0	0	0
90°	0	0	0



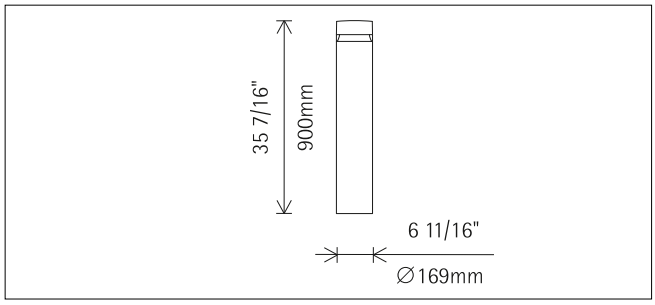


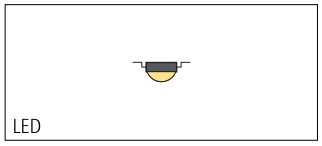
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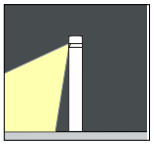
Castor Bollard luminaire

Floor washlight

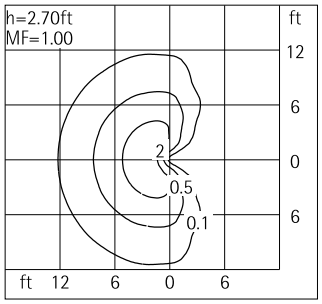












35748.023 Graphit m
LED module: 12W 1260lm 3000K warm white
0-10V dimmable
Version 2
Wide beam

Product description
For mounting on accessories.
Bollard: corrosion-resistant aluminum profile, No-Rinse surface treatment. Double powder-coated. Optimized surface for reduced accumulation of dirt.
Upper cover and base plate: corrosion-resistant cast aluminum, No-Rinse surface treatment. Double powder-coated. Base plate for mounting on ground socket, concrete anchor or mounting plate.
Control gear 120V/277V, 60Hz, dimmable. 2 cable entries. Through-wiring possible. 5 terminals.
LED module: high-power LEDs on metal-core PCB.
180° light guidance ring made of optical polymer.
Anti-glare cone: corrosion-resistant cast aluminum, No-Rinse surface treatment. double powder-coated and black lacquered.
Glare-free above the light aperture.
Mounting accessories to be ordered separately.
Suitable for wet location (IP65): dust-proof and water jet-proof.
Dimming with external dimmers possible (0-10V).
Weight 21.43lbs / 9.72kg
Maximum wind load area 1.61ft² / 0.15m²
Version with 3000K CRI 97 or 2700K, 3500K, 4000K CRI 92 available on request.

Technical data

Luminous flux of the luminaire	236lm
Connected load	14.0W
Luminaire efficacy	17lm/W
Color deviation	1.5 SDCM
Color rendition index	CRI 92
Lumen maintenance (LED manufacturer specifications)	L90/B10 ≤50000h L90 ≤100000h
LED failure rate	0.1% ≤50000h
LMF	E

Luminaire Type
BC1

For your regional contact in the ERCO Sales network click here
www.erco.com/contact

Technical region: 120V/60Hz, 277V/60Hz
We reserve the right to make technical and design changes.
Edition: 28.04.2022
Current version under
www.erco.com/35748.023

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ERCO

Castor Bollard luminaire

Planning data

Cleaning (a)	1				2				3			
Ambient conditions	P	C	N	D	P	C	N	D	P	C	N	D
LMF	0.96	0.94	0.90	0.86	0.93	0.91	0.86	0.81	0.92	0.90	0.84	0.79
RSMF	0.97	0.95	0.91	0.86	0.97	0.94	0.90	0.86	0.97	0.94	0.90	0.86

Hours of operation (h)	1000	5000	10000	20000	30000	40000	50000
LLMF	1.00	0.99	0.98	0.96	0.94	0.92	0.90
LSF	1	1	1	1	1	1	1

MF	LMFxRSMFxLLMFxLSF
MF	Maintenance Factor
LMF	Luminaire Maintenance Factor
RSMF	Room Surface Maintenance Factor
LLMF	Lamp Lumens Maintenance Factor
LSF	Lamp Survival Factor
P	Room pure
C	Room clean
N	Room normal
D	Room dirty

Technical data based on international standards and directives

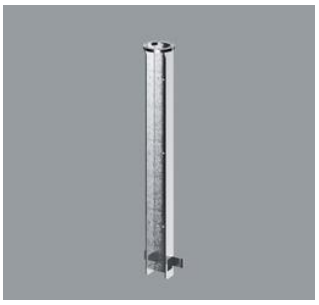
IEC 60598	Luminaires – Parts 1 + 2: General requirements, particular requirements and tests
IEC 62031	LED modules for general lighting – Safety specifications
IEC 62471	Photobiological safety of lamps and lamp systems
UL 1598	Luminaires
UL 1574	Standard for Track Lighting Systems
UL 8750	Standard for Light Emitting Diode (LED) Equipment for Use in Lighting Products
IES LM-79-08	Electrical and Photometric Measurements of Solid-State Lighting Products
IES LM-80-08	Measuring Lumen Maintenance of LED Light Sources
CIE 13	Method of measuring and specifying color rendering properties of light sources

All technical data are subject to industry standard tolerances.
See also www.erco.com/erco-led

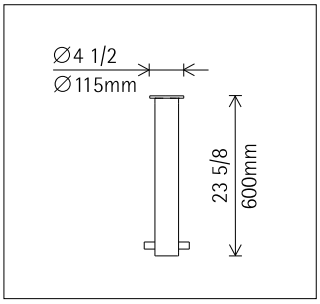
ERCO

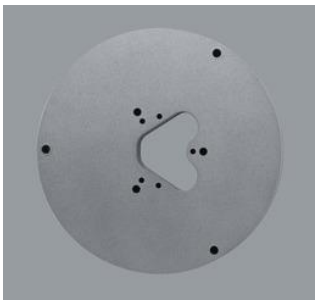
Castor Bollard luminaire

Accessories

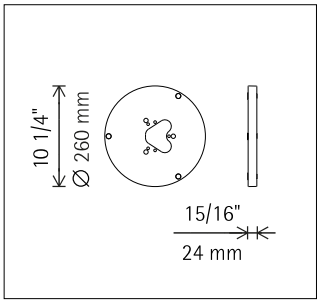


33974.000
Ground socket
Metal, hot-dip galvanised.
Weight 6.39lbs / 2.90kg



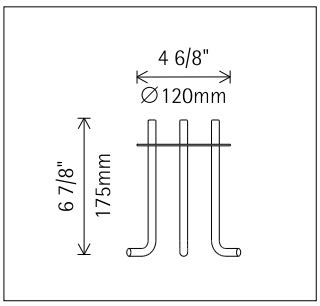


33982.000
Mounting plate
Corrosion-resistant cast aluminum, No-Rinse surface treatment. Graphit m, double powder-coated.
Weight 3.75lbs / 1.70kg
→Outdoor
Dry Damp Wet





33981.000
Concrete anchor
Mounting plate with threaded bar and fixing nuts M10. Individual parts to be assembled on-site.
Weight 1.68lbs / 0.76kg



GARDCO by signify

Wall Mount

LED Mini sconce

111L



Gardco 111 LED mini sconce luminaires are compact in size, perfect for low mounting height wall mount applications. 111 LED luminaires are designed to integrate naturally to wall surfaces. 111 LED luminaires are available in Type 2, 3 and 4 distributions, and provide output from 1,300 to 4,600 lumens.

Luminaire Type
BD

Lamps: Qty:

Notes:

Ordering guide

example: 111L-16L-550-CW-G3-2-UNV-PCB-F1-BK

Prefix	No. of LEDs	Drive Current	Color/Generation	Distribution	Voltage	Controls	Electrical	Finish
111L	16							
111L Trapezoidal Wedge Mini Sconce LED	**16L** 16 LED module	**200** 200mA **350** 350mA **550** 550mA **750** 750mA	**WW-G3** Warm White 3000K, 70 CRI generation 3 **NW-G3** Neutral White 4000K, 70 CRI generation 3 **CW-G3** Cool White 5000K, 70 CRI generation 3 **WY-G3** Warm Yellow 2700K, 80 CRI Generation 3[2] **BW-G3** Balanced White 3500K 80CRI Generation 3[2] **AM-G3** Direct Amber (590nm) Generation 3[2]	**2** Type II Wide Throw Optic, with maximized lateral throw **3** Type III Preferred Wide Throw Optic, with improved forward throw **4** Type IV Maximized forward throw optic	**UNV** 120-277V 50hz/60hz **120** 120V **208** 208V **240** 240V **277** 277V	**PCB** Photocontrol Button[1]	**F1** Single fusing (120, 277VAC)[1] **F2** Double fusing (208, 240VAC)[1] **F3** Canadian double pull fusing (208, 240VAC)[1]	**Textured** **BK** Black **WH** White **BZ** Bronze **DGY** Dark Grey **MGY** Medium Grey **Customer specified** **RAL** Specify optional color or RAL (ex: OC-LGP or OC-RAL7024) **CC** Custom color (must supply color chip for required factory quote)

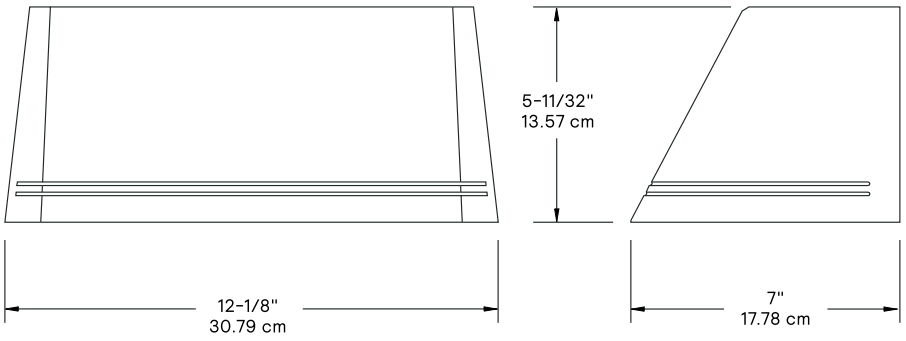
1. Provide specific input voltage.
2. Extended lead times apply. Contact factory for details.

Accessories (ordered separately)

Mounting Accessories	
Wall Mount	
WS	Wall Mounted Box for Surface Conduit

111 LED Mini Wall Sconce

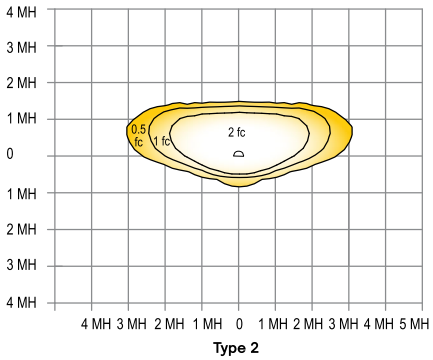
Dimensions



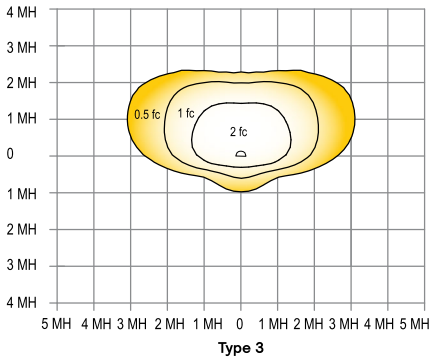
Note: Mounting plate center is located in the center of the luminaire width and 2.38" (6.03cm) above the luminaire bottom (lens down position). Splices must be made in the J-box (by others). Mounting plate must be secured by max. 1/4" (.64cm) diameter bolts (by others) structurally to the wall.

Weight: 6.6 lbs

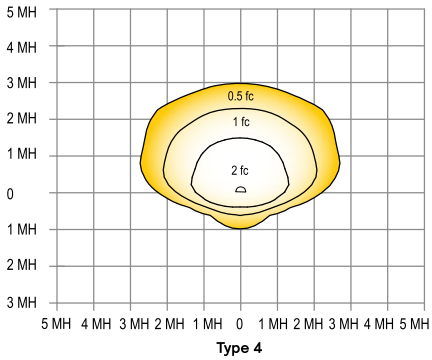
Optical Distributions



Type 2



Type 3



Type 4

111 LED Mini Wall Sconce

3000K LED Wattage and Lumen Values

CAT LOGIC	LED QTY	System Current (mA)	Color Temp	Avg System Wattage (W)	2			3			4		
					Lumen Output	Efficacy (Lm/W)	BUG Rating	Lumen Output	Efficacy (Lm/W)	BUG Rating	Lumen Output	Efficacy (Lm/W)	BUG Rating
111L-16L-200-WW-G3-x	16	200	3000	12	1370	114	B1-U0-G0	1343	112	B0-U0-G0	1315	110	B0-U0-G0
111L-16L-350-WW-G3-x	16	350	3000	18	2304	128	B1-U0-G0	2260	126	B1-U0-G1	2213	123	B1-U0-G1
111L-16L-550-WW-G3-x	16	550	3000	29	3503	121	B1-U0-G0	3435	118	B1-U0-G1	3363	116	B1-U0-G1
111L-16L-750-WW-G3-x	16	750	3000	39	4598	117	B1-U0-G1	4509	114	B1-U0-G1	4415	112	B1-U0-G1

4000K LED Wattage and Lumen Values

CAT LOGIC	LED QTY	System Current (mA)	Color Temp	Avg System Wattage (W)	2			3			4		
					Lumen Output	Efficacy (Lm/W)	BUG Rating	Lumen Output	Efficacy (Lm/W)	BUG Rating	Lumen Output	Efficacy (Lm/W)	BUG Rating
111L-16L-200-NW-G3-x	16	200	4000	12	1439	120	B1-U0-G0	1411	118	B0-U0-G0	1381	115	B0-U0-G0
111L-16L-350-NW-G3-x	16	350	4000	18	2420	134	B1-U0-G0	2373	132	B1-U0-G1	2323	129	B1-U0-G1
111L-16L-550-NW-G3-x	16	550	4000	29	3678	127	B1-U0-G0	3606	124	B1-U0-G1	3531	122	B1-U0-G1
111L-16L-750-NW-G3-x	16	750	4000	39	4828	123	B1-U0-G1	4734	120	B1-U0-G1	4636	118	B1-U0-G1

5000K LED Wattage and Lumen Values

CAT LOGIC	LED QTY	System Current (mA)	Color Temp	Avg System Wattage (W)	2			3			4		
					Lumen Output	Efficacy (Lm/W)	BUG Rating	Lumen Output	Efficacy (Lm/W)	BUG Rating	Lumen Output	Efficacy (Lm/W)	BUG Rating
111L-16L-200-CW-G3-x	16	200	5000	12	1439	120	B1-U0-G0	1411	118	B0-U0-G0	1381	115	B0-U0-G0
111L-16L-350-CW-G3-x	16	350	5000	18	2420	134	B1-U0-G0	2373	132	B1-U0-G1	2323	129	B1-U0-G1
111L-16L-550-CW-G3-x	16	550	5000	29	3678	127	B1-U0-G0	3606	124	B1-U0-G1	3531	122	B1-U0-G1
111L-16L-750-CW-G3-x	16	750	5000	39	4828	123	B1-U0-G1	4734	120	B1-U0-G1	4636	118	B1-U0-G1

Values from photometric tests performed in accordance with IESNA LM-79 and are representative of the configurations shown.
Actual performance may vary due to installation and environmental variables, LED and driver tolerances, and field measurement considerations. It is highly recommended to confirm performance with a photometric layout.
NOTE: Some data may be scaled based on tests of similar (but not identical) luminaires. Contact factory for configurations not shown.

111 LED Mini Wall Sconce

Specifications

Housing

Housings are die cast aluminum. A memory retentive gasket seals the housing to the door frame to exclude moisture, dust, insects and pollutants from the optical system. A black, die cast ribbed backplate dissipates heat for longer system life. Main body cast housing and back plate made of a low copper die cast. Hinged door allows access to driver and LED compartment.

Mounting

Mounting is completed through integral back plate that features a separate recessed feature for hook and lock quick mount plate that secures with two set screws from bottom of luminaire. Luminaire ships fully assembled, ready to install.

Light Engine

Light engine comprises of a module of 16-LED aluminum metal clad board fully sealed with optics offered in 1 module of 16 LEDs. Module is RoHS compliant. Standard color temperatures: 3000K +/-125K, 4000K, 5000K +/- 200K. Minimum CRI of 70. Also available in 2700K, 3500K, and Amber (590nm) with extended lead times. Contact factory for details. LED light engine is rated IP66 in accordance to Section 9 of IEC 60598-1.

IP Rating

Luminaires are rated IP66.

Optical system

Type 2, 3, and 4 distributions available. Performance tested per LM-79 and TM-15 (IESNA) certifying its photometric performance. Luminaire designed with 0% uplight (U0 per IESNA TM-15).

Electrical

Driver: Driver efficiency (>90% standard). 120-480V available (restrictions apply). Open/short circuit protection. Standard 0-10V dimming drivers. RoHS compliant.

Button Photocontrol (PCB): Button style design for internal luminaires mounting applications. The photocontrol is constructed of a high impact UV stabilized polycarbonate housing. Rated voltage of 120V or 208-277V with a load rating of 1000 VA. The photocell will turn on with 1-4Fc of ambient light.

Surge protection (SP1): Each luminaire is provided as standard with surge protector tested in accordance with ANSI/IEEE C62.45 per ANSI/IEEE C62.41.2 Scenario I Category C High Exposure 10kV/5kA waveforms for Line Ground, Line Neutral and Neutral Ground, and in accordance with U.S. DOE (Department of Energy) MSSLC (Municipal Solid-State Street Lighting Consortium) Model Specification for LED Roadway Luminaires Appendix D Electrical Immunity High Test Level 10kV / 5kA.

Finish

Five standard colors offered in textured black, white, bronze, dark gray and medium gray. Color in accordance with the AAMA 2604 standard. Application of polyester powder coat paint 2.5 mils minimum. The thermosetting resins provides a discoloration resistant finish in accordance with the ASTM D2244 standard, as well as luster retention in keeping with the ASTM D523 standard and humidity proof in accordance with the ASTM D2247 standard. RAL and custom color matching available.

Listings

cULus Listed for Canada and USA suitable for wet locations when mounted downward facing. cULus Listed for Canada and USA suitable for damp locations when inverted upward facing when mounted in covered ceiling application. DesignLights Consortium qualified on models as listed on DLC QPL. CCTs 3000K and warmer are Dark Sky Approved. Luminaire is rated for operation in ambient temperature of -40°C (-40°F) up to +40°C (+104°F).

Limited Warranty

111 LED mini sconce luminaires feature a 5-year limited warranty.

See signify.com/warranties for complete details and exclusions

Predicted Lumen Depreciation Data

Ambient Temperature °C	System Current	LED Current	Calculated L_{70}hrs[1,2]	L_{70} per TM21[2,3]	Lumen Maintenance @ 60,000hrs
25 °C	750 mA	750 mA	>100,000	>60,000	97%

1. Predicted performance derived from LED manufacturer's data and engineering design estimates, based on IESNA LM-80 methodology. Actual experience may vary due to field application conditions.
2. L70 is the predicted time when LED performance depreciates to 70% of initial lumen output.
3. Calculated per IESNA TM 21-11. Published L70 hours limited to 6 times actual LED test hours.

Buy American Act of 1933 (BAA):

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SECTION 27 0000
TELECOMMUNICATIONS SYSTEM

PART 1 - GENERAL

1.01 DESCRIPTION

A. This project includes the provisions for and installation of a complete telecommunications system pathways and wiring infrastructure system for the building, including all terminations, testing, and all related passive components required for operation.

1.02 WORK INCLUDED

A. Work included in this Section: All materials, labor, equipment, services, and incidentals necessary to install the work as shown on the drawings and as specified hereinafter, including, but not limited to the work listed below.

B. Provide and install a complete and functional data communication system, including voice services via VoIP capability, and all necessary passive components, to allow full operation of the wiring infrastructure system upon completion.

C. The installation shall include all twisted pair copper, conduit, copper interconnect / patching equipment, copper connectors, splices, wiring blocks, data outlets, wi-fi access point jacks, and any other equipment specified herein.

D. The installation shall not include any active network components such as routers, switches, hubs, fiber optic transceivers, wireless communications system transceivers, antennae, base stations and concentrators or servers, which shall be supplied by the owner.

E. Upon completion of the installation, this contractor shall test all copper pathways and record the test results as specified herein. Test results must be delivered to the owner upon completion of project

F. The scope of work under this Section shall include any other work as might reasonably be implied as required, even though not specifically mentioned herein or shown on the drawings.

G. Provide CBC 2019 compliant seismic installation. See Section 26 05 00 for all certification and submittal requirements.

1.03 RELATED WORK

A. Division 1 - General Requirements.

B. Division 9 - Finishes.

C. Section 26 05 00 - Basic Electrical Requirements

D. Section 26 27 00 - Basic Electrical Materials & Methods

E. Equipment and work provided by the owner's network integrator, including owner provided network servers, switches, hubs, optical fiber transceivers, routers, wireless communication system equipment, etc.

1.04 INCORPORATED DOCUMENTS

A. Requirements of the General Conditions, supplementary conditions, and Division 1 Sections apply to the work of this section, unless modified herein.

B. Published specifications, standard tests or recommended methods of trade, industry or government organizations shall apply to work of this section where cited by abbreviations noted below, unless modified herein.

1. National Electrical Code, latest edition, (NEC), Article 800
2. ANSI/TIA-568.0-D - Generic Communications Cabling for Customer Premises
3. Underwriters' Laboratories, Inc. (UL), UL 1459, UL 1863.
4. ANSI/TIA-568.1-D "Commercial Building Communications Cabling Standard"

5. ANSI/TIA-569-D "Telecommunications Pathways and Spaces"
6. ANSI/TIA-568-C.2-1. "Balanced Twisted-Pair Telecommunications Cabling and Components Standard"
7. ANSI/TIA-606-B.1 - Administration Standard for the Commercial Telecommunications Infrastructure
8. ANSI/TIA-607-C - Generic Telecommunications Bonding and Grounding (Earthing) for Customer Premises
9. ANSI/TIA-862-B - Structured Cabling Infrastructure Standard for Intelligent Building Systems
10. ANSI/TIA-942-A - Telecommunications Infrastructure Standard for Data Centers
11. BICSI - TDMM, Building Industries Consulting Services International, Telecommunications Distribution Methods Manual (TDMM)
12. IEEE 802.3 "Carrier Sense Multiple Access With Collision Detection".
13. IEEE 802.11b "Wireless Network standard"
14. Owner's telecommunications Standards and Requirements.

1.05 CONTRACTOR QUALIFICATIONS

A. Contractor must possess a valid state Contractor's License and must have successfully performed at least three projects of similar scope, within two years of the date of this bid. Proof of performance shall be in the form of reference sheets, which shall include a brief description of the project, the beginning and ending contract price, the project foreman or superintendent's name, and the name, address, and telephone number of a project contact.

B. Contractor must have been in business and in the business of installing telecommunications systems, continuously, for a period of at least three years, prior to the date of this bid.

1.06 SUBMITTALS

A. General: Comply with the requirements of Section 26 05 00 - Submittals.

B. Submit complete list of all items of materials to be furnished, and installed to the owner for compliance review prior to purchasing the materials. Submittals shall include:
   1. Complete bill of materials and equipment, including a complete listing of the characteristics of the equipment as specified.
   2. One line diagram indicating all system connections, all closet locations, rack arrangements, cabinets, and workstation outlets.
   3. Rack and communications cabinet layouts and dimensions.
   4. Samples of proposed cable markers and labeling, and patch panel labeling and color-coding.
   5. List of instrumentation to be used for system testing, including certificate of manufacturer's calibration.
   6. ¼ scale plan of all telecommunications rooms and closets, indicating proposed layout of all equipment and cable trays, troughs, and runways.
   7. Manufacturer's warranty application for the indicated project.
   8. Schedule of work completion coordinated with the General Contractor.

C. Submit Contractor's qualifications as outlined in Section 1.05 above.

D. Submit "as-built" record drawings at the completion of the installation and testing.

E. The Contractor shall submit all testing documentation prior to acceptance of the work by the Owner.

1.07 GENERAL REQUIREMENTS

A. From the existing building IDF, one or more twisted-pair copper cables shall be routed to each data outlet location, and to each wireless antenna location, as indicated on the drawings.

1. The wiring system shall be provided and installed per TIA / EIA-568 wiring topology and shall be Category 6A rated.
2. Unshielded twisted pair (UTP) cable, installed for high-speed data application, shall not exceed 295 feet in length between terminations.

B. Terminations:
1. All data and voice cables and wireless communications cables shall be terminated on modular patch panels.
2. All active equipment will be provided and installed by the owner.

1.08 FUNCTION AND OPERATION

A. The function of the data communications cable system is to transmit data signals from a central location to multiple individual data outlet locations. Upon completion of the work outlined in this specification, the entire cable system, including cable, and communications outlets shall be tested to (and meet) Category 6A compliance.
1. Horizontal UTP Category 6A 23AWG copper cabling system shall be guaranteed to exceed all TIA-568-C.2 link and channel performance requirements and be capable of supporting 10G Base-T (802.3an) and ISO/IEC 11801 Class EA applications for a total distance of 100 meters with equipment cords. System shall be guaranteed to meet all Cat 6A requirements for short links and channels down to a 10 foot link (5 meter channel) with a guaranteed 4 dB margin of Alien Crosstalk.

1.09 GUARANTEE

A. The Cabling System shall meet the performance requirements of the ANSI/TIA/EIA-568-C.2 standard. The warranty on the material, services, and operation of the cabling system to this specification must be for a period of at least 15 years. The connecting hardware shall have a lifetime extended warranty against defects in material and workmanship.

B. The warranty must include the following statements regarding the cabling system:
1. “Will support and conform to TIA/EIA-568-C.2 specifications covering any current or future application which supports transmission over a properly constructed horizontal cabling system premises network which meets the channel and/or basic link performance as described in TIA/EIA-568-C”.
2. “Will be free from defects in material or faulty workmanship for the entire warranty period”.
3. The Contractor shall apply for a warranty from the manufacturer within 60 days from end of project. In order to achieve a warranty the contractor must be in good standing with current training records on file.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Copper Cable
1. BerkTek, Superior Essex, Avaya, Siecor, or equal

B. Copper Patch Panels and Devices
1. Ortronics, Leviton, Avaya, Ortronics, Siemon, or equal

C. Cabinets and Racks
1. Ortronics, ESW (Encore), Leviton, Homaco, Chatsworth, or equal

D. Firestopping
1. STI (Specified Technologies, Inc.), 3M, or equal

2.02 SYSTEM PERFORMANCE

A. Category 6A (CAT6A) Unshielded Twisted Pair (UTP) Systems

1. Category 6A 23AWG UTP copper cabling system shall be guaranteed to exceed all TIA-568 link and channel performance requirements and be capable of supporting 10G Base-T (802.3an) and ISO/IEC 11801 Class EA applications for a total distance of 100 meters with equipment cords. System shall be guaranteed to meet all CAT6A requirements for short links and channels down to a 10 foot link (5 meter channel) with a guaranteed 5 dB margin of Alien Crosstalk.
2. Basis of Design is Berk-Tek Leviton Technologies CX6850 Cat6A Premium UTP System, or approved equal.
3. Category 6A Performance Parameters, headroom over TIA-568 standard:

INSERTION LOSS	NEXT	PSNEXT	ACR-F (ELFEXT)	PSACR-F (ESELFEXT)
3%	5DB	6DB	10DB	10DB

RETURN LOSS	ACR-N	PSACR	PSANEXT	PSAACR-F
4DB	7DB	7DB	5DB	11DB

A. Connectors
   1. Provide mission-critical, modular-type, information connectors/outlets (jacks) for 23-24 AWG copper cable. These connectors shall be individual snap-in style, and exceed compliance with TIA-568 specifications. The connectors shall comply with the following:
      a. Shall be 8-position 8-conductor (8P8C) "RJ45"-style modular jack, Category 6A (CAT6A), with IDC terminals, T568A/B wiring scheme (use T568B), and utilize a non-punchdown simplified manual termination style.
      b. Shall be encased in a die-cast housing to protect from potential EMI/RFI, and utilize a universal Keystone-style insertion footprint as the manufacturer's main "flagship" line of products.
      c. CAT6A connectors shall exceed all component performance requirements for Augmented Category 6 in the ANSI/TIA-568 standard, as well as Class EA requirements as described in ISO/IEC 11801, from 1 MHz to 500 MHz to support the IEEE 802.3an standard for 10GBASE-T network performance.
      d. Shall be tested by an Independent testing body such as Intertek (ETL) for component compliance (i.e. "Component rated") to ANSI/TIA-568 and for POE+ applications. Test results shall be published and publicly available without special request.

2.03 MATERIALS

A. Copper Cable:
   1. Inter-building outside-plant cable shall be multi-pair unshielded twisted pair type, #23 AWG, Superior Essex type ANMA or equal. The wiring shall comply with the following:
      a. Maximum DC resistance: 26.5 Ohms Per 1000 feet
      b. Maximum mutual capacitance at 1 kHz: 15.7 nF per 1000 feet
      c. Nominal attenuation @ 1 MHz: 6.7 db per 1000 feet
      d. Characteristic impedance @ 1.0 Hz: 1.0 MHz: 100 Ohms (+) 15%
   2. Interior backbone cable shall be multi-pair unshielded twisted pair type, #23 AWG, Superior Essex AR Series Riser Cable type ARMM or equal. The cable sheath shall be armored and riser-rated (CMR). The cable shall meet ANSI / TIA / EIA-568 standards for 100 ohm category 3 UTP multi-pair backbone cable and also comply with the following:
      a. Maximum DC resistance: 26.5 Ohms per 1000 feet
      b. Maximum mutual capacitance at 1 kHz: 15.7 nF per 1000 feet
      c. Nominal attenuation @ 1 MHz: 7.6 db per 1000 feet

d. Characteristic impedance @ 1.0 - 16.0 MHz: 100 Ohms, (+) 15%

3. Inter-building and interior backbone cable shall meet the following requirements.
   a. Cable Conductors specifications:
      1) 23 AWG solid copper conductors.
      2) Individual conductors PVC jacketed.
   b. Cable construction specifications:
      1) Core wrap - Polypropylene film.
      2) Shield - Corrugated aluminum tape bonded to riser-rated jacket.
      3) Cable Jacket marking: Must be legible and shall contain the following information:
      4) Manufacturer's name.
      5) Copper conductor gauge.
      6) Pair counts.
      7) UL and CSA listing.
      8) Manufacturer's trademark.
      9) Category rating.
      10) Sequential foot markings, in 1-foot increments.
      11) Cable jacket shall be gray with black lettering.
4. Horizontal distribution cable in conduit shall consist of four unshielded twisted pairs, #23 AWG, BerkTek Lanmark Cat. 6A type CMR or equal, with the following characteristics: Cable shall be characterized to 750 MHz and UL/ETL Listed by the Manufacturer printed on the cable jacket and package, as well as Intertek (ETL) Verified to TIA-568 Category 6A and ISO/IEC 11801 Class EA requirements for channel, link and component performance to support IEEE 10GBASE-T (802.3an) networks.
5. Horizontal distribution cable, where not installed in conduit in plenum spaces, shall be plenum rated and consist of four unshielded twisted pairs, #23 AWG, BerkTek Lanmark Cat. 6A type CMP or equal, with the following characteristics: Cable shall be characterized to 750 MHz and UL/ETL Listed by the Manufacturer printed on the cable jacket and package, as well as Intertek (ETL) Verified to TIA-568 Category 6A and ISO/IEC 11801 Class EA requirements for channel, link and component performance to support IEEE 10GBASE-T (802.3an) networks..
6. Horizontal cable shall meet the following requirements.
   a. Cable jacket marking: Must be legible and shall contain the following information:
      1) Manufacturer's name.
      2) Copper conductor gauge.
      3) Pair counts.
      4) UL and CSA listing.
      5) Manufacturer's trademark.
      6) Category rating.
      7) Sequential foot markings, in 2-foot increments.
   b. Telecom station (and wireless antenna) cable jacket shall be blue with black lettering and shall be in 1000-foot boxes.
   c. The jacket for telecom cabling serving AV devices and equipment shall be yellow with black lettering and shall be in 1000-foot boxes.
   d. Type CMR cable shall be solid annealed copper with polyolefin insulation round design with flexible web separator with flame retardant PVC jacket.
   e. Type CMP cable shall be same as Type CMR except with type FEP insulation.
7. Data Equipment Inter-Connect patch Cords: Four twisted-pair stranded, Category 6A, 23 AWG copper conductors. Individual conductors PVC jacketed. Each conductor provided with unique color code. Manufacturer terminated on each end with Ortronics or Systimax Category 6A 8-pin / 8-position modular plug to be pinned as per EIA / TIA 568 C.

Connector plug shall be polarized to prevent polarity reversal or split pairs, and shall be factory-marked to indicate top of connector. Inter-connect cord shall be UL listed.

8. The Contractor shall complete data interconnects between patch panels and Owner-provided active network electronics.
9. Lengths as required running from the data station cable terminations to the ports on equipment mounted in any rack position. Minimum length shall be 5 feet and the maximum length shall be 15 feet.

B. Data Outlets
   1. Cable termination hardware shall be individual; Category 6A rated Leviton (or equal) jacks. The listed product shall have the following characteristics:
      a. One eight-position, eight-conductor jack (non-keyed), TIA/EIA-568-C Compliant, wired to T568B, Leviton category 6A.
      b. The cover of the information outlet shall be labeled above the jack. The number on the outlet jacks shall coincide with the identification requirements listed in Part 3 of this Section below.
      c. The color of all general use jacks shall be blue.
      d. The color of all jacks at AV-related devices or racks shall be yellow.
      e. The color of all faceplates and blank inserts or visible mounting plates shall match the adjacent power or signal outlet covers on the project (provided under another Section).
      f. The devices at outlets and the devices in the patch panels shall be of the same manufacturer and same type.
      g. See Drawings for number of jacks at each outlet, jack arrangement, and mounting type.
         1) The 8-pin 8-position jacks at terminal blocks and at each 4-pair termination shall be labeled with laser-printed polyester self-laminating wrap-around labels.
            (a) Eight-pin 8-position jack label-faceplates;
               (1) All labels shall be polyester and white in color;
               (2) All labels shall be 1.80-inch in width and 0.375-inch in length;
               (3) Labels shall have an adhesive backing;
               (4) Labels shall be attached to the faceplate by adhesive and clipping in behind the snap in clear plastic cover;
               (5) Labels shall be laser printed with the labeling scheme as specified;
               (6) Labels shall be Panduit Pan-CODE Laser Labels (PLL) part EFPL-1, Leviton LabelWare, or equal.
               (7) Terminal block designation strip:
               (8) All labels shall be polyester;
               (9) Labels shall be white in color for 4-pai data station cable terminations, located within a blue plastic label holder;
               (10) Labels shall be attached to the designation strip provided with the blue plastic holders;
               (11) All labels shall be 7.88 inches in width and 0.50 inches in length;
               (12) Labels shall have an adhesive backing;
               (13) Labels shall be laser-printed with the labeling scheme as specified;
               (14) Labels shall be Panduit Pan-CODE Laser Labels (PLL) part number PLL-22-Y3-1, Leviton LabelWare, or equal.
               (15) Labeling for all cable, jacks, and other elements of the telecom cabling system shall follow TIA/EIA-606 Standards. Provide color-coded labels for all wiring blocks as follows:
               (16) Interface to Site Cabling - Brown
               (17) Interface to Equipment Cabling - Purple

(18) Interface to Horizontal Cabling - Blue
(19) Interface to Telephone Company - Green

C. Termination Hardware at (Data / Voice)
1. All cables installed for voice and data application shall be terminated in rack-mounted modular patch panels and the entire installation shall be in compliance with TIA/EIA-568-D Category 6A requirements.
2. Patch panels shall be Leviton Category 6A discrete port-type. Port panels shall be certified by the manufacturer as suitable for 1000 Mbps data transmission. Patch panels shall be manufactured of aluminum or steel.
3. Wire management hardware shall be Leviton Versi-Duct 49265 Series, or equal, installed at both the top and the bottom and between each patch panel and along the sides of the rack for patch cable routing and management.
4. Wire managers shall be of sufficient width and depth to permit orderly routing of all patch cables at one hundred percent utilization.
5. Patch panels shall be mounted on equipment racks. Panels shall be affixed to the rack by at least four (4) screws. The screws shall be of the correct size and thread configuration for the holes in the rack. They shall be tightened to the extent that they hold the equipment firmly to the rack, without distorting the equipment or stripping the threads.

PART 3 - EXECUTION

3.01 CABLE AND WIRE INSTALLATION:

A. This contractor shall be responsible for the provision and installation of all telecom cables including all supports, hangers, and hardware necessary for a complete installation. Under no circumstances shall cables be laid on the suspended ceiling. This contractor shall be responsible for providing and installing all necessary cable support hardware to meet Category 6A requirements. Refer also to Section 26 27 00 Basic Materials & Methods:
1. T-Bar Suspended Ceilings: Copper station cabling may be run outside of conduits when routed above T-Bar suspended ceilings. Cables installed in this fashion are to be run horizontally in bundles and tied down neatly suspended from J-hooks, and well clear of any light fixtures or other electrical appliances that may affect data transmissions.

B. At each telecom room cables are to be segregated by type, neatly tied together, properly dressed, and routed to the patch panels. All cables shall be tagged.

C. Cable distances from patch panels to data outlet shall not exceed 295 feet. This contractor is responsible to ensure the distance specified is not exceeded.

D. Care shall be exercised in routing both station and backbone/tie cables so as to avoid areas where sources of high levels of EMI (such as electric motors, transformers and fluorescent lighting fixtures) may exist. Maintain a minimum distance of 12" for voltages of 3KVA or less and 36" separation for voltage of 5KVA and more from these sources when run parallel. Cross at 90-degree angles where crossing must occur.

E. Each station cable shall be "home run" (no splices or cross connection points) between jacks and patch panels.

F. All openings or raceway transitions through firewalls and floors shall utilize UL listed fire-rated penetrations.

G. No more than (2) 90-degree bends shall be allowed on all conduit runs for the horizontal voice/data cabling system, without an intermediate pullbox or junction box.

H. Station cable terminations.
1. Cable pair twists of Category 6A Cable shall be maintained within 0.5-inch of the point of termination. Under no circumstances shall cable pairs be untwisted or otherwise altered prior to termination.

2. Do not bend Category 6A station cables to a radius of less than 4 times the cable diameter - approximately 2-inches.
3. Allow slack in Category 6A cable bundles at entrances and exits of conduit sleeves and at transitions from "J" hooks to cable trays. Do not exceed maximum 25 pounds of pulling tension on cabling. Never pull cables tight at cable tray transitions; doing so may damage the cables by crimping them on the cable tray side of the bundles.
4. Keep the cable evenly distributed within the cable tray. Do not allow the cables or bundles to be pulled tight against the splines or to be unevenly balanced on one side of the tray.
5. Bundles of station cable in floor slots shall not exceed 2.5 inches in diameter, and shall be spaced 4 inches apart for proper fire stopping of the floor slot.
6. Bundles of station cable in 4-inch floor sleeves shall not exceed a 39 percent fill.

I. Where copper cable enters an equipment room, it shall be affixed to the backboard via "D" Rings and cable ties. All cable shall be neatly bundled, combed, and tied. All exposed cable runs shall be horizontal or vertical, and bends shall comply with manufacturer required minimum cable bending radii.

J. Provide (1) patch cable for each activated jack on the project. Lengths shall be 5ft. minimum or as required for the MDF or IDF design. Patch cords shall be factory tested to ensure compliance with current standards.

K. Labeling: Labeling shall include, but not be limited to:
1. Labeling telecommunications outlet faceplates;
2. Labeling station cables;
3. Labeling terminal blocks;
4. Labeling of telecommunications pathways, including conduits, steel wire cable trays, cable runway and pullboxes;
5. Labeling of all grounding conductors and ground bars in the Intermediate Distribution Facilities (IDFs) and Main Distribution Frame (MDF).
6. The intent of the final labeling is to allow the Owner or persons contracted by the Owner to identify any part of the structured cabling system through physical identification of the components and their related components at the specified access point without the use of electrical, electronic or mechanical means of identification.

3.02 FIRE AND SMOKE PARTITION PENETRATIONS

A. Conduit sleeves shall be provided as part of this contract as a means of routing cables through fire-rated walls and floors. Openings in sleeves and conduits used for system cables and those that remain (empty) spare shall be sealed with an approved fireproof, removable sagging material at completion. Sleeves, which pass vertically from floor to floor, shall be sealed in a similar manner using an approved re-enterable system. Additional penetrations through rated assemblies, necessary for passage of voice/data wiring, shall be made using an approved method and permanently sealed after installation of cables. UL systems must be available for each firestop penetration and included in the submittal. All firestop products must be readily available at local electrical and/or telecom distribution outlets.

3.03 COPPER CABLE TESTING AND DOCUMENTATION

A. Cabling systems shall meet or exceed the electrical and transmission characteristics of the systems specified.

B. Cable segments and links shall be tested from both ends of the cable for each of the construction phases. (Verify that cable labeling matches at both ends).

C. The system shall not be considered certified until the tester has acknowledged that the performance of the physical layer of the system has been fully tested and is operational at the completion of the installation phase.

D. After the installation is complete, in addition to any other required testing as described herein, and at such times as the Owner or Architect directs, the Contractor shall be present while the Owner conducts an operating test for approval. The installation shall be demonstrated to be in accordance with the requirements of this specification. Any defects revealed shall be corrected promptly at the Contractor's expense and the tests performed again.

E. After review of the completed test results, the Owner reserves the right to retest the installed cables, utilizing the Contractor's tester and the Contractor's labor.

F. Equipment Manufacturer's Factory Test
   1. Each cable and equipment manufacturer shall factory test their respective products being installed on this project and provide test reports at time of delivery. Provide separate respective test reports indicating that they meet or exceed the latest applicable TIA/EIA Standards and technical bulletins.
   2. All other products relative to this specification shall be tested to its respective industry strictest standards.
   3. Each manufacturer shall factory test their respective cable or equipment provided to this project at several lower frequency levels, including the minimum and maximum frequency level indicated herein. The test reports shall indicate test results for at least five equal incremental frequency levels including the maximum required.
      a. Field Testing Equipment: Submit during shop drawing review on the testing equipment to be utilized on this project. Tester shall be a Level IV device or better and configured to the specific cable installed. The installer shall test all cables installed under this Section.
         1) Unshielded Twisted Pair Testing Equipment:
            (a) The cable tester shall have a wide variety of preprogrammed cable types as an integral part of its testing system and have the ability to test cables less than 6 feet (6ft.) from the test point.
               (1) Testing shall be accomplished using level III or higher field tester that is loaded with the most current version of test software by the manufacturer of the test equipment.
               (2) Provide factory calibration report of field test equipment.
         2) Testing Procedures:
            (a) Testing shall conform to TIA-568 standards.
            (b) Testing shall be to the Permanent Link Test Parameters.
            (c) Test each pair and shield of each cable for opens, shorts, grounds, and pair reversal. Correct grounded and reversed pairs. Examine open and shorted pairs to determine if problem is caused by improper termination. If termination is proper, tag bad pairs at both ends and note on termination sheets.
            (d) Test each UTP cable and passive components. Provide certification that entire installation of UTP cabling, equipment and jacks are NRTL certified meeting or exceeding a minimum of category performance specified on all four pairs of conductors.
            (e) Tests shall be based on each pair of conductors and not the aggregate multiple pair results.
            (f) Test all installed cable segments end-to-end, from the telecommunications room horizontal patch panel/cross connect block panel to each work area outlet and from each telecommunications room backbone patch panel/cross-connect block panel to respective main cross connect, and from the work area outlet to the main cross-connect (through patch cables or cross- connect wiring) with a Signal Injector, Graphical Link Testing Meter and Time Domain Reflectometer (TDR) for compliance to latest TIA

performance requirements, as well as NEXT, ELFEXT, structural return loss, alternating power sum, opens, shorts, continuity, cable length, and characteristic impedance.

(g) Provide report indicating failures and what actions were taken to ensure a passing horizontal cable and its terminations. Any cable failing the certification test (Fail, Fail* or, Pass*) must have remedial work done to provide a full pass test result; Remediation may include re-termination or replacement of the cable, which fails. Cables passing within tolerance only (Conditional Pass*) will not be accepted.

3) Test results:

(a) The test results information for each link shall be recorded in the memory of the field tester upon completion of the test. The tester shall be capable of storing test data in either internal or external memory. The external media used shall be left to the discretion of the user.

(b) Test results saved by the tester shall be transferred into a Windows based database utility that allows for maintenance, inspection and archiving of these test records. A guarantee must be made that the measurement results are transferred to the PC unaltered as well as any printed reports generated from the software application.

(c) Optional formats of data reporting are: comma separated variable (.csv), Portable Document File (.pdf) or compatible, plain text (.txt), or hypertext markup language (.html/.htm).

(d) Test Results shall include the following:

(1) Applicable room number of jack location (room number per Contract Documents)
(2) Applicable Telecommunications Room number
(3) Circuit I.D. number with corresponding jack identifier
(4) Wire Map - shall include the following:
(5) Continuity to the remote end
(6) Shorts between any two or more conductors
(7) Crossed pairs
(8) Reversed pairs
(9) Split pairs
(10) Any other mis-wiring
(11) Length
(12) Insertion Loss
(13) Near-end Crosstalk (NEXT) Loss
(14) PS-NEXT (Power Sum Near End Cross Talk)
(15) ELFEXT (Equal Level Far End Cross Talk)
(16) PS-ELFEXT (Power Sum Equal Level Far End Cross Talk)
(17) Propagation Delay
(18) Delay Skew
(19) Return loss

3.04 TRAINING AND PATCHING

A. The Contractor shall provide a minimum of (1) person for a minimum of (4) man-hours beginning with the first scheduled move-in date to train Owner personnel in maintenance and repair of cabling system. This technician shall also assist the Owner in patching telecom services throughout the facility during the move-in period. It is at this time that all Owner-provided connectivity for voice and data services will be provided to the Contractor. Patching of the station assignments between the Owner's services demark shall also be considered part of this Contractor's work.

3.05 ACCEPTANCE

A. Prior to acceptance all the following conditions must be met:
   1. As required the Contractor shall make submittals and deficiencies or rejected submittals shall be corrected.
   2. All specified cable management devices including cable ladder, steel wire cable tray, 2-sided vertical rack cabling sections, and horizontal ring panels shall be installed as indicated and specified. All parts not installed shall be inventoried and provided to the Owner in the manufacturer's packaging.
   3. All seismic bracing shall be in place.
   4. All specified station cabling with associated termination components, labeling and fire stopping shall be installed properly. Any component not installed shall be inventoried and provided to the Owner in the manufacturer's packaging; loose miscellaneous parts shall not be accepted.
   5. Terminal blocks shall be clean and free of trimmed or cut-off copper pairs, sheaths, armors, cable lubricants or any other disposables used in the installation of the station cables.
   6. All station cables shall be neatly dressed behind the terminal blocks in the IDF.
   7. All required submittals indicated in this Specification Section shall be made by the Contractor, and any deficiencies or rejected submittals shall be corrected.
   8. Any deficiencies and punch list items shall be corrected.
   9. All as-built documentation shall be complete, reviewed and provided to the Owner.

B. Acceptance of the telecommunications system by the Owner shall be based on the result of testing, functionality, and the receipt of documentation and warranty. With regard to testing, Contractor shall provide two technicians, equipped with the specified test equipment, to do random test verification in the presence of, and at the direction of, an Owner designated representative. Verification testing shall not exceed 20% of the cable plant, provided cables tested are verified to be 100% compliant, per requirements previously stated. If more than 5% of cables tested during the verification process fail, Owner reserves the right to have the entire cable plant retested, at the Contractor's expense, and in the presence of an Owner-designated representative.

3.06 RECORD DRAWINGS

A. The project record drawings shall show the types, locations, cable numbers and pair counts of installed twisted-pair cable:
   1. Cable routing and numbers.

B. The project record drawings shall show the types and locations of installed equipment racks.

END OF SECTION

SECTION 28 3100

FIRE ALARM SYSTEM WITH VOICE EVACUATION

PART 1 - GENERAL

1.01 DESCRIPTION

A. This project shall include the furnishing, installation, connection, programming, commissioning, and testing of new fire alarm equipment required to form a complete coordinated system ready for operation at the new building, interconnected to the existing campus system. The fire alarm system shall include, but not be limited to, alarm initiating devices, alarm notification appliances, voice evacuation system, auxiliary control devices, power supply extender panels (as required), amplifiers, and all associated wiring.

B. The system shall generally consist of an existing fire alarm control panel and power supply extender panels and amplifiers at the existing building, to control and operate all initiation and notification appliances at the new building. The existing fire alarm control panel includes a digital dialer with off-site monitoring connection in order to identify the specific location of the control panel to the Fire Department.

C. Alarms/troubles at the building shall activate the local notification devices (or report troubles) at the respective building panel and report alarms/troubles to the main fire alarm control panel.

D. The system shall include an emergency voice evacuation alarm communication system. A digitized pre-recorded voice message shall notify occupants that a fire alarm condition has been reported. The message shall instruct the occupants with emergency instructions. All notification shall be speaker/strobes or strobe lights.

E. The work shall include all required programming to allow proper sequence and operation as required by code. Final programming shall be done based on the actual physical room names and numbers used on site, if different from the room names or numbers on the approved plans.

F. Provide CBC 2019 compliant seismic installation. See Section 26 0500 for all certification and submittal requirements.

G. All work shall comply with Sections 26 0500 and 26 2700.

1.02 SCOPE

A. This specification outlines the requirements for a microprocessor based, addressable (intelligent) automatic fire detection and alarm system. The system and components shall be supplied by one manufacturer of established reputation and experience who shall have produced similar apparatus for a period of at least five (5) years and who shall be able to refer to similar installations in public buildings rendering satisfactory service.

B. The work described in this specification consists of all labor, materials, equipment and services necessary and required to complete and program and test the automatic fire detection and alarm system. Any material not specifically mentioned in this specification or not shown on drawings but required for proper performance and operation shall be furnished, installed, and connected complete.

C. Final system programming (or re-programming for existing systems) shall be done based on the actual physical room names and numbers used on site, if different from the room names or numbers on the approved plans.

1.03 REQUIREMENTS

A. This installation shall be made in accordance with the drawings, specification and the following:
   1. National Electrical Code Article 760
   2. NFPA Standard 72

3. Local Codes and Authorities Having Jurisdiction
4. ADA requirements and regulations.

B. Fire Watch:
1. Provide an AHJ approved Fire Watch plan and Fire Watch for any portion of the fire alarm system that is left inoperative in a normally occupied building.
2. At no time during the project shall a normally occupied building, or portion thereof that remains occupied, be left without a functioning fire alarm system, unless an approved Fire Watch is provided.
3. Include all required planning and labor for a Fire Watch, where required.

1.04 RELATED WORK

A. Division 26: Basic materials and methods

B. Division 21: Fire protection systems

C. Division 23: HVAC systems

D. Division 23: Fire Smoke Dampers

1.05 FIRE ALARM SYSTEM DESCRIPTION

A. The system shall be a supervised, non-coded, 24 volt DC, power limited system, networked if indicated on the drawings, and shall be capable of having all addressable initiation devices on the system in alarm at one time. Notification device circuits shall be wired Class B. Initiation device circuits shall also be wired Class B. A single ground or open on any initiating device circuit or notification appliance circuit shall not cause system malfunction, loss of operating power, or the ability to report an alarm.

B. Provide initiation, notification and other devices as per specifications and indicated on drawings.

C. Indicate alarms, supervisory, and trouble signals on the main fire alarm control panel and annunciator at each building and at the building fire alarm control panel in a networked system.

D. Initiate signals to control (shut-off) HVAC system units and FSD's as per drawings and as required by code.

E. Transmit alarm signals to off-site reporting agency via a digital communicator at each fire alarm control panel, with specific building address ID.

F. The fire alarm system shall function as follows when any smoke or duct detector, waterflow switch, manual station or other initiating device operates:
1. Operate required audible/visual and visual devices indicated on the drawings.
2. Automatically notify off-site reporting agency.
3. Indicate at the control panel alphanumeric display the number and location of the alarmed device.
4. Light an indicating lamp on the smoke detector initiating the alarm.
5. Light an indicating lamp on the remote annunciator indicating the location alarmed as well as the type of device alarmed (area smoke detector, duct detector, manual pull station, waterflow switch, kitchen fire suppression system panel, valve supervisory switch, etc.).

G. Provide additional system features and capacities as indicated in Part 2 of this Section of the Specifications.

1.06 GUARANTEE

A. All work performed and all material and equipment furnished under this contract shall be free from defects and shall remain so for a period of at least one (1) year from the date of acceptance.

1.07 APPLICABLE PUBLICATIONS

The publications listed below form a part of this specification.

A. National Fire Protection Association (NFPA) - USA:

No. 70	National Electrical Code (NEC)
No. 72	National Fire Alarm Code
No. 101	Life Safety Code

B. Underwriters Laboratories Inc. (UL) - USA:

No. 268	Smoke Detectors for Fire Protective Signaling Systems
No. 864	Control Units for Fire Protective Signaling Systems
No. 268A	Smoke Detectors for Duct Applications
No. 521	Heat Detectors for Fire Protective Signaling Systems
No. 464	Audible Signaling Appliances
No. 1971	Visual Signaling Appliances
No. 38	Manually Actuated Signaling Boxes
No. 346	Waterflow Indicators for Fire Protective Signaling Systems

C. Local and State Building Codes.

D. All requirements of the Authority Having Jurisdiction (AHJ).

1.08 APPROVALS

A. Fire alarm control panels and all peripherals shall have proper listing and/or approval from Underwriters Laboratory (UL) and be California State Fire Marshall listed and approved.

PART 2 - PRODUCTS

2.01 EQUIPMENT AND MATERIAL, GENERAL

A. All equipment and components shall be new, and the manufacturer's current model.

B. The system shall be UL 864 (9th Edition) listed.

C. Acceptable System Manufacturers:
   1. To match existing at facility (Siemens - No Substitutions).

D. All equipment and components shall be installed in strict compliance with manufacturers' recommendations.

E. All Equipment shall be attached to and ceiling/floor assemblies and shall be held firmly in place. (e.g., detectors shall not be supported solely by suspended ceilings). Fasteners and supports shall be adequate to support the required load.

2.02 CONDUIT, BOXES, AND WIRE

A. All conduit and wire shall comply with section 26 27 00 of these specifications.

B. Conduit:
   1. Conduit shall be in accordance with The National Electrical Code (NEC), local and state requirements.
   2. Conduit fill shall not exceed 40 percent of interior cross sectional area where three or more cables are contained within a single conduit.
   3. Cable must be separated from any open conductors of Power, or Class 1 circuits, and shall not be placed in any conduit, junction box or raceway containing these conductors, as per NEC Article 760-29.
   4. Conduit shall be 3/4 inch minimum.

C. Wire:
   1. All fire alarm system wiring shall be new and installed in conduit. All wiring shall be in conformance with fire alarm system manufacturer's requirements.
   2. Wiring shall be in accordance with local, state and national codes (e.g., NEC Article 760). Number and size of conductors shall be as recommended by the fire alarm system manufacturer, but not less than 16 AWG for initiating device circuits and signaling line circuits, and 12 AWG for Notification device circuits.
   3. All field wiring shall be completely supervised, Class B for initiation loops, and Class B also for notification loops with end-of-line devices located as shown on the riser diagram.
   4. All cable used in conduit outdoors or underground shall be Outside Plant Rated.

D. Terminal Boxes, Junction Boxes and Cabinets:
   1. All boxes and cabinets shall be UL listed for their use and purpose.
   2. Outlet boxes for surface mounting shall be fire alarm listed use boxes with exactly the same size of the device. Standard galvanized outlet or j-boxes are not acceptable.

E. Each Fire Alarm Control Panel and expander panel shall be connected to a separate dedicated branch circuit, maximum 20 amperes. This circuit shall be labeled at the power panel as FIRE ALARM and include a breaker handle lock for the dedicated breaker. Fire alarm control panel primary power wiring shall be #12 AWG. The control panel cabinet shall be properly grounded.
   1. For buildings with elevators, the elevator shunt-trip circuit shall be a dedicated 20 amperes branch circuit. This circuit shall also be labeled at the power panel as FIRE ALARM ELEVATOR SHUNT TRIP and include a breaker handle lock for the dedicated breaker.

2.03 CONTROL PANEL

A. The control panel is existing to remain - Siemens.

2.04 INITIATION DEVICES

A. Addressable photoelectric smoke detectors, (intelligent), shall be provided as indicated on the drawings, with features and characteristics as follows:
   1. The detector shall be self-compensating for ambient temperature and humidity.
   2. The detector shall be addressed, tested and programmed prior to installation using a UL listed programmer/tester. The detector readout shall yield a discrete electrical value for status tracking and logging for determining maintenance and cleaning requirements.
   3. The detector shall be suitable for two wire operation and two way communication on the intelligent analog signaling circuits.

4. The detector shall display a flashing red LED when in the alarm state when the system is operating from normal or standby power.
5. The detectors furnished shall be listed for use in environments as covered by Factory Mutual, UL and shall be installed according to the requirements of NFPA 72 for open area coverage.

B. Heat detectors shall be provided as indicated on drawings. Heat detector shall be of the rate compensation type, 135 degree.

C. A monitor module interface device shall be provided for required interface points such as water flow devices and tamper switches, or any contact type devices as indicated on drawings. This interface device shall have one or two Class B (Style 4) circuits as required.

D. Provide a 120VAC circuit connection to each sprinkler system water flow bell (provided by Division 21). Wire power via the local water flow switch auxiliary contact to ring the bell upon water flow activation.

2.05 BATTERIES

A. Batteries shall be 12 volt, sealed type, with combined Amp-Hour ratings as required by Code.

B. Battery shall have a minimum sufficient capacity to power the fire alarm system for not less than twenty-four hours in standby mode, plus 15 minutes of full system alarm upon a normal AC power failure.

C. The batteries are to be completely maintenance free, no liquids required. Fluid level checks, refilling, spills and leakage control shall not be required.

2.06 CONTROL DEVICES

A. Control modules shall be provided as indicated on the drawings for fire alarm output functions. These devices shall be connected to the Network Communications Lines, and be field programmable for one of the following options; Remote Relay (form C 1amp 24vdc, 200ma 120vac) with supervised relay operation; Remote Supervised Indicating Appliance Circuit (fused at 1 amp). There shall be an LED on the device that shall flash to indicate the unit is being monitored and a steady LED to indicate the unit has been activated. Secondary relays with control power connections shall be provided as required where contact ratings (voltage & amps) so dictate.

2.07 NOTIFICATION DEVICES

A. Speaker / Strobe Notification Devices:
   1. All speakers shall operate on 70.7 VRMS, with field selectable output taps from 1/8 to 2 Watts in 3dB steps. Frequency response shall be a minimum of 400 HZ to 4 KHZ.
      a. Speaker circuits shall have 20% space capacity for future expansion or increased power output requirements. All speaker tap settings shall be set per recommended settings (minimum 1/4 watt) for area coverage, and shall be re-tapped as required after final testing to provide adequate audible coverage throughout each area (to meet NFPA requirements).
      b. Speaker circuits and control equipment shall be arranged such that loss of any one (1) speaker circuit will not cause the loss of any other speaker circuit in the system.
      c. Provide amplifier modules as required to carry the full designed load, plus 20% spare capacity. Provide (1) additional back-up amplifier module for automatic back up of any failed amplifier module.
      d. Speaker/Strobe combinations shall be provided as indicated on Drawings. The speaker / strobe combination shall be Wheelock or equal, ADA and UL 1971 compliant (candela values as required) - white finish.

B. Strobe Lights shall be provided as indicated on drawings. The strobe lights shall be either ceiling mounted, or wall mounted at +80" AFF or 6" below the ceiling level, whichever is lower,

Wheelock or equal, ADA and UL 1971 compliant (candela values as required) - White finish. See drawings for locations.

C. All devices in the gymnasium, multipurpose and locker rooms shall be provided with clear protective covers for vandalism protection. Provide protective covers as recommended by the manufacturer.

D. Refer to Part 3 below for required synchronization of strobes when located in the same field of view.

2.08 AUDIO AMPLIFIERS

A. The Audio Amplifiers shall provide audio power at 70.7 Volts RMS for distribution to speaker circuits.

B. Multiple audio amplifiers shall be mounted in the FACP, or at the FACP or expander panel locations, either to supply incremental audio power, or to function as an automatically switched backup amplifier(s).

C. The audio amplifiers shall include an integral power supply, and shall provide the following controls and indicators:
   1. Normal Audio Level LED
   2. Incorrect Audio Level LED
   3. Brownout LED
   4. Battery Trouble LED
   5. Amplifier Trouble LED

2.09 AUDIO AMPLIFIER GAIN ADJUST

A. Adjustment of the correct audio level for the amplifier shall not require any special tools or test equipment.

B. Amplifiers shall include audio input and amplified output supervision; back up input, and automatic switch over function, (if primary amplifier should fail).

C. Amplifiers shall be backed up in groups (1 amplifier backs up several at the same location). Failure of any one amplifier in the system shall not degrade system performance in any way

2.10 AUDIO MESSAGE GENERATOR (PRERECORDED VOICE)

A. Each initiating zone or intelligent device shall interface with an emergency voice communication system capable of transmitting a prerecorded voice message to all speakers in the building.

B. Activation of any alarm-initiating device shall cause a prerecorded message to sound over the designated speakers. The message shall be repeated a minimum of four (4) times.

C. A built in microphone shall be provided to allow paging through speaker zone circuits.

D. The audio message generator shall have the following controls and indicators to allow for proper operator understanding and control:
   1. All Call LED
   2. On Line LED

E. All Call Switch Local Speaker Volume Control Local (Test) Speaker

2.11 SPEAKER CIRCUIT CONTROL SWITCHES / INDICATORS

A. The speaker circuit control switches/indicators shall include visual indication of active and trouble status for each speaker circuit in the system.

B. The speaker circuit control panel shall include switches to manually activate or deactivate each speaker circuit in the system.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Installation, programming and testing shall be performed by current factory-authorized contractor of the specified system.

B. Installation shall be in accordance with the NEC, NFPA 72, local and state codes, as shown on the drawings, and as recommended by the major equipment manufacturer.

C. All conduit, junction boxes, conduit supports and hangers shall be concealed in finished areas and may be exposed in unfinished areas. Smoke detectors shall not be installed prior to the system programming and test period. If construction is ongoing during this period, measures shall be taken to protect smoke detectors from contamination and physical damage.

D. All fire detection and alarm system devices, control panels and remote annunciators shall be flush mounted when located in finished areas and may be surface mounted when located in unfinished areas.

E. Provide identification labeling on all devices to identify loop and device number/address. Labeling shall consist of min. 3/8" black lettering on white background P-Touch style adhesive labels with machine printing, Helvetica font or similar.

F. At the final inspection a factory trained representative of the manufacturer of the major equipment shall perform the tests in Section 3.3 TESTING.

G. Wiring:
   1. See Part 1 of this Section of the Specification and the drawings for wiring requirements.
   2. When (3) or more visual notification devices are located within the same field of view and are less than 55 feet apart (within the field of view), all devices within that field of view shall be synchronized to provide the same flash rate and frequency. Provide all required sync modules and compatible strobe devices to provide a synchronized output.

3.02 PROGRAMMING

A. Provide system programming as required by code to provide a fully functional system. Final programming shall be done based on the actual physical room names and numbers on site, if different from the room names or numbers on the approved plans.

B. Include changes to existing system programming (if existing), to accommodate the new devices and equipment, as well as any sequence of operation changes.

3.03 TESTING

A. Provide the service of a competent, factory trained engineer or technician authorized by the manufacturer of the fire alarm equipment to technically supervise and participate during all of the adjustments and tests for the system. Each building shall be separately tested as completed and where a networked system is indicated on the drawings, the entire networked system tested just prior to project completion. Include contractor pre-test for each building prior to the final AHJ testing to insure a suitable final test result.
   1. Before energizing the cables and wires, check for correct connections and test for short circuits, ground faults, continuity, and insulation.
   2. Close each sprinkler system flow valve and verify proper supervisory alarm at the respective FACP and/or annunciator.
   3. Verify activation of all flow switches.
   4. Open initiating device circuits and verify that the trouble signal actuates at the respective FACP and/or annunciator.
   5. Open and short all notification appliance circuits and verify that trouble signals actuate at the respective FACP and/or annunciator.

6. Ground circuits and verify response of trouble signals at the respective FACP and/or annunciator.
7. Check presence and audibility of tone at all alarm notification devices.
8. Check installation, supervision, and operation.
9. Verify that each initiating device alarm is properly received and processed by the respective FACP and annunciator (Walk Test).
10. Conduct tests from each FACP to verify trouble indications for common mode failures, such as alternating current power failure.

B. Test reports shall include, but not be limited to:
1. A complete list of equipment installed indicating proper operations as listed above.
2. Point print of all devices connected to all the FACP's.

3.04 FINAL INSPECTION

A. Final acceptance will require the contractor to deliver to the Owner the following;
1. A fully bookmarked PDF of the operating instructions and system maintenance manuals.
2. A fully bookmarked set of PDF record drawings.
3. A fully bookmarked PDF of the final test reports.
4. A fully bookmarked PDF indicating the name and phone number of person to contact in the event of equipment failure, and date when system warranty will be terminate.
5. A fully bookmarked PDF sets of data sheets for each piece of equipment supplied.

B. The fire alarm system notification audibility and intelligibility shall be tested and approved prior to final acceptance. Verify that all occupied spaces in the buildings are provided with adequate audibility and intelligibility of the temporal 3 alarm tone and voice evacuation recorded message. Test to be conducted in the presence of the IOR, who will provide acceptance of test outcome. Provide, install, and test additional alarm devices as required, if any deficiencies are noted.

3.05 GUARANTEE

A. See Part 1 of this Section of the Specifications.

3.06 INSTRUCTION

A. Provide complete instruction manuals and training to the building personnel. "Hands-on" demonstrations of the operation of all system components and the entire system shall be provided.

END OF SECTION

Section 31 0563

TEMPORARY TREE AND PLANT PROTECTION

PART 1 GENERAL

1.1 SUMMARY

A. Section describes notification and tree protection requirements for any work occurring within tree protection zones of all trees to remain.

B. Development of the project infrastructure, including buildings, roads, utilities, and drainage facilities will alter the natural terrain and affect existing trees growing close to the construction areas. The following tree protection requirements are intended to minimize construction impacts and ensure tree survivability.

PART 2 - DEFINITIONS

2.1 TREE PROTECTION ZONE (TPZ)

A. All construction activity (grading, filling, paving, landscaping) will respect Tree Protection Zones (TPZ) around trees to be protected. The outside edge of these TPZs is determined by measuring a one-foot radial distance from each protected tree trunk for each one inch of trunk diameter (12 inch trunk diameter equals a 12 foot TPZ radius) or by the dripline, whichever is greater.

2.2 TREE PROTECTION FENCING

A. Tree Protection Fencing: Temporary six foot high chain link fencing.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine all tree protection areas. Do not proceed with work until all tree protection procedures are understood and accepted. The Landscape Architect, or other Owner designated representative, must approve, in writing, all work within TPZ areas prior to start of work.

3.2 CONSTRUCTION INSPECTION AND SUPERVISION

A. All arboricultural and related soil work within the TPZ areas shall be performed under the direct supervision of the Landscape Architect, or other Owner designated representative. The contractor in charge of work occurring within TPZ areas is required to meet with the Landscape Architect to review all tree protection requirements prior to start of work.

B. Landscape Architect shall be notified in advance of all work occurring within the TPZ areas. One week notice is required to schedule on-site supervision.

3.3 TREE PROTECTION FENCING

A. Tree protection fencing shall be installed as shown on the Demolition Plan. The Landscape Architect shall approve final location of fencing. All fencing shall be in place prior to any site work.

B. Contractor shall maintain the protection fencing and prohibit all access to fenced areas by construction personnel or equipment until all site work is completed.

C. All structures including construction trailers, equipment storage areas and any other construction traffic are prohibited within fenced areas. Burning or debris piles are prohibited within fenced areas. No materials, equipment, spoils, waste, or washout water shall be deposited or stored within fenced areas. Fences may not be moved without written permission of the Landscape Architect.

D. If temporary access within a fenced area is determined to be necessary, then a six-inch layer of bark mulch shall be placed in all areas requiring access. This requirement for mulching should apply to all areas within the fenced areas. If equipment access is required, then the mulch should be overlaid with interlocking metal plates of sufficient thickness to adequately distribute bearing load. Fence construction equipment may be exempt from this requirement upon approval by the Landscape Architect.

3.4 SITE GRADING, TRENCHING, AND ROOT PRUNING

A. Excavations, site grading, and trenching shall be kept within designated construction zones. Excavations, grading cuts, or trenching within the TPZ of a retained tree trunk require special trenching, root pruning, and/or excavation procedures. Trenches shall be dug manually or with the use of an air spade. Alternatively, a root cutting machine, rock saw, or other approved root-pruning equipment can be used outside the trenching or excavation area. This root-pruning trench should be placed one foot outside the edge of the grading cut or trench edge. The depth of the trench should equal the depth of the grading cut (or trench depth) to a maximum depth of 40 inches. Spoils from trenching or other excavation work shall be stored outside TPZ areas. Temporary storage of spoils is not permitted within TPZ areas.

B. A trench may be mechanically dug toward a tree until the edge of the TPZ is reached. From the edge of the TPZ, the special trenching procedures should apply as described in 3.4 A (above).

C. Underground utilities, drain, and irrigation lines should be routed outside the TPZ. When lines must cross the TPZ, the lines are recommended to be bored or tunneled through the area at a depth approved by the Landscape Architect. In these instances, a single shared utility conduit should be used to reduce impacts to trees.

D. Any roots one inch in diameter or larger requiring removal should be cut cleanly in sound tissue. The roots and surrounding soil should be moistened and covered with a thick mulch (4”) to prevent desiccation. No pruning seals or paints should be used on wounds. Cut and exposed roots should be protected from drying. A water absorbent material (i.e. burlap) should be secured at the top of the trench and draped over the exposed roots. This material should be kept moistened and soil should be replaced as soon as practicable.

3.5 PRUNING

A. Any tree pruning, or other similar activity, which may be required as part of site construction, shall be reviewed by the Landscape Architect. Tying of branches may be required to provide temporary access for equipment.

B. Pruning methods shall conform to the ANSI A 300 Pruning Standards and be performed by an ISA Certified Arborist or Certified Tree Worker. No pruning by construction personnel is permitted.

3.6 IRRIGATION

A. Provide watering for all planting within Contract limit and any adjacent areas affected by the work. Coordinate shut off of irrigation systems with the Owner and be responsible for any damage caused to adjacent landscaping by Contract work.

3.7 REPLACEMENT

A. Replace trees cut or severely damaged. Determine tree value by formula adopted by the National Shade Tree Conference 1951 and 1955. Replace in cash value.

END OF SECTION

SECTION 31 1000

SITE PREPARATION

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:
   1. Locate and mark existing utilities within the limits of work.
   2. Remove all existing structures, as well as surface and subsurface improvements within the area of work, except for existing structures, surface, and subsurface improvements designated to remain as indicated on plan.
   3. Properly dispose of all excess and unsuitable material.
   4. Strip all areas within the limits of work.
   5. Deploy and subsequently remove temporary construction area fencing at completion of construction.
   6. Install and maintain erosion control measures.
   7. At the Contractor's option, salvage existing aggregate base for reuse.

B. Related Sections:
   1. Earthwork - Section 31 2000
   2. Trenching, Backfilling and Compaction - Section 31 2316

1.02 REFERENCES

A. Reference Data:
   1. If the year of the adoption or latest revision is omitted from the designation, it shall mean the specification, manual, or test designation in effect the date the Notice to Proceed with the work is given.

B. City of San Rafael Standard Plans and Specifications.

C. Caltrans Standard Plans and Specifications, where applicable.

PART 2 PRODUCTS – NOT USED

PART 3 EXECUTION

3.01 CLEARING AND GRUBBING

A. Install tree protective fencing around trees designated to be saved prior to the start of demolition work. See Civil Plans and Specifications. Install fencing as far from the trunk as possible to allow for construction of proposed improvements. Maintain fencing throughout duration of construction.

B. The area above the natural ground surface shall be cleared of all vegetable growth (such as trees not designated to be saved, roots, brush, grass, mulch and weeds, etc.) and cleared of all other objectionable material (such as buildings, building slab-on-grade/foundations, asphalt, concrete, base material, curbs, walls, pavers, headerboards, walkway canopies (including footings), site furniture, entry arch (including footings), utility piping, appurtenances, signs/posts (including footings), etc.), and any similar such materials within the limits of

construction.

C. All concrete and asphalt pavements and other existing improvements within the areas to be developed should be removed during site demolition. At the Contractor's option, salvaged class 2 aggregate base material may be stockpiled for reuse.

D. The natural ground surface within the entire site, except within the tree protection zones, shall be grubbed to a depth necessary to remove all stumps, buried logs, roots over 2-inches in diameter, and all other unsuitable material. Stumps shall be removed to a depth of at least 24" below original grade.

E. Existing utilities designated to be removed that do not conflict with proposed improvements may be abandoned in place. If they are abandoned in place, the utility shall be slurried and capped. Any portions of these utilities that conflict with the new improvements shall be removed.

F. All unsuitable material shall be removed from the construction area and disposed of properly. Comply with hazardous materials abatement regulations that may apply.

3.02 DEMOLITION SEQUENCING

A. The Owner has strict utility outage limitations that will require careful sequencing of the demolition and construction work. Acceptable shutdown times are typically Friday through Sunday and must be specifically approved in advance by the Construction Manager and the School District. Permanent and/or temporary facilities may need to be installed prior to demolition to limit utility outages. Any planned and or necessary interruption of existing utilities shall be coordinated with the Construction Manager. A minimum of one week's notice shall be provided before any such interruption.

3.03 STRIPPING

A. The upper soils containing grass, small roots, and other vegetation to a depth of 4 inches shall be stripped from and removed from the site. Deeper stripping may be required in localized areas to remove roots or other concentrations of organic material.

B. Dust control shall be performed by the Contractor during all phases of the construction. Payment for the dust control work involved shall be considered included in the various other items of work and no additional allowance will be made therefor.

C. The Geotechnical Engineer will observe the clearing and stripping operations and recommend the maximum depth of stripping required and any additional excavation necessary due to contamination of materials or concentrations of vegetation.

D. All suitable stripped material in excess of those needed to backfill landscape and/or planter areas shall be removed from the project site and disposed of properly.

3.04 CLEARED MATERIAL

A. The objectionable cleared material including buildings, building slab-on-grade/foundations, asphalt, concrete, base material, curbs, walls, pavers, headerboards, walkway canopies (including footings), site furniture, entry arch (including footings), utility piping, appurtenances, signs/posts (including footings), etc., and any similar such materials shall be removed from the project site and disposed of properly. Contractor is encouraged to recycle the existing aggregate base materials for use in hardscape areas only (non-building).

3.05 STRIPPED MATERIAL

A. Excess and objectionable stripped material including grass/vegetation, mulch, shrubs, trees,

roots, etc. shall be removed from the project site and disposed of properly.

3.06 EROSION AND SEDIMENT CONTROL

A. Install and maintain erosion control devices/measures, including, but not limited to, drainage inlet protection, fiber rolls, silt fence, etc., until such time as all vegetative and hard surface improvements within their individual tributary areas are completed. Provide periodic maintenance of all such devices, and following completion of said improvements, remove and dispose of erosion control devices, and repair surfaces to match final specified surface finishes.

B. Any areas where ground has been disturbed, and where final landscaping has not been installed by October 15 will require the installation and maintenance of erosion control devices by the Contractor, as generally noted in the Erosion Control Notes on the plans.

C. Additionally, the contractor shall implement and adhere to the requirements of the Storm Water Pollution Prevention Plan (SWPPP), including, but, not limited to rain event inspections, storm water discharge sampling and analysis, vehicle/equipment maintenance and cleaning, etc..

3.07 SURFACE IMPROVEMENT AND UTILITY REMOVAL AND RELOCATION

A. The Contractor shall have Underground Service Alert mark all existing public utilities as a first order of work. Additionally, the contractor shall have a locating service mark all existing private utilities within the limits of work.

B. The Contractor shall pothole each existing utility that will be extended or reused at its point of cut and removal to confirm the actual locations and depths. Notify engineer of results via the RFI process.

C. Existing water, sewer, storm drain, gas, electrical, communication (data) services, and laterals to be abandoned or removed as indicated on the plans, shall be provided with replacement facilities as to comply with construction sequencing requirements and limit utility/service outages as required by the owner.

D. See Mechanical, Electrical, and Civil plans for detailed removal/replacements requirements.

3.08 CLEAN UP

A. Remove all debris and stains resulting from the work of this section.

END OF SECTION

SECTION 31 2000

EARTHWORK

PART 1 GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Section, apply to this Section.

1.02 SUMMARY

A. This Section includes, but is not limited to, the following:
   1. Description of suitable materials for on-site earthwork operations.
   2. Definitions of terms.
   3. Description of the duties and responsibilities of the Geotechnical Engineer.
   4. Requirements for dust and erosion control.
   5. Requirements for excavation, overexcavation, import of fill, placement of fill, and disposal of surplus material off the project site.
   6. Dewatering of excavations.

B. Related Sections include the following:
   1. Site Preparation - Section 31 1000
   2. Trenching, Backfilling and Compaction - Section 31 2316

1.03 REFERENCES

A. Reference Data:
   1. If the year of the adoption or latest revision is omitted from the designation, it shall mean the specification, manual or test designation in effect the date the Notice to Proceed with the Work is given.

1.04 EXISTING CONDITIONS

A. Geotechnical Report -- For supplementary information, the Contractor shall review the Geotechnical Investigation and Geologic Hazards Study Report for this project entitled “Terra Linda High School, Kiln Room Addition” prepared by A3GEO, dated December 22, 2021. Where these specifications and the Geotechnical Report do not agree, the Contractor shall obtain clarification from the Geotechnical Engineer.

B. Groundwater was encountered at a depth of approximately 7’ at the time the borings were performed. Groundwater depth will vary dependent on the time of year.

C. It is the Contractor's responsibility to achieve the finished grades shown on the plan, and to determine the quantity of and provide for soil import or export required to achieve plan grades.

1.05 SUBMITTALS

A. Submit test reports and compaction curve analysis for import fill required in accordance with Section 01 3300.

1.06 DEFINITIONS

A. Standard Specifications -- Where referred to in these specifications, "Standard Specifications"

shall mean the State of California Standard Specifications; and City of San Rafael Standard Plans and Specifications, current editions. All work shall be carried out in conformance with the Standard Specification unless otherwise specified herein.

B. Percent Compaction -- As referred to in these specifications, percent compaction is the required in-place dry density of the material, expressed as a percentage of the maximum dry density of the same material determined by the ASTM D 1557 test procedure.

C. Optimum Moisture Content -- As referred to in these specifications, optimum moisture content is the moisture content, percent (by dry weight), corresponding to the maximum dry density of the same material as determined by the ASTM D 1557 test procedure.

PART 2 PRODUCTS

2.01 GENERAL FILL

A. General fill material should have an organic content of less than 3% by volume and should not contain environmental contaminants or rocks or lumps greater than 6 inches in greatest dimension.

B. Onsite, native materials can be reused as general fill if they meet or can be processed (e.g. by sorting and/or crushing) to meet the above requirements.

C. General fill can be used anywhere except where non-expansive fill is required.

2.02 NON-EXPANSIVE FILL

A. Non-expansive fill should conform to the requirements of general fill, have a plasticity index no greater than 12, and a liquid limit no greater than 40.

B. A non-expansive fill layer is required beneath concrete slabs, pavements, and in cases where uplift pressures are a concern (e.g. below grade beams that are in direct contact with the ground.

C. Onsite, native materials may be suitable for reuse as non-expansive material provided it conforms to the above requirements

2.03 IMPORTED FILL

A. Imported fill should conform to the requirements of non-expansive material and should be evaluated by the project Geotechnical Engineer and Environmental consultant prior to its importation to the site.

PART 3 EXECUTION

3.01 GEOTECHNICAL ENGINEER

A. The work covered by these specifications shall be performed under the observation of the project Geotechnical Engineer, who shall be retained and paid by the Owner. The Geotechnical Engineer will be present at the site intermittently during the conduct of work to observe the work, and to perform field and laboratory tests to evaluate material quality and compaction. The Contractor shall cooperate with the project Geotechnical Engineer in performing the observations and tests. The Geotechnical Engineer shall notify the Contractor of failed test results. The Contractor shall rework these areas until the specified degree of compaction is obtained. At the completion of his work, the Geotechnical Engineer shall submit a report to the Owner, including a tabulation of all tests performed. The Geotechnical Engineer's costs for observing and testing the repair of unsatisfactory work performed by the Contractor shall be

billed to the Owner. The Owner shall pay them and then shall deduct the amount from monies due to the Contractor.

3.02 SPILLAGE, DUST AND EROSION CONTROL

A. The Contractor shall prevent spillage when hauling on or adjacent to any public streets or highways. In the event that such occurs, the Contractor shall remove all spillage and sweep, wash or otherwise clean such streets or highways as required by local City and County authorities and/or the State of California.

B. The Contractor shall take all precautions needed to prevent a dust nuisance to adjacent public or private properties and to prevent erosion and transportation of soil to downstream, adjacent properties, due to his work under this contract. Any damage so caused shall be corrected or repaired by the Contractor at no cost to the Owner.

3.03 EXCAVATION

A. Following clearing and stripping, over-excavate existing exposed materials to 18" below building pad elevations and 12" below hardscape subgrade elevations. The over-excavation shall extend 5' beyond the building footprint or edge of grade beams, whichever is greater. The over-excavation shall extend 3' beyond the edge of exterior hardscape areas. The excess and unsuitable excavated material shall be disposed of properly offsite or stockpiled on the site for later use as landscaping material by the Contractor.

B. The upper 6" of all exposed surface soils shall be scarified and moisture-conditioned and compacted as follows:
   1. If exposed materials are predominantly cohesive (>15% passing #200 sieve), materials should be moisture conditioned, as necessary, to between 3% and 5% of the optimum moisture content, and compacted to at least 90% relative compaction.
   2. If exposed materials are predominantly granular (<15% passing #200 sieve), materials should be moisture conditioned, as necessary, to between 2% and 4% of the optimum moisture content, and compacted to at least 95% relative compaction

C. Recompacted subgrade shall have a firm and unyielding surface under the observation of the project Geotechnical Engineer or their designated representative. If excessive pumping or instability is observed, overexacavtion of subgrade materials may be required by the project Geotechnical Engineer.

D. Final surfaces exposed by the completed excavations (cutting) shall be finished true to line and grade. Depressions shall be filled and compacted, and loose material shall be removed.

E. Temporary construction slopes shall not exceed requirements set forth in Cal-OSHA Industrial Safety Orders, or ratio suggested in the field by the Geotechnical Engineer.

F. It is the Contractor's responsibility to achieve the finished grades shown on the plans, and to determine the quantity of and provide for soil import or export required to achieve plan grades

3.04 FIELD QUALITY CONTROL

A. The Geotechnical Engineer will observe the excavation, soil removal, moisture conditioning, and recompaction operations. After the completion of these operations and before placement of fill, the Contractor shall obtain the Geotechnical Engineer's approval of the site preparation in each area.

3.05 DEWATERING

A. During excavation activities, groundwater may be encountered. The contractor is responsible for accounting in their bid for the necessary equipment required to remove groundwater from

excavations to allow for the proper placement of fill per the Geotechnical Report.

B. Groundwater shall be discharged through a silt-sack type device at the outlet end of the discharge pipe to allow for filtration.

C. Silty water shall not be discharged to any storm drain.

3.06 PLACEMENT, MOISTURE CONDITIONING AND COMPACTION

A. A 12" non-expansive fill blanket below the building and exterior hardscape areas should subsequently be placed on prepared subgrade in loose horizontal lifts of 6 inches thick or less, moisture-conditioned to near optimum moisture content, and uniformly compacted to at least 95% relative compaction.

B. In the building areas, an additional 6" thick layer of class 2 aggregate base shall be placed on top of the non-expansive fill blanket. The aggregate base material shall be moisture-conditioned to near optimum moisture content, and uniformly compacted to at least 95% relative compaction

C. All site preparation and fill placement should be observed by a representative of the Geotechnical Engineer.

D. Where field density tests indicate that required compaction and/or moisture content has not been attained, the fill shall be reconditioned as necessary and recompacted to the required density and/or moisture content prior to placing additional material. The Contractor shall be responsible for placing, moisture conditioning, and compacting approved material in accordance with these specifications.

E. Sufficient testing and inspection should be performed to assure compliance with the recommended compaction standards. Samples of proposed native or imported fill should be submitted to the Geotechnical Engineer material testing laboratory for assessment at least 48 hours prior to placement or importing to the site (whichever is soonest).

3.07 FINISH

A. Fill slopes shall be compacted by slope rolling and trimming or shall be overfilled and trimmed back to planned grade. The completed fill shall be finished true to line and grade. Depressions shall be filled and compacted and all loose material shall be removed.

B. After completion of compaction and finish grading operations, fill slopes, horizontal surfaces disturbed by construction operations, and cut slopes shall be moisture conditioned and "trackwalked" to provide a firm and uniformly roughened surface free of loose material.

C. See also requirements in landscape specifications for slope and landscaped area requirements.

3.08 CLEAN UP

A. Remove all debris and stains resulting from the work of this section, including any and all excess material.

END OF SECTION

SECTION 31 2316

TRENCHING, BACKFILLING AND COMPACTION

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. The Section includes the following:
   1. Trenching and other excavation needed for the installation of pipe and appurtenances.
   2. Provide and install bedding material as specified.
   3. Backfill and compact trenches and excavations with suitable material and as specified.
   4. Patch trenches in existing surfaced areas to match surrounding surfacing as illustrated on the Pavement Plan.
   5. Provide and install subbedding material as required.

B. Related Sections include the following:
   1. Earthwork – Section 31 2000
   2. Site Drainage – Section 33 4000
   3. Water Utility Distribution Piping – Section 33 1100
   4. Sanitary Sewerage Utilities – Section 33 3000

1.03 SUBMITTALS

A. In accordance with Section 01 3300, Submittal Requirements:
   1. Sand equivalent and gradation analysis of bedding and backfill materials.

1.04 REFERENCES

A. Standard Specifications
   1. Where referred to in these specifications, "Standard Specifications" shall mean the State of California Department of Transportation Standard Specifications. All work shall be carried out in conformance with the Standard Specifications unless otherwise specified herein.
   2. Where referred to in these specifications, "City Standards" shall mean the latest edition of the City of San Rafael Standards. All applicable work shall be carried out in conformance with the referenced standard.

1.05 EXISTING SITE CONDITIONS

A. The Contractor shall acquaint himself with all site conditions. If unshown active utilities are encountered during the work, the Engineer shall be promptly notified for instruction. Failure to notify will make the Contractor liable for damage to these utilities arising from Contractor's operations subsequent to his discovery of such unshown utilities.

B. The Contractor shall review the Soils Report and plan their work accordingly.

1.06 QUALITY ASSURANCE

A. Testing Agency: The project Geotechnical Engineer (Inspector) shall verify the adequacy of sub-

bedding conditions and monitor bedding, backfilling, and compaction.

B. Unsatisfactory Conditions: The Inspector will advise the Contractor immediately if unsatisfactory conditions or test results are observed. The area where compaction is unsatisfactory shall be reworked until the required density has been attained. The Inspector shall have the authority to reject bedding or backfill until corrective measures to unsuitable material or rework have taken place. It shall be the sole responsibility of the Contractor to achieve the specified degree of compaction.

1.07 PROTECTION FROM CAVING

A. Construction Safety Orders
   1. Nothing in this section shall be deemed to allow the use of a shoring, sloping, or protective system less effective than that required by the Construction Safety Orders. The Contractor shall take all necessary measures to protect the workmen and adjacent areas and structures from the hazards of the trenching or excavation operations. Sheet piling and other sheeting shall be withdrawn in such a manner as to prevent caving at the walls of excavation or damage to piping or other structures. Except as may be hereinafter modified, no sheeting shall be left in the trench and no backfill shall be made against the sheeting before it is removed. Any sheeting extending below the invert of the pipe shall be left in place by cutting off in a manner satisfactory to the Inspector.

B. Liability
   1. Nothing in this section shall be construed to impose tort liability on the Architect or the Design Engineer.

PART 2 PRODUCTS

2.01 TRENCH STABILIZATION SUBBEDDING

A. Drain rock for trench stabilization subbedding shall be of the nominal sizes designated as 3/4" x 1/4".

2.02 BEDDING MATERIAL

A. Bedding material shall be well graded sand material free from vegetable matter and refuse.

B. The minimum sand equivalent value shall be 30.

C. The grading shall conform to the following:

Sieve	Percentage Passing	
	Minimum	Maximum
1"	-	100
3/4"	90	100
3/8"	65	100
No. 4	30	100
No. 20	0	15

2.03 BACKFILL

A. Backfill material may be native excavated material free of vegetable matter, refuse, and other unsatisfactory material, in non-hardscape areas only.

B. The backfill material shall be free of stone and lumps exceeding 4 inches in greatest dimension.

C. Imported granular trench backfill material may be used in lieu of native material at the Contractor's option.

2.04 GRANULAR BACKFILL MATERIAL

A. Imported granular backfill material must be used in hardscape areas and shall be non-expansive rock, gravel, sand, or rock material, free from deleterious materials.

B. Minimum sand equivalent value shall be 25.

C. Imported granular backfill material shall conform to the following:

Sieve Size	Percentage Passing
3"	100
No. 4	40 to 70
No. 30	10 to 100
No. 200	0 to 15

PART 3 EXECUTION

3.01 EXCAVATION

A. The Contractor shall make all necessary excavations to construct the work shown on the Drawings and in accordance with trench detail appropriate to the utility being installed and the City Standards.

B. The Contractor shall perform all excavations of every description and all substances encountered to the depth indicated on the drawings. During excavation, that material suitable for backfilling shall be deposited in an orderly manner a sufficient distance from the banks for the trench to avoid overloading and to prevent slides or cave-ins. All excavated material no require or suitable for backfill shall be removed and properly disposed of offsite.

C. Excavation shall include the removal of all materials or surface obstructions of any nature that would interfere with the execution of the work, and their replacement to equivalent preconstruction condition after installation of utilities.

D. All trench excavation work shall conform to Cal-OSHA standards, as currently published.

3.02 TRENCH WIDTH AND DEPTH

A. The maximum allowable width of trench measured at the top of the pipe shall be the outside diameter of the pipe exclusive of bells and collars, plus twenty-four (24) inches, and such maximum width shall be inclusive of all trench sheeting. Minimum width of trench for pipes 18″ diameter and smaller shall be pipe diameter plus 6″. Maximum width of trench for pipes 18″ diameter and smaller shall be pipe diameter plus 9″. Minimum width of trench for pipes greater than 18″shall be pipe diameter plus 9″. Maximum width of trench for pipes greater than 18″ shall be pipe diameter plus 12″. Whenever the maximum allowable trench width is exceeded for any reason, the Contractor shall, at his expense, embed or cradle the pipe in concrete in a manner satisfactory to the Engineer.

B. The trench shall be excavated to the dimensions and depth shown on the Drawings and in a manner, which will produce a firm foundation for supporting the entire length of each section

of pipe. Bell holes shall be provided so that the load is carried on the pipe barrel.

3.03 CONTROL OF WATER

A. The Contractor, at his own expense, shall provide sufficient pumping equipment, and the operation thereof, to remove groundwater from the excavation.

B. Water shall be disposed of in such a manner as to cause no injury to public or private property, nor be a menace to the public health. Discharges directly to storm drainage systems, ditches, and creeks shall not be allowed.

C. Dewatering shall be performed under a contractor obtained permit from either the City of San Rafael (if discharge is to the sewer system) or the Regional Water Quality Control Board (if discharge is to the storm drain system). The Contractor is advised that both of these agencies may require testing of the proposed dewatering discharge for contaminants. It shall be the sole responsibility of the Contractor to apply for and obtain the necessary permits, obtain and pay for any required water quality tests, design shoring and dewatering systems, and pay any fees associated with discharging the water to the sanitary sewer system. Permits must be obtained prior to any discharge occurring.

3.04 UNSUITABLE SUB-BEDDING

A. Where soft, wet, spongy, or unsuitable trench foundation is encountered, sub-bedding material shall be placed under the pipe to facilitate construction. The cost of furnishing and placing sub-bedding material shall be included in the price bid for the job as a unit cost.

3.05 BRACING EXCAVATIONS

A. Excavations shall be so braced and supported that they will be safe, and the ground alongside the excavation will not slide or settle, and all existing improvements of any kind, either on public or private property, will be fully protected from damage.

B. If any damage does result to such improvements, the Contractor shall make the necessary repairs or reconstruction at his own expense.

3.06 PIPE BEDDING

A. Bedding material shall be placed under the pipe before the pipe joints have been completed and inspected.

B. Bedding material shall be placed carefully around and under the pipe in horizontal layers 4 inches thick after compaction.

C. The bedding material shall be brought up uniformly on each side of the pipe.

D. Bedding material shall have the proper moisture content to ensure maximum compaction by using hand and pneumatic tampers.

E. Bedding shall be accomplished in a manner which will not disturb the pipe but will secure a relative compaction of 90 percent.

F. Bedding shall be installed up to 4 inches below and over the bottom/top of the pipe.

3.07 TRENCH BACKFILL

A. Backfill material shall be placed after the pipe and bedding have been inspected by the Inspector. All trenches shall be backfilled to pavement or exterior slab structural section subgrade, or to finished grade if in unpaved areas.

B. Backfill and compaction of utility trenches in and immediately adjacent to building pads, driveways, parking, and other flatwork areas should be such that no settlement will occur.

C. Granular Backfill (Non-native)
   1. The backfill material shall be placed in layers not exceeding 8" in uncompacted thickness.
   2. Compaction may be accomplished by adding sufficient water to the material as it is placed in the trench to achieve 90 percent relative compaction.
   3. Supplemental compactive efforts using vibratory means shall be employed if necessary to obtain specified degree of compaction.
   4. Ponding or the use of excessive amounts of water will not be allowed.
   5. Vibratory or other compaction equipment shall be used whenever necessary to obtain the required compaction, and must be used within 3' of pavement and exterior slab.

D. Native Backfill
   1. Native backfill material shall be placed in layers not exceeding 6" in uncompacted thickness.
   2. Compaction may be accomplished by adding sufficient water to the material as it is placed in the trench to achieve 90 percent relative compaction.
   3. Supplemental compactive effort using vibratory means shall be employed if necessary to obtain specified degree of compaction.
   4. Ponding or the use of excessive amounts of water will not be allowed.
   5. Vibratory or other compaction equipment shall be used whenever necessary to obtain the required compaction, and must be used within 3' of pavement and exterior slab subgrade.

3.08 CLEAN UP

A. Remove all debris and stains resulting from the work of this section.

END OF SECTION

SECTION 32 1216

ASPHALT CONCRETE PAVING AND BASE AND SEAL COAT

PART 1 GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Section, apply to this Section.

1.02 SUMMARY

A. This Section includes, but is not limited to, the following:
   1. Provide, spread and compact aggregate base as shown on the Contract Documents and as specified herein.
   2. Provide, spread and compact asphaltic concrete pavement.
   3. Provide and install redwood headerboards (HB) where indicated on the plans.
   4. Adjusting to finish grade any and all new or existing, cleanouts, drainage structures, utility vaults, manholes, etc., which are included in the limits of work.

B. Related Sections includes, but are not limited to the following:
   1. Earthwork - Section 31 2000
   2. Trenching, Backfilling and Compaction - Section 31 2316

1.03 REFERENCES

A. Reference Data:
   1. If the year of the adoption or latest revision is omitted from the designation, it shall mean the specification, manual or test designation in effect the date the Notice to Proceed with the Work is given.

B. City of San Rafael Standard Plans and Specifications.

C. Caltrans Standard Specifications.

1.04 QUALITY ASSURANCE

A. Testing and inspection of the aggregate base and asphaltic concrete shall be done by a testing laboratory retained and paid for by the Owner. Any areas receiving failing tests shall be reworked by the Contractor to achieve the minimum specified degree of compaction. It shall be the sole responsibility of the Contractor to achieve satisfactory results.

B. Test Methods: Unless otherwise indicated, tests shall be made in conformance with the following standard methods:
   1. Relative compaction shall be determined by Test Method No. California 216 and 231.
   2. Design and Construction Standards of the City of San Rafael latest edition.
   3. Caltrans Standards and Specifications, latest edition.

1.05 SUBMITTALS

A. Submit asphalt mix design parameters and certificates of compliance.

B. Submit certificate of compliance for aggregate base, recycled, or virgin.

C. Submit product data sheets for seal coat and crack sealant material.

D. Submittals shall conform to the requirements of Section 01 3300.

PART 2 PRODUCTS

2.01 AGGREGATE BASE

A. Aggregate for aggregate bases shall be clean and free of vegetable matter and other deleterious substances.

B. Aggregate base shall be of such a nature that it can be compacted readily under watering and rolling to form a firm, stable base.

C. Aggregate base shall be Class 2, and the combined aggregate shall conform to the ¾" maximum grading specified in Section 26-1.02A "Class 2 Aggregate Base" of the 1992 Caltrans Specifications.

D. Recycled Class 2 aggregate base materials meeting the gradation and strength requirement of virgin material is acceptable.

E. At the Contractor's option, the non-contaminated, demolished aggregate base may be reused provided it is approved by the project Geotechnical Engineer. See Section 31 1000, Site Preparation.

2.02 ASPHALT CONCRETE

A. The asphalt concrete shall be Type A, ½" maximum, medium for non-vehicular (including bicycle) areas or Type A, ¾" maximum, medium vehicular areas, and shall conform to the applicable portions of Section 39 of the Caltrans Standard Specifications. See Pavement Plan for locations of each size.

2.03 HEADER BOARDS

A. Header boards shall be constructed of nominal 2"x 6" wood, meeting the requirements of Section 20-2.12, "Lumber", of the Caltrans specifications.

PART 3 EXECUTION

3.01 SUBGRADE PREPARATION FOR BASE MATERIAL

A. Subgrade preparation shall conform with the requirements in Section 31 2000 - Earthwork, and shall not vary more than 0.05 foot above, or 0.05 foot below the grade established by the plans.

B. Prepared subgrade shall be inspected by the independent testing laboratory retained by the Owner prior to the placement of any aggregate base.

C. As per Section 31 2000 - Earthwork.

3.02 SPREADING

A. Aggregate base shall be delivered to the roadbed as uniform mixtures and shall be graded in layers or windrows. Segregation shall be avoided and the base/subbase shall be free from pockets of coarse or fine material.

B. The aggregate base, after spreading as above specified, shall be shaped to such thickness that after watering and compacting the completed base will conform to the required grade and cross section, within the tolerances specified in Section 26-1.05 "Compacting" of the Caltrans Specifications.

C. The base shall be spread, watered and compacted in layers not to exceed 6 inches in compacted thickness to achieve the specified thickness.

3.03 COMPACTION AND TOLERANCE

A. The relative compaction of the base shall not be less than 95 percent.

B. The finished surface of the aggregate base shall not vary more than 0.05 foot from the design grades.

C. Aggregate base which fails to meet the specified tolerances shall be reshaped, dewatered and recompacted at the Contractor's expense.

3.04 SUBGRADE PREPARATION FOR ASPHALT CONCRETE

A. All construction beneath the subgrade shall be completed, including pipeline testing, prior to asphalt concrete placement.

B. Subgrade shall not vary more than 0.05 foot above or below design grade.

C. Any soft spots in the subgrade shall be repaired by the Contractor, regardless of cause, prior to paving.

D. Minimum Class 2 aggregate base material under private walkways as shown on the Drawings shall be 4" in compacted thickness, unless otherwise noted.

3.05 TACK COAT

A. Apply tack coat of RS-1 or CRS1 Emulsion to vertical surfaces of existing surfacing that will come into contact with asphalt concrete.

3.06 SPREADING AND COMPACTING ASPHALT CONCRETE

A. Shall be in accordance with Section 39 of the Caltrans Standard Specifications.

3.07 STRUCTURE ADJUSTMENT

A. The Contractor shall mark the location of all structures to be adjusted to grade and shall be responsible for their location after paving operations are completed.

B. After surfacing or resurfacing is completed, the Contractor shall construct or reconstruct the structures to grade, as shown on the plans.

3.08 FLOW TEST

A. Finished pavement areas shall be flow tested in the presence of the Inspector of record to confirm that positive gradients that facilitate proper and complete surface drainage, have been achieved in all paved areas.

B. Any areas that fail the flow test, defined as any area where depth of ponding water exceeds 1/8 inch or where the surface of a ponding area exceeds 10 square feet, shall be repaved to achieve positive drainage.

3.09 CLEAN UP

A. Remove all debris and stains resulting from the work of this section.

END OF SECTION

SECTION 32 1600

CONCRETE CURB, SIDEWALK AND WALKWAYS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Construct concrete curbs, sidewalks, and walkways.

B. Provide mockup of exterior concrete walk finish, including, but not limited to score/joint pattern, color, and/or texture.

1.02 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including the Division 01 Specification Sections apply to this Section.

B. Related Sections include, but are not limited to, the following:
   1. Concrete Reinforcing – Section 03 2000
   2. Cast-in-Place Concrete – Section 03 3000
   3. Earthwork – Section 31 2000
   4. Asphalt Concrete Paving, Base and Seal Coat – Section 32 1216

1.03 REFERENCES

A. Reference Data:
   1. If the year of the adoption or latest revision is omitted from the designation, it shall mean the specification, manual or test designation in effect the date the Notice to Proceed with the Work is given.

B. Caltrans Standard Specifications, Sections 73 (Concrete Curbs and Sidewalks) and 90 (Concrete).

1.04 SUBMITTALS

A. Submit concrete mix design to Engineer for review at least 21 days prior to concrete mixing.

B. Submit mockup of exterior concrete walk finish, including, but not limited to score pattern, color and texture to Architect for review prior to any concrete installation.

PART 2 PRODUCTS

2.01 CONCRETE

A. Concrete shall comply with the applicable provisions of Section 90 "Concrete" of the Caltrans Standard Specifications for Section 90-2 ”Minor Concrete” and meet the following requirements listed below.
   1. Concrete shall have a minimum 28 day compressive strength of 3,000 psi.
   2. Concrete shall have a maximum slump of 4 inches.
   3. Concrete must contain at least 505 pounds of cementitous material per cubic yard.
   4. Cementitious material must be Type II or V Portland cement or a combination of Type II or V Portland cement and other approved Supplementary Cementitious Materials (SCM’s). Typical SCM’s are ground granulated blast furnace slag, fly ash, silica flume, rice hull ash and natural pozzolans such as calcined shale, calcined clay and metakaolin. The amount of

SCM's in the concrete mix shall not exceed the requirements listed in section 90-1.02B of the Caltrans Standard Specifications.

5. The quantity of free water must not exceed 310 pounds per cubic yard of concrete plus 20 pounds of free water for each required 100 pounds of cementitious material in excess of 550 pounds of cementitious material per cubic yard of concrete.
6. The maximum course aggregate size must not be larger than 1-1/2" or smaller than ¾" and meet the gradation requirements in section 90-1.02C(4)(b).
7. Fine Aggregate grading shall meet the gradation requirements in section 90-1.02C(4)(c).
8. Acceptable admixtures shall conform to Section 90-1.02E. Chemical admixtures must comply with ASTM C 494, Air-entraining admixtures must comply with ASTM C 260.

PART 3 EXECUTION

3.01 GENERAL

A. Curbs, sidewalks, and walkways shall conform to the details shown on the Drawings.

B. Provide representative mockup of sidewalk including, but not limited to, score/joint pattern, color, and/or texture, for review and approval by Architect prior to construction.

C. Concrete finishes along accessible routes of travel shall be at least as slip-resistant as that described as a medium salted finish for slopes of less than 6%, and slip-resistant at slopes of 6% or greater.

D. Concrete finishes in non accessible path of travel areas should be a medium broom finish.

3.02 SUBGRADE PREPARATION

A. As per Section 31 2000, Earthwork.

B. Minimum Class 2 aggregate base material under sidewalks as shown on the Drawings shall be at least 4 inches in compacted thickness, or otherwise noted.

C. Subgrade and forms shall be wet immediately before concrete placement.

D. Reinforcement shall be carefully placed and supported.

E. Steel dowels, reinforcement steel and welded wire reinforcement must comply with Section 52 "Reinforcement" of the California Standard Specifications

F. Apply soil sterilizer 6" each side of the edges of sidewalks/walkways to prevent growth of vegetation under sidewalks/walkways.

G. Excavate for thickened edges where they occur.

3.03 EXISTING CURBS, GUTTERS AND SIDEWALKS

A. Joint shall be cut to a minimum depth of 1-1/2 inches with an abrasive type saw.

B. Joint shall be at first scoring line at or beyond the planned joint location.

3.04 FORMS

A. Smooth face against concrete, true smooth upper edge and rigid enough to withstand pressure of fresh concrete without distortion.

B. Clean and oil coated.

C. Carefully set to alignment, grade, and required dimensions.

D. Adequately secured from movement by stakes, clamps, spreaders and braces.

3.05 CURB, SIDEWALK AND WALKWAY CONSTRUCTION

A. Dimensions as shown on Drawings.

B. Weakened plane joints shall be constructed at intervals not exceeding 15 feet, or otherwise noted.

C. Expansion joints, 1/2 inch wide, shall be installed where the new walkway joins existing curbs, drainage structures and other fixed objects, and as shown on the Drawings.

D. Expansion joints shall contain 1/2-inch thick premolded joint fillers the full thickness of concrete. Preformed expansion joint filler must comply with ASTM D 1751. The top of expansion joints shall be sealed/caulked flush with adjacent concrete.

E. The top and face of curbs, and non-decorative sidewalks shall be finished with a steel trowel and be given a final fine brush finish.

F. The top and face of curb shall be true and straight and not vary more than 0.01 foot above or below the staked grade.

G. Concrete curing shall be as provided in Section 90-1.03B of the California Standard Specifications.

H. Repairs shall be made by removing and replacing the entire unit between scoring lines or joints.

I. Dowel sidewalks to building slabs at all doorways.

3.06 ADJUST UTILITY BOXES

A. The Contractor shall adjust all existing and new utility boxes, and any other service castings falling within the limits of work to exact grade at the same time the concrete improvements are being constructed and shall maintain these appurtenances to true and exact grade until concrete is thoroughly set.

3.07 CURING

A. Moist Curing: Cover with reinforced waterproof curing paper. Seal all joints and weights down edges. Maintain moist for 14 days.

B. Liquid Curing Compound: Locations as approved by Architect. Apply a uniform coating within two hours of final troweling.

3.08 REPAIRS AND PROTECTIONS

A. Repair or replace broken or defective concrete as directed by Architect.

B. Protect concrete from damage until acceptance of work. 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.

3.09 CLEAN UP

A. Remove all debris and stains resulting from the work of this section.

END OF SECTION

SECTION 32 3113
CHAIN LINK FENCES AND GATES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Posts, rails, and frames.

B. Wire fabric.

C. Gates and related hardware.

D. Accessories.

1.02 RELATED REQUIREMENTS

A. Section 01 6116 - Volatile Organic Compound (VOC) Content Restrictions.

B. Section 03 3000 - Cast-in-Place Concrete: Concrete anchorage for posts.

C. Section 08 7100 - Door Hardware: Gate locking device.

1.03 REFERENCE STANDARDS

A. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.

B. ASTM F567 - Standard Practice for Installation of Chain-Link Fence.

C. ASTM F668 - Standard Specification for Polyvinyl Chloride (PVC) and Other Organic Polymer-Coated Steel Chain-Link Fence Fabric.

D. ASTM F1083 - Standard Specification for Pipe, Steel, Hot-Dipped Zinc-Coated (Galvanized) Welded, for Fence Structures.

E. ASTM F1665 - Standard Specification for Poly(Vinyl Chloride)(PVC) and Other Conforming Organic Polymer-Coated Steel Barbed Wire Used with Chain-Link Fence.

F. CLFMI CLF-SFR0111 - Security Fencing Recommendations.

1.04 SUBMITTALS

A. See Section 01 3300 - Submittals, for submittal procedures.

B. Product Data: Provide data on fabric, posts, accessories, fittings and hardware. Demonstrate compliance with specified attributes.

C. CAL-GREEN Submittals: Product Data – VOC Limits: For adhesives sealants, fillers, primers and coatings, documentation including printed statement of VOC contents, comply with limits specified in related section.

D. Shop Drawings: Indicate plan layout, spacing of components, post foundation dimensions, hardware anchorage, and schedule of components. See CLFMI CLF-SFR0111 for planning and design recommendations.
   1. Include plans, elevations, sections, details, and attachments to other work.
   2. Include accessories, hardware, gate operation, and operational clearances.

E. Samples: Submit two samples of fence fabric, slat infill, 8 inch by 10 inch in size illustrating construction and colored finish.

F. Manufacturer's Installation Instructions: Indicate installation requirements, post foundation anchor bolt templates, and _____.

G. Project Record Documents: Accurately record actual locations of property perimeter posts relative to property lines _____.

1.05 FIELD CONDITIONS

A. Field Measurements: Verify layout information for chain-link fences and gates shown on Drawings in relation to property survey and existing structures. Verify dimensions by field measurements.

1.06 WARRANTY

A. Special Warranty: Installer agrees to repair or replace components of chain-link fences, gates and operators that fail in materials or workmanship within specified warranty period.
   1. Failures include, but are not limited to, the following:
      a. Failure to comply with performance requirements.
      b. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
      c. Faulty operation of gate operators and controls.
   2. Warranty Period: Five years from date of Substantial Completion.

1.07 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than three years of documented experience.

B. Fence Installer: Company with demonstrated successful experience installing similar projects and products, with not less than five years of documented experience.

1.08 WARRANTY

A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.

B. Correct defective Work within a five year period after Date of Substantial Completion.

PART 2 PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

A. VOC Limits for adhesives, sealants, fillers, primers and coatings . Comply with limits specified in related section.

B. Structural Performance: Chain-link fence and gate frameworks shall withstand the design wind loads and stresses for fence height(s) and under exposure conditions indicated according to ASCE/SEI 7. Design shall account for added wind resistance from privacy slats and windscreen fabrics where these items are shown on the drawings.
   1. Design Wind Load: As indicated on Drawings.
   2. Minimum Post Size and Maximum Spacing: As indicated on Drawings and as determined according to CLFMI WLG 2445, based on mesh size and pattern specified, except that if drawing details conflict with CLFMI WLG 2445, provide larger posts and closer spacings as detailed.

2.02 MANUFACTURERS

A. Chain Link Fences and Gates:
   1. Master-Halco, Inc: https://www.masterhalco.com/#sle.
   2. Builders Fence Company: www.buildersfence.com

3. Merchants Metals: https://www.merchantsmetals.com/#sle.
4. Substitutions: See Section 01 6000 - Product Requirements.

2.03 MATERIALS AND COMPONENTS

A. Materials and Components: Conform to CLFMI Product Manual for structural performance as specified.

B. Fabric Size: CLFMI Standard Industrial, Heavy Residential service and as specified below.
1. Top and bottom selvage knuckle ends closed
2. Chain Link Fabric 2 inch mesh, 6 gauge, 0.148 in. diameter steel wire core, height as shown on Drawings, except if no height is shown, provide 6'-0" height.
3. Polymer coated steel chain link fabric per ASTM F668, Class 2b Fused and adhered to metallic coated steel wire.
   a. Color of chain link fabric per ASTM F934, Black.
4. Coat selvage ends of metallic-coated fabric before the weaving process with manufacturer's standard clear protective coating.

C. PVC Color Coated Steel Fence Framework.
1. Framework color to match fabric.

D. Intermediate Steel Posts: Type I round.

E. Fittings
1. All fittings to be PVC thermally fused color coated having a minimum thickness of 0.006" per ASTM F626. PVC color to match fabric and framework. Moveable parts, nuts and bolts to be field coated with PVC liquid touch up after installation.
2. Post caps: ASTM F626 galvanized pressed steel, malleable iron, or aluminum alloy weather tight closure cap for tubular posts. Provide one cap for each post. "C" shaped line post without top rail do not require post caps. When top rail is specified provide line post loop tops to secure top rail.
3. Rail ends: Galvanized pressed steel per ASTM F626, for connection of rails to post using a brace band.
4. Top rail sleeves: 7" galvanized steel sleeve per ASTM F626. ~~[If expansion and contraction of the rail is of concern, add a 0.137" wire diameter by 1.80" long expansion spring between the adjourning rails]~~
5. Wire ties: 9 gauge (0.148") galvanized steel wire for attachment of fabric to line posts and rails. Alternate double wrap 13 gauge (0.092") galvanized steel wire for rails and braces. Pre-formed hog ring ties to be 9 gauge (0.148") galvanized steel or aluminum for attachment of fabric to tension wire. Tie wire and hog rings PVC coated and in compliance with ASTM F626. Color to match fabric color.
6. Brace and tension (stretcher bar) bands: ASTM F626 galvanized 12 gauge (0.105") pressed steel by 3/4" formed to a minimum 300 degree profile curvature for post attachment. Secure bands using minimum 5/16" galvanized carriage bolt and nut.
7. Tension (stretcher) galvanized steel bars: One piece lengths equal to 2 inches less than full height of fabric with a minimum cross-section of 3/16" x 3/4" (per ASTM F626. Provide tension (stretcher) bars where chain link fabric is secured to the terminal post.
8. Truss rod assembly: Galvanized steel minimum 5/16" diameter truss rod with pressed steel tightener, in accordance with ASTM F626
9. Carriage bolts and nuts: Galvanized of commercial quality

F. Tension Wire
1. Tension wire: Poly Vinyl Chloride (PVC) coated metallic coated steel tension wire per ASTM F 1664 7 gauge steel core wire, 0.177" PVC coating class and color to match chain link fabric.

G. Concrete: Type specified in Section 03 3000.

2.04 CHAIN LINK SWING GATES

A. Swing gates, single and double leaf types where indicated, height of gate to equal height of fence.
   1. Gate Width: As shown on Drawings, except if no dimensions are shown then provide single leaf type minimum 48 inches wide and double leaf gates 96 inches wide, (48 inches per leaf).
   2. Fabricate chain link swing gates of welded construction with gate frame members spacing no greater than 8' 0" apart horizontally or vertically, in accordance with ASTM F900. Exterior members to be 1.900 inch OD pipe, interior members shall be 1.660 inch OD pipe. PVC coated pipe to be Grade 1 ASTM F1083.
   3. Chain link fabric to match material of fence. Stretch fabric tightly and secure to vertical outer frame members using tension bar and tension bands spaced 12 inches on center and tied to the horizontal and interior members 12 inches on center using 9 gauge galvanized steel ties.

B. Hardware for Single Swinging Gates: 180 degree hinges, 2 for gates up to 60 inches high, 3 for taller gates; fork latch with gravity drop and padlock hasp; keeper to hold gate in fully open position.

C. Hardware for Double Swinging Gates: 180 degree hinges, 2 for gates up to 60 inches high, 3 for taller gates; drop bolt on inactive leaf engaging socket stop set in concrete, active leaf latched to inactive leaf preventing raising of drop bolt, padlock hasp; keepers to hold gate in fully open position.

2.05 ACCESSORIES

A. Privacy Slats: High density virgin polyethylene, stable color pigment with ultraviolet inhibitors, 25 year limited warranty against color fading and breakage of slats and locking-channel used under normal climactic extremes experienced in North America and Hawaii. Color: Black. Standard PDS self- locking using horizontal bottom channel locking system.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install framework, fabric, accessories and gates as indicated and in accordance with ASTM F567.

B. Place fabric on inside of posts and rails.

C. Set intermediate and other posts plumb, in concrete footings with top of footing 6 inches below finish grade. Slope top of concrete for water runoff.

D. Line Post Footing Depth Below Finish Grade: ASTM F567, minimum and deeper as shown on drawings and to resist imposed loads as specified.

E. Corner, Gate and Terminal Post Footing Depth Below Finish Grade: ASTM F567, minimum and deeper as shown on drawings and to resist imposed loads as specified.

F. Brace each gate and corner post to adjacent line post with horizontal center brace rail _____. Install brace rail one bay from end and gate posts.

G. Provide top rail through line post tops and splice with 6 inch long rail sleeves.

H. Provide bottom rail at transformer and mechanical equipment enclosures and athletic backstops.

I. Install center brace rail on corner gate leaves.

J. Do not stretch fabric until concrete foundation has cured 2 days.

K. Stretch fabric between terminal posts or at intervals of 100 feet maximum, whichever is less.

L. Position bottom of fabric 2 inches above finished grade.

M. Fasten fabric to top rail, line posts, braces, and bottom tension wire with tie wire at maximum 15 inches on centers.

N. Attach fabric to end, corner, and gate posts with tension bars and tension bar clips.

O. Install bottom tension wire stretched taut between terminal posts.

3.02 GATE INSTALLATION

A. Install gates according to manufacturer's written instructions, level, plumb, and secure for full opening without interference. Attach fabric as for fencing. Attach hardware using tamper-resistant or concealed means. Install ground-set items in concrete for anchorage. Adjust hardware for smooth operation.

B. Do not attach the hinged side of gate to building wall; provide gate posts.

C. Provide concrete center drop to footing depth and drop rod retainers at center of double gate openings.

3.03 TOLERANCES

A. Maximum Variation From Plumb: 1/4 inch.

B. Maximum Offset From True Position: 1 inch.

C. Do not infringe on adjacent property lines.

3.04 ADJUSTING

A. Gates: Adjust gates to operate smoothly, easily, and quietly, free of binding, warp, excessive deflection, distortion, nonalignment, misplacement, disruption, or malfunction, throughout entire operational range. Confirm that latches and locks engage accurately and securely without forcing or binding.

END OF SECTION 32 3113

SECTION 32 3119
ORNAMENTAL FENCES AND GATES

PART 1 GENERAL

1.01 SUMMARY

A. Ornamental metal fence, gates, accessories, anchorage, labor and materials necessary for complete installation.

1.02 RELATED SECTIONS

A. Divisions 31 and 32: Pertinent sections specifying grading, paving, site concrete, landscaping and underground utilities.

B. Section 32 3113 - Chain Link Fencing and Gates.

1.03 REFERENCES

A. ASTM A526-Steel Sheet Zinc-Coated (Galvanized by the Hot Dip Process)

B. ASTM B117-Salt Spray Testing

C. California Code of Regulations, Title 24, Part 11 California Green Building Standards Code, "CAL-Green."

D. California Code of Regulations, Title 24, Part 2, California Building Code (CBC), International Building Code, with California Amendments.

E. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design; updated 2010.

1.04 SUBMITTALS

A. See Section 01 3300 - Submittals, for submittal procedures.

B. Product Data: Provide data for materials, coatings finish and assembly.

C. CAL-GREEN Submittals:
   1. Product Data - VOC Limits: For adhesives, sealants, fillers, coatings and primers, documentation including printed statement of VOC contents, comply with limits specified in related section.

D. Shop Drawings: Indicate fencing and gate layout specific to site conditions including field measurements. Indicate all support and attachment conditions. Indicate all interface conditions with other work.

E. Samples: Submit two pickets, 12 inches in length, illustrating selected finish. Submit 2 pieces of perforated metal security panels, 6" square minimum.

1.05 QUALITY ASSURANCE

A. Installer Qualifications: Company specializing in performing the work of this section with minimum three years of experience.

1.06 DELIVERY, STORAGE, AND PROTECTION

A. Check all materials for transit damage upon delivery to site. Do not accept damaged materials.

B. Store materials to ensure proper ventilation and drainage, and prevent damage from weather, vandalism, and theft.

1.07 PROJECT CONDITIONS

A. Coordinate fence installation with size, location and installation of service utilities. Avoid conflict of fence footings with underground work.

1.08 WARRANTY

A. See Section 01 7000 - Contract Closeout, for additional warranty submittal requirements.

B. Provide ten year manufacturer warranty for components and finish. Provide 5 year comprehensive labor warranty for replacement or restoration of warranted materials.

PART 2 PRODUCTS

2.01 PERFORMANCE REQUIREMENTS

A. VOC limits for adhesives, sealants, fillers, primers, and coatings. Comply with limits specified in related section.

B. ADA Standards: Design and construct gates and hardware to comply with requirements of Americans with Disabilities Act (ADA) Standards for Accessible Design; updated 2010, and CBC 11B-404.

2.02 MANUFACTURERS

A. Ameristar Fence Inc., Tulsa, Oklahoma, www.ameristarfence.com.

B. Approved equal.

C. Substitutions: See Section 01 6000 - Product Requirements.

2.03 ORNAMENTAL METAL FENCE

A. Fence Product: Montage, Industrial Welded, “Majestic” Design with 3 rails, flush bottom rail treatment.

B. Fence Framework. Pickets, Posts, and Rails: Fabricate all components from coil steel, 45,000 psi minimum yield strength, G-60 hot-dipped galvanized per ASTM A526;
   1. Fence Pickets: 1 inch square x 16 gauge steel tubing. Seal all picket-to-rail intersections with rubber grommets.
   2. Post Size/Spacing:
      a. Posts: As indicated on drawings, except if post size is not shown, provide 2-1/2 inch square x 12 gauge tubing, minimum, otherwise.
      b. Post Spacing: As indicated on drawings, except if spacing is not shown, provide 71-1/4 inches maximum for 6 feet on center nominal or 96 inches for 8 feet on center nominal, minimum otherwise.
   3. Rails: Manufacturer's Forerunner™ cross-section design with outside dimensions of 1.75 inches square, 12 gauge minimum thickness with picket holes at 4.75 inches (approx.) on center.
   4. Fence Panel design must reject a 4 inch diameter sphere.
   5. Height: As shown on Drawings, if no fence height is shown, provide 6’-0” height fence.

2.04 SWING GATES

A. Gate Product: Montage II, Welded, “Majestic” Design with 3 rails, flush bottom rail treatment.

B. Swing Gate Panels. Pickets, Posts, and Rails: Fabricate all components from coil steel, 45,000 psi minimum yield strength, G-60 hot-dipped galvanized per ASTM A526;

1. Fence Pickets: 1 inch square x 14 gauge steel tubing. Seal all picket-to-rail intersections with rubber grommets.
2. Post Size/Spacing:
   a. Posts: As indicated on drawings, except if post size is not shown, provide 2-1/2 inch square x 12 gauge tubing, and 3 inch square x 12 gauge at gates wider than 36 inches, minimum, otherwise.
   b. Post Spacing: As indicated on drawings, to suit size of gate.
3. Rails: Manufacturer's Forerunner™ cross-section design with outside dimensions of 1.75 inches square, 12 gauge minimum thickness with picket holes at 4.75 inches (approx.) on center.
4. Panel design must reject a 4 inch diameter sphere.
5. Height: As shown on Drawings, if no gate height is shown, match height of fence.

C. Swinging Gate: Fabricate Swing Gates from fence panels specified above in sizes as shown on Drawings.
1. Gates in the path of travel shall meet the door requirements of CBC 11B-404 with required clearances and reference details. Provide lever hardware and 10 inch minimum smooth bottom or kick plate. Provide Panic Hardware (Exit Device) and exit signs as required by Fire and Life Safety.
2. Swinging Gate Hardware: Provide all hardware necessary for a complete, operational gate assembly, sizes and types recommended by manufacturer to suit conditions indicated, galvanized and shop finished to match adjacent gate components.
   a. Hinges: Brass washer leaf hinges: 7 inch ball bearing hinges for medium and heavy gates. Provide two hinges for each leaf up to 6 foot nominal height, and one additional hinge for each additional 24 inches in height, or fraction thereof.
   b. Hasps and Cane Bolts at Gates without exit devices.
   c. Gates with Exit Devices:
      1) Schlage Classroom Security Locksets, ND95LD series, with Rhodes style lock levers.
      2) ASSA Maximum Plus cylinders; coordinate keying with District.
      3) Von Duprin 98/99 exit devices with cylinder dogging.
      4) Provide 10 inch smooth bottom or kick plate.
3. Security Panels at Exit Gates: 16 gauge perforated metal, finished to match fencing. 1/8" holes at 3/16" staggered spacing. McNichols or equal.

2.05 ACCESSORIES

A. Accessory Materials: Fasteners and other materials not specifically indicated but required to achieve the results specified; commercial quality. Types recommended by manufacturer to suit conditions.

2.06 FABRICATION

A. Field Measurements: Take field measurements prior to preparation of shop drawings and fabrication, where possible, to ensure proper fitting of the work. Allow for trimming and fitting where field conditions preclude accurate measurements or where final dimensions cannot be established prior to fabrication.

B. Fit and shop assemble items in largest practical sections, for delivery to site.
1. Minimize field splicing and site assembly. Disassemble only to the extent necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation.

2. Complete assembly, including welding, before start of finishing operations. Provide finish surfaces of members exposed in the final structure free of markings, burrs, and other defects.
3. Use materials and items necessary to complete the work, using the best materials and methods ordinarily used for this type of work whether explicitly specified, indicated and detailed or not.

C. Fabricate items with joints tightly fitted and secured.

D. Machine-roll components or elements required to be curved or radiused. Do not field bend or "walk-down". Provide curves true to indicated dimensions, minimizing joints; segmented fabrication not allowed unless specifically noted.

E. Continuously seal joined members by continuous welds.
1. Grind exposed joints flush and smooth with adjacent finish surface. Make exposed joints butt tight, flush, and hairline. Ease exposed edges to small uniform radius.
2. Exposed Mechanical Fastenings: Flush countersunk screws or bolts; unobtrusively located; consistent with design of component, except where specifically noted otherwise.
3. Supply components required for anchorage of fabrications. Fabricate anchors and related components of same material and finish as fabrication, except where specifically noted otherwise.

F. Use only materials smooth and free of blemishes including pitting, seam marks, roller marks, trade names and roughness.

G. Fabricate steel members in accordance with drawings and as recommended by A.I.S.C. Verify all dimensions with field conditions prior to fabrication.
1. Clean, prepare and shop-prime steel members. Do not prime surfaces to be field welded or in direct contact with concrete.
2. Cutting and drilling: Provide holes for fabrication and for attachment of work specified elsewhere. Countersink holes for bolts and screws.
3. Form changes in direction of railing members by radius bends, maintaining cross-section of tube throughout bend without buckling, twisting, cracking or otherwise deforming exposed surface of tube.

H. Field Welding: Design fence components to avoid field welds to extent possible.

I. Pre-cut Pickets, Rails, and Posts to specified lengths. Pre-punch Forerunner rails to accept pickets.
1. Insert pickets through grommets inserted into pre-punched holes in rails so that pre-drilled picket holes align precisely with the internal upper raceway of Forerunner rails, utilizing an alignment jig.
2. Insert retaining rods into each Forerunner rail to pass through the predrilled holes in each picket.

J. Completed fence panel sections shall be capable of supporting a 600 lb. load applied at midspan without permanent deformation and conformable to a 25% change in grade.

K. Swing Gates: Fabricate using Montage II /Majestic panel material and gate ends having the same outside cross-section dimensions as the Forerunner rail.
1. Weld all connections, including:
   a. Upright and Rail intersections.
   b. Picket and Rail intersections.
   c. Hinge and Hardware brackets.
   d. Security panels to frame and pickets.

2.07 FACTORY FINISHING

A. All Fence Panels, Gates and components: Galvanize and pre-treat with six stage zinc phosphate pretreatment/wash followed by "PERMACOAT™", an electrostatic spray application of a two coat powder system with salt spray resistance of 3,500 hours without loss of adhesion per ASTM B117.
   1. Base Coat: Thermosetting epoxy powder coating (gray color) 2-4 mils minimum thickness.
   2. Top Coat: TGIC polyester "No-mar" powder coat, 2-4 mils minimum thickness.
   3. Color: Black.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that conditions are appropriate to begin work.
   1. Verify underground utility locations are as indicated.
   2. Verify that site paving conditions are as indicated.

B. Confirm varying conditions are corrected before start. Start of work indicates acceptance of substrates.

C. Field measurements to include determination of required “equal spacing” of posts at each run of fencing.

3.02 PREPARATION

A. Lay out work as indicated. Identify and resolve potential conflicts before proceeding with installation.

B. Protect adjacent completed work from damage. Repair or replace all damaged work.

3.03 INSTALLATION

A. Fences: Plumb posts in each direction.

B. Anchor posts in concrete by means of galvanized steel pipe sleeves, not less than 6 inches long, with an outside diameter not less than 1/2 inch greater than the outside diameter of the inserted pipe post. Provide steel plate closure secured to bottom of sleeve of width and length not less than 1 inch greater than outside diameter of sleeve. After posts have been inserted into sleeves, fill annular space between post and sleeve solid with non-shrink, non-ferrous grout.

C. Fence posts shall be set at equal spacings as indicated on drawings and as confirmed by field measurement.

D. Gate posts shall be spaced according to the gate openings specified in the construction plans.

E. Related sections specifying concrete and earthwork govern post base placement and accessory material requirements. Attach Panels to posts using panel brackets supplied by the bolt-on hardware supplied by manufacturer.

F. Gates: Install gates plumb, level, and secure for full opening without interference. Anchor ground-set items in concrete. Adjust hardware and power operators for smooth operation and lubricate where necessary.

3.04 ERECTION TOLERANCES

A. Maximum Variation From True Position: 1/4 inch.

B. Maximum Offset From True Alignment: 1/4 inch.

C. Maximum Variation from Plumb: 1/8 inch in 10 feet.

3.05 ADJUSTING

A. Adjust gate hardware for smooth operation.

3.06 CLEANING AND PROTECTION

A. Excavation Spoils:
   1. Post-hole excavation prior to finish grading and planting: Suitable materials conforming to requirements of other sections may be used in other locations on the site. Remove excess materials as specified in related sections.
   2. Post-hole excavation following finish grading and planting: Remove all materials from site.

B. Clean fence and gates from concrete overspray and other soiling of finish.

C. Protect installed work from subsequent construction operations.

D. Dispose of all excess materials.

E. Repair paving and landscape to conform to fencing installation, with material matching original conditions.

END OF SECTION 32 3119

SECTION 32 8400

IRRIGATION

PART 1 GENERAL

1.01 DESCRIPTION

A. The work in this section consists of furnishing, layout and installing an irrigation system.

B. Related work specified elsewhere includes:
   1. Section 32 92 00, Planting.
   2. Section ELECTRICAL stub-out(s) for controller(s).

1.02 CALIFORNIA MODEL WATER EFFICIENT LANDSCAPE ORDINANCE REQUIREMENTS

A. Contractor shall be familiar with and follow the State of California Model Water Ordinance, California Code of Regulations, Title 23 Waters, Division 2, Department of Water Resources, Chapter 2.7. Also, the Contractor is responsible to follow all local water ordinances.

B. Pursuant to the requirements of the California Model Water Efficient Landscape Ordinance, the Contractor shall submit a Certification of Installation to the Local Jurisdiction /water purveyor as described in the construction documents and these specifications. Certification shall at a minimum include the following documents:

PART 1. Project Information Sheet
PART 2. Certification of Installation according to the landscape documentation package.
PART 3. Irrigation Scheduling and Controller Programming
PART 4. Schedule of Landscape and Irrigation
PART 5. Landscape Irrigation Audit Report
PART 6. Soil Management/Analysis Report with verifying implementation, see Planting Specification for analysis requirements.

1.03 Quality Assurance

A. Manufacturer's Specifications: Follow manufacturer's current printed specifications and drawings in all cases where the manufacturers of articles used in the Contract furnish directions covering points not specified or shown in the drawings.

B. Ordinances and Regulations: All local, municipal and state laws, codes and regulations governing or relating to all portions of this work are hereby incorporated into and made a part of these Specifications. Anything contained in these Specifications shall not be construed to conflict with any of the above codes, regulations or requirements of the same. However, when these Specifications and Drawings call for or describe materials, workmanship or construction of a better quality, higher standard, or larger size than is required by the above codes and regulations, the provisions of these Specifications and Drawings shall take precedence. Furnish without extra charge additional materials and labor required to comply with above rules and regulations.

C. References, Codes and Standards:
   1. AB 325 State of California Model Water Efficient Landscape Ordinance.
   2. Water Use Classification of Landscape Species (WUCOLS).
   3. American Society of Irrigation Consultants (ASIC) Design Guidelines.
   4. California Landscape Standards, California Landscape Contractors Association, (CLCA) Sacramento, California.

5. CAL-OSHA, title 8, Subchapter 4-Construction Safety Orders and Subchapter 7-General Industry Safety Orders.
6. California Electric Code.
7. California Plumbing Code (UPC) published by the Association of Western Plumbing Officials.
8. NFPA 24, Section 10.4, Depth of Cover.
9. Underwriters Laboratories (UL): Electrical wiring, controls, motors and devices, UL listed and so labeled.
10. American Society of Testing Materials (ASTM).

D. Furnish without extra charge any additional material and labor when required by the compliance with all above mentioned codes and regulations, though the work be not mentioned in these specifications or shown on the drawings.

E. Reclaimed Water: Contact water company supplying reclaimed water prior to the commencement of installing the irrigation system to coordinate inspection of the work and to verify all codes and regulations regarding use of reclaimed water. Provide all required signage and other warnings.

F. Experience: Assign a full-time employee to the job as supervisor for the duration of the Contract with a certified landscape technician, irrigation certification through CLCA or minimum of four (4) years of experience in landscape irrigation installation.

G. Labor Force: Provide a landscape installation and maintenance force thoroughly familiar with, and trained in, the work to be accomplished to perform the task in a competent, efficient manner acceptable to the Owner's Representative.

H. Explanation of Drawings:
1. Due to the scale of the Drawings, it is not possible to indicate all offsets, fittings, sleeves, etc., which may be required. Carefully investigate the conditions affected all of the work and plan accordingly, and furnish all required fittings. Install system in such a manner to avoid conflicts with planting, utilities and architectural features.
2. Do not install the irrigation system as shown on the Drawings when it is obvious in the field that obstructions, grade differences or discrepancies in arc dimensions exist that might not have been considered in engineering. Bring such obstruction or differences to the attention of the Owner's Representative. In the event this notification is not given, the Contractor shall assume full responsibility for any revision necessary.

I. Trench Interference with Tree Root Systems:

1. Prior to trenching, layout main and lateral line locations within Drip Line of trees and review locations with Owner's Representative. Relocate any lines that may interfere with existing root systems to avoid or reduce damage to root systems as accepted by Owner's Representative.

2. Mechanical Trenching is not allowed within dripline of existing trees to be protected except as approved by Landscape Architect.

1.04 PROTECTION OF EXISTING STRUCTURES AND UTILITIES

A. The Drawings show, if applicable, existing above and below grade structures and utilities that are known to the Owner. Locate known existing installations before proceeding with construction operations that may cause damage to such installations. Existing installations shall be kept in service where possible and damage to them shall be repaired with no adjustment of Contract Sum. Verify with Owner if As Built drawings are available.

B. If other structures or utilities are encountered, request Owner's Representative to provide

direction on how to proceed with the Work. If a structure or utility is damaged, take appropriate action to ensure the safety of persons and property.

C. Verify location of existing irrigation systems to be removed and replaced. Maintain any existing systems as required by the Drawings and Specifications, including temporary retention of systems necessary to maintain existing on site and adjacent planting.

1.05 SUBMITTALS, IN ACCORDANCE WITH SECTION 01 33 00.

A. Materials List:
1. Submit required copies of the cut sheets and a complete list of materials proposed for installation, along with any proposed substitutions clearly identified and obtain the Owner Representative's written approval thereof before proceeding. Use only accepted materials and items of equipment.
2. List all materials by manufacturer's name and model number.
3. Submit to Local Water Purveyor with copy to the Owner Certification of Installation as required by the State of California Model Water Ordinance.

B. Substitutions:
1. If the Contractor desires to substitute a product, he shall list each item and note it as a "substitution" and provide the following information:
   a. Descriptive information describing its similarities to the specified product.
2. If the product is approved and, in the opinion of the Owner's Representative, the substituted product does not perform as well as the specified product, the Contractor shall replace it with the specified product at no additional cost to the Owner.

C. Manuals:
1. Prior to the final acceptance of the irrigation system, furnish three (3) individually bound Operation and Maintenance Manuals to the Owner's Representative for use by the Owner. The manuals shall contain complete enlarged drawings, diagrams and spare parts lists of all equipment installed showing manufacturer's name and address. In addition, each Service Manual shall contain the following:
   a. Index sheet indicating the Contractor's name, address and phone number.
   b. Copies of equipment warranties and certificates.
   c. List of equipment with names, addresses and telephone numbers of all local manufacturer representatives.
   d. Complete operating and maintenance instructions in sufficient detail to permit operating personnel to understand, operate and maintain all equipment.
   e. Parts list of all equipment such as controllers, valves, solenoids and heads.

D. Record Drawings:
1. Dimension the location of the following items from two (2) permanent points of reference such as building corners, sidewalks, road intersections, etc.:
   a. Connection to existing water lines/meter.
   b. Connection to electrical power.
   c. Gate valves.
   d. Routing of sprinkler pressure lines (a dimension at least every 100 feet and as required to identify all changes in direction and location).
   e. Remote control valves.
   f. Routing of control valves.
   g. Quick coupling valves.
   h. All sleeve locations.
   i. Routing of all control wiring.
   j. Include all invert elevations below 12".

2. Deliver a reproducible record drawing to the Architect within seven (7) working days before the date of final review. Delivery of the record drawings shall not relieve the Contractor of the responsibility of furnishing required information in the future.

E. Controller Plan:
1. Provide one Irrigation Diagram plan in each controller housing. The plan shall show the area controlled by each valve in different colors and for orientation, any major permanent structure such as buildings and roads.
2. Charts to be waterproof and hermetically sealed between two pieces of transparent 10 mil thick plastic and installed in each controller on the door as accepted by the Owner's Representative no later than the time of the coverage test of the irrigation system.

F. Maintenance Material - supply the following tools to the Owner:
1. Three (3) sets of specialized tools required for removing, disassembling and adjusting each type of sprinkler, valve or other equipment supplied on this project.
2. Two (2) keys for each type of equipment enclosure.
3. Two (2) keys for each type of automatic controller.
4. Two (2) quick-coupler keys and matching hose swivels for each type of quick-coupling valve installed.
5. All lock keys shall be keyed alike.
6. Two (2) keys for each type of valve (including square type key for valves larger than 2")

1.06 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Furnish and deliver materials in manufacturer's packaging, bearing original legible labeling.

B. The Contractor is cautioned to exercise care in handling, loading, unloading, and storing PVC pipe and fittings. All PVC pipe shall be transported in a vehicle which allows the length of the pipe to lie flat so as not to subject it to undue bending or concentrated external load at any point. Any section of pipe that has been dented, cracked, or otherwise damaged shall be discarded and, if installed, shall be replaced with new piping.

1.07 TRENCH INTERFERENCE WITH TREE ROOT SYSTEMS

A. Prior to trenching, layout main and lateral line locations within Drip Line of trees and review locations with Owner's Representative. Relocate any lines that may interfere with existing root systems to avoid or reduce damage to root systems as accepted by Owner's Representative.

1.08 SEQUENCING AND SCHEDULING

A. Acceptance: Do not install main line trenching prior to acceptance by Owner's Representative of rough grades completed under another Section.

B. Coordination: Coordinate with the work of other sections to insure the following sequence of events:
1. Sleeves and Conduits: Installation of all sleeves and conduits to be located under paving and through walls prior to placement of those materials.
2. Bubbler Heads: Install after placement of tree, but prior to backfill with planter soil mix.
3. On-Structure Equipment: Install piping and risers after waterproofing is accepted.
4. Sprinkler Head in Pots: Install riser and seal the penetration of the pot prior to backfill of pot with drainage materials and planter soil mix.
5. Coordinate work schedule with Owner to avoid disruption of landscape maintenance of existing landscaping.
6. Install piping prior to soil preparation (planting soil amendment installation).

1.09 WARRANTY, PER SECTION 01 77 00.

A. In addition to manufacturer's guarantees and warranties, work shall be warranted for one (1) year from date of final acceptance against defects in material, equipment and workmanship. Warranty shall also cover repair of damage to any part of the premises resulting from leaks or other defects in materials, equipment and workmanship to the satisfaction of the Owner.

B. Include a copy of the warranty form in the Operation and Maintenance Manual.

1.10 OPERATION

A. Routine: Inspect and adjust all spray heads and control valves including raising or lowering of spray head heights to accommodate plant growth and weather conditions.

B. Controller: Inspect regularly for power interruption and reset clock as required. Adjust station timing to accommodate changes in plant growth and weather conditions.

C. System Failure: Perform all repairs within one (1) operating period. Replacements to match removed products and materials in all respects. Report promptly all damage not resulting from Contractor's operations. Repair all damage caused by Contractor at no expense to Owner.

D. Climate Change: Set and program automatic controllers in response to seasonal requirements and requirements of newly planted materials.

Part 2 PRODUCTS

2.01 PIPE – FOR RECLAIMED WATER USE

A. Pressure Main Line Pipe and Fittings: All PVC fittings shall bear the manufacturer's trademark name, material designation, size, applicable I.P.S. schedule and NSF seal of approval.

B. All main line pipe shall be solvent welded and shall be Schedule 40 with Schedule 80 fittings unless shown otherwise on the Drawings. 24" minimum cover over pipe in pedestrian areas and 30" minimum cover in vehicular areas.
   1. PVC Pressure Rated Pipe: ASTM D2241 NSF approved Type I, Grade I, solvent welded PVC with an appropriate standard dimension ratio (S.D.R.).
   2. PVC Scheduled Pipe: ASTM D1785 NSF approved, Type I,
   3. Grade I, solvent welded PVC.
   4. PVC Solvent-weld Fittings: ASTM D2466 Schedule 80, 1-2, II-I NSF approved.
   5. Solvent Cement and Primer for PVC solvent-weld pipe and fittings: Type and installation methods prescribed by the manufacturer.
   6. Connections between Main Lines and RCVs: Schedule 80 PVC (threaded both ends) nipples and fittings unless required otherwise by local jurisdiction.
   7. Valves 2-inch and larger shall be flanged only.
   8. Copper pipe shall be Type K or Red Brass where threaded joints are required and Type L otherwise.

C. All lateral line pipe shall be solvent welded and shall be Schedule 40 with Schedule 80 fittings unless shown otherwise on the Drawings.

2.02 CONTROLLER ENCLOSURES

A. Type: Use one of the following (unless noted otherwise on the Drawings):
   1. Stainless steel, NEMA Type 3 rated, with back panel, padlocking hasp and padlock. See Detail for pedestal construction.
   2. Le Meur, (714) 822-5100.
   3. "Strong Box" available from John Deere, (800) 347-4272.
   4. Rainmaster Controller Enclosure as recommended for controller

2.03 REMOTE CONTROL VALVE (RCV): As shown on Drawings and with the following minimum requirements:

A. Remote control valves shall be those normally manufactured for irrigation systems and shall have a slow, consistent speed of closure through entire closing operation, including last portion. To ensure this, the effective diaphragm working area/valve seating opening ratio must be a minimum 3 to 1.

B. Shall be mechanically self-cleaning to help prevent diaphragm or solenoid port plugging. To ensure this, the flush rod should be tapered to vary the size of the port opening as the diaphragm raises and lowers, thus allowing trapped material to escape. Rod is to be finished with a serrated surface to help scrub trapped material out. Screens not acceptable.

C. Shall have removable valve seat so valve can be repaired without removal from irrigation line.

D. Shall have ability to operate manually without the use of wrenches or special keys.

E. Shall have one-piece solenoid that attaches directly to valve without shunts or clips that can be lost.

F. Shall have cross top handle to adjust maximum travel of diaphragm to allow "tuning" of valve and closure.

2.04 BOX FOR REMOTE CONTROL VALVE (RCV): Rectangular plastic valve box with lid - Ametek, Brooks, Christy or accepted equal in purple color for reclaimed water (unless noted otherwise), with non-hinged bolt down lid marked “irrigation”. Box body shall have knock outs. Do not saw cut body. Minimum size box as shown on Drawings. Increase box size as required to fit. Valve box lids are to indicate the controller letter and station number of valve as accepted by Owner’s Representative. Also refer herein to required polyurethane tag at valve solenoid control wire under Control Wires. Locate the identification in center of the lid. Provide separate box for each valve. Provide H/20 Loading concrete boxes with bolt-down concrete lids for all valves that occur in paved areas.

2.05 CONTROLLER GROUND

A. Provide each pedestal controller with its own ground rod, model as recommended by manufacturer. Separate the ground rods by a minimum of eight feet. The ground rod shall be an eight foot long by 5/8" diameter U.L. approved copper clad rod or as recommended by controller manufacturer. Install no more than 6" of the ground rod above finish grade. Connect #8 gauge wire with a U.L. approved ground rod clamp to rod and back to ground screw at base of controller with appropriate connector. Make this wire as short as possible, avoiding any kinks or bending. Install within pedestal housing base unless otherwise noted.

B. Provide irrigation controller with its own independent low voltage common ground wire.

2.06 CONTROLLER: As shown on Drawings and with the following minimum requirements:

A. Shall be user-friendly. The controller must have a minimum 20-character readout display describing actions or options, or a full visible panel of buttons, dials, or switches that control all different functions separately.

B. Shall have the ability to start a programmed sequence of valves a minimum of 5 times a day per program.

C. Shall have ability to easily and quickly change watering schedules due to change in weather.

2.08 CONTROL WIRES

A. Connections between automatic controllers and the solenoid-operated electric control valves shall be made with direct burial copper wire 14- AWG-UF 600 volt (minimum size). Pilot wires shall be a color other than white, and shall be a different color for each automatic controller with wires sharing a common trench. Common wires shall be white in color, with a different color stripe for each controller with wiring sharing the same common trench. No stripe is required if multiple controller wiring is not present.

B. Size of wire shall conform to the remote control valve manufacturer's specification for control wire sizes, but in no case shall the control wire be smaller than #14. Runs over 2,000 lineal feet shall be #12- AWG-UF 600 volt copper wire.

C. All wire splices are to be made within a valve box, with a copper crimp-type connector, and a "3-M" #DBY splice kit, or as recommended by controller manufacturer.

D. Use continuous control wiring between controllers and remote control valves (no splices).

E. Provide polyurethane tag at valve solenoid control wire that shows the controller number and station number. Also refer to valve box lid identification.

F. Provide a spare control wire in each RCV box for future.

2.09 BUBBLER HEADS

A. As shown on drawings

2.10 QUICK COUPLER VALVES:

A. Quick coupler valves shall be as listed on the Drawings with 10" diameter box and lid similar to isolation valve box described below. Purple color for reclaimed water.

2.11 ISOLATION/GATE VALVE:

A. Valves smaller than 3 inches: 125 lb. WSP bronze gate valve with union bonnet, non-rising stem and solid wedge disc. Valves shall be line size. Leemco, LGT-SS Series, or approved equal.

B. Valves larger than 3 inches: 125 lb. WSP bronze gate valve with union bonnet, non-rising stem and solid wedge disc. Valves shall be line size. Nibco P-619-RW, or approved equal.

2.12 SUBSURFACE DRIP IRRIGATION:

A. As specified herein and as shown on the drawings and in accordance with manufacturer's recommendations. Provide all miscellaneous valves, filters fittings etc. required for a complete, operable system including the following:
   1. Emitters shall be Toro DL 2000 Techline, in-line Treflon impregnated emitter with Netafim Automatic Flush Valves, Toro DL 2000 Air/Vacuum Relief Valves in accordance with "Toro DL-2000 Low-Volume Irrigation Bidding Specifications and Design Details" and as shown on the drawings as required for a complete working system.

B. Drip Valve Assembly: Size valve box large enough and deep enough to contain assembly and allow convenient access and easy removal of filter screen. Position filter pointed down, approximately 45 degrees.

C. Pressure regulator: Size regulator in accordance with flow rate. Do not over size. Use factory pre-set regulator at 30 PSI.

2.13 BOX FOR ISOLATION VALVE: 10" diameter plastic, Ametek, Brooks, Christy with bolt down lid marked "irrigation," or accepted equal. Avoid locating valve in paved areas. Provide H/20

Loading concrete box with bolt-down concrete lid if valve is located in paved area. Obtain location approval by Owner's Representative.

2.14 SWING JOINTS

A. Bubblers: Use Dura, Lasco or equal pre-assembled swing joints with O-rings.

B. Quick Coupling Valve: Dura 1-inch 1-A2-1-11-18 pre-assembled swing joint with O-rings and Dura quick lock to receive stabilizing rod.

2.15 Y-STRAINER

A. "Y"-Strainer upstream of remote control valves, Brass, 100 mesh.

2.16 RCV IDENTIFICATION TAGS: Plastic Or Brass Tags With Valve Number, Approximately 2" By 2" With Number Imprinted, As Accepted By Owner.

2.17 BACKFLOW PREVENTION DEVICE

A. As required by Code and as shown on Drawings. Verify with Owner if Anti-freeze Jacket is required and provide as required.

B. Riser assemblies from main line burial depth to backflow preventers shall be Schedule 40 brass pipe.

C. All metallic pipe and fittings installed below grade shall be painted with two coats of Koppers #50 Bitumastic, or approved equal. Pipes may be wrapped with an approved asphaltic tape in lieu of the liquid-applied coating.

2.18 BACKFLOW PREVENTION DEVICE ENCLOSURE

A. "Smooth Touch" enclosure without sharp edges, by Strong Box, available from V.I.T., Escondido, CA (800) 729-1314 or equal. Coordinate size of enclosure with plumbing for minimum clearance and size. Enclosure to include hasp and staple to receive padlock. Padlock N.I.C.

2.19 MISCELLANEOUS INSTALLATION MATERIALS

A. Solvent Cement and Primers for Solvent-weld Joints: Make and type approved by manufacturer(s) of pipe and fittings. Maintain cement proper consistency throughout use.

B. Pipe and Joint Compound: Permatex: Do not use on sprinkler inlet port.

2.20 MISCELLANEOUS EQUIPMENT/ACCESSORIES

A. Concrete For Thrust Blocks and Pads: Poured-in-place Class A concrete per Section 90 of the Caltrans Standard Specifications.

B. Sleeves and Conduits: See Drawings.

C. Key(s) for Quick-Coupling Valves:
1. Type: Same manufacturer as Quick-Coupling Valve.

2.21 OTHER EQUIPMENT: As shown on Drawings and required for a fully functional irrigation system.

Part 3 EXECUTION

3.01 EXAMINATION

A. Sleeves and Conduits: Verify that all installed sleeving and conduits are undisturbed and are

free of defects or errors introduced by the work of other sections.

B. Water Meter/Water Pressure: Test and verify that existing water pressure is the minimum pressure at maximum system g.p.m. to operate the irrigation system as indicated on the drawings.

C. Stub-outs: Verify that all stub-outs to be provided under another contract are correctly sized, located and installed as noted on Drawings.

D. Notification: Submit written notification to Owner's Representative within ten (10) working days of above inspections describing all acceptable and non-acceptable site conditions.

3.02 CONNECTIONS TO SERVICES

A. Provide and coordinate connection to water meter.

B. Provide and coordinate connection of irrigation controller to electrical power source.

3.03 INSTALLATION

A. Install irrigation system components in accordance with this Section, with the Drawings, with the manufacturer's recommendations, and with established industry standards. The Contractor shall do nothing that may jeopardize any manufacturer warranty.

B. Conduits and Sleeves:
1. Coordination: Provide conduits and sleeves and coordinate installation with other trades.
2. Extent: Install conduits and sleeves where control wires and pipes pass under paving or through walls as shown on Drawings. Extend twelve inches (12") beyond edges of paving and walls and cap ends until ready for use.

C. Excavating and Trenching:
1. Dig trenches wide enough to allow a minimum of three inches (3") between parallel pipe lines. Provide a minimum cover from finish grade as follows:
   a. 24-inches Deep: Over pipe on pressure side of irrigation control valve, control wires and quick-coupling valves.

D. Pipeline Assembly:
   a. General:
1 Install pipe and fittings in accordance with manufacturer's current printed Specifications.
2. Clean all pipes and fittings of dirt, scale and moisture before assembly.
   a. Solvent-welded Joints for PVC Pipes:
      1. Solvents: Use solvents and methods specified by pipe manufacturer.
      2. Curing Period: Minimum of one (1) hour before applying any external stress on the piping and at least 24 hours before placing the joint under water pressure.
   b. Threaded Joints for Plastic Pipes:
      1. Use Permatex on all threaded PVC fittings except sprinkler heads and quick coupler valve ACME threads.
      2. Joining: Use strap-type friction wrench only. Do not use metal-jawed wrench. Assemble finger tight plus one or two turns.
      3. Laying of Pipe:
   a. Bedding On-grade: Remove from trench all rocks or clods. Bed pipe in at least 2 inches of soil excavated from trench. Backfill on all sides of piping to provide a uniform bearing.
   b. Snaking: Snake pipe from side to side of trench bottom to allow for expansion and contraction. Minimum allowance for snaking is one (1) additional foot per 100 ft. of pipe.

c. Moisture Restrictions: Do not lay PVC pipe when there is water in the trench. Do not assemble PVC pipe unless the pipe is dry.

E. Remote Control Valves:
1. Install in valve boxes where shown on Drawings and group together where practical. Install box flush with finish grade, not necessarily level. If valve occurs in drainage swale, relocate out of drainage swale as approved by Owner's Representative.
2. Where two or more valves are installed adjacent to each other, provide at least six inches (6") separation. Align boxes in a row, perpendicular with pavement edge.
3. Permanently mark valve box lid with 2" black valve number and controller letter or with numbered metal tag inside box as approved by Owner's Representative.
4. Refer to control wiring for required spare wire in each valve box.

F. Install "Y"-Strainer upstream of remote control valves at backflow preventer with two pressure gauges, one upstream and one downstream of each strainer/filter.

G. Bubblers:
1. Coordinate installation with planting contractor to insure timely and proper placement of heads at new planting.

H. Subsurface Irrigation
1. Install emitters at uniform 18 inches on center and 6 inches deep except where shown otherwise. Adjust spacing on slopes to prevent over watering at base of slopes. Install system in accordance with "Toro DL-2000 Low-Volume Irrigation Bidding Specifications and Design Details" and as shown on the Drawings as required for a complete working system.
2. Provide air/vacuum relief valves at all high points on systems.
3. Provide filter as shown and as recommended by emitters manufacturer.
4. Tape pipe ends during installation and do not allow dirt or debris to enter pipe.
5. Use emitter line with the specified emitter flow rate and emitter spacing. Assemble dripper line to allow water to flow continuously and directly, with no dead ends or dead end loops between control valve and flush valve.
6. Use fittings at sharp bends and do not allow dripper line to kink.
7. Install emitter line around perimeter of planter not more than 3 inches off edge for ground cover and turf, 18 inches maximum for shrub planting.
8. Adjust alternate rows so emitters are spaced in a triangular pattern.
9. Collect water from multiple dripper lines and convey the water to automatic line flush valve.
10. Install flush valve at end(s) of collector laterals so that entire system will flush and be free of dirt and debris.
11. Flush valves shall be open when water is turned on for the first time and after a break in the main or lateral lines. Extend collector lateral as required and locate flush valve at convenient accessible location.
12. Flush the systems weekly through the first month of the maintenance period.
13. Thoroughly saturate soil prior to planting. Provide additional surface watering as required to keep plant root systems moist during planting establishment period.

I. Automatic Controller:
1. General: Install with lock box cutoff switch per local code and manufacturer's current printed specifications.
2. Connection to Valves: Connect remote control valves to controller in clockwise sequence to correspond with station setting beginning with Stations 1, 2, 3, etc.
3 .Labeling: Affix controller letter (i.e., "A") on inside of controller cabinet door with

minimum of one-inch (1") high permanent letter.

4. Irrigation Diagram: Affix a non-fading, waterproof copy of irrigation diagram to cabinet door below controller name. Irrigation diagram to be sealed between two plastic sheets, 20 mil. minimum thickness. Use a legible reduced copy of the Record Drawing for the irrigation diagram clearly showing all valves operated by the controller, station, number, valve size, and type of planting irrigated. Color code area operated by each valve.

J. Control Wiring:
   1. General: Install control wires in common trenches with sprinkler mains and laterals wherever possible. Lay to the bottom side of pipe line. Provide looped slack at valves. Snake wires in trench to allow for contraction of wires. Tie wires in bundles at 10 ft. intervals.
   2. Extra Length: Provide 30 inches (30") extra control wire at each remote control valve splice to facilitate the removal of the remote control bonnet to finish grade without cutting wires.
   3. Spare: Install one unconnected spare control wire running from the controller through each intermediate control valve box.
   4. Size: Minimum size of wire is to be determined strictly by the manufacturer's current printed specifications for remote control valves, but not smaller than #14.
   5. Detection Wire: Install a bare #12 copper wire or greater on top of the PVC supply line for the purpose of possible future mine detection search. Install the control wires on the bottom of the PVC supply line with electrical tape every ten feet (10').
   6. Splicing: Crimp control wire splices at remote control valves. Seal with specified splicing materials. In-line splices will be allowed only on runs exceeding 2500 feet and only in junction boxes.

K. Closing of Pipe and Flushing of Lines:
   1. Capping: Cap or plug all openings as soon as lines have been installed to prevent entrance of materials that would obstruct the pipe. Leave in place until removal is necessary for completion of installation.

L. Rain Shutoff Switch:
   1. Install switch in area not affected by irrigation or rain shadow. Provide wires in rigid conduit as accepted by Owner’s Representative.

M. Detection Wire and Warning Tape:
   1. Install a bare # 12 copper wire or greater on top of the PVC supply line for the purpose of possible future mine detection search.
   2. Install a continuous PVC irrigation mainline warning tape 12” above the supply line.

N. RCV IDENTIFICATION TAGS: Install in remote control valve box as recommended by manufacturer and as accepted by Owner’s Representative.

3.04 MISCELLANEOUS EQUIPMENT

A. Install miscellaneous equipment with concrete footings, brackets, etc., as required and as recommended by manufacturer.

3.05 FIELD QUALITY CONTROL

A. Testing of Irrigation System:
   1. Make hydrostatic tests with risers capped when welded PVC joints have cured at least 24 hours. Center load piping with backfill to prevent pipe from moving under pressure. Keep all couplings and fittings exposed.
   2. Install two (2) pressure gauges at opposite ends of main line system. Pump system up to a minimum of 125 psi the day preceding the scheduled test and verify that pressure is

holding. Inspect system early following day and immediately notify Owner's Representative if the test confirmation must be postponed.

3. Apply continuous static water pressure of 125 psi in accordance with Caltrans Standard Specifications Section 20-5.03H, except after a drop in pressure (5 psi maximum), then the pressure must stabilize and remain stable for a one (1) hour minimum period before acceptance of the test.
4. Leaks detected during tests shall be repaired and test repeated until system passes tests at no additional cost to Owner.

B. Adjustment of the System:
1. Flush and adjust all sprinkler heads for optimum performance and to prevent overspray onto walks, roadways and buildings. Adjust the arc and radius as applicable.
2. Include as a part of the work any nozzle changes or arc adjustments necessary due to daytime windy conditions during grass establishment period. After grass has been established and watering can be performed during calm early morning or evening hours, make any required adjustments to nozzles and arcs.
3. Set all sprinkler heads perpendicular to finished grades unless otherwise noted on the drawings.
4. When the landscape sprinkler system is completed and before planting, perform a coverage test in the presence of the Owner's Representative to determine if the water coverage for planting areas is adequate.
5. Test controllers individually in the presence of the Owner's Representative and the Landscape Architect. Demonstrate that all control valves operate electronically. Provide vehicles and radio equipment as necessary to expedite this process.
6. Demonstrate to Owner's Representative that irrigation scheduling programmed into controller is adequate for plant requirements without causing runoff, and that scheduling capacities of controller are utilized.

3.06 IRRIGATION SCHEDULING AND CONTROLLER PROGRAMMING

A. Per the requirements of the California Model Water Efficient Landscape Ordinance All irrigation schedules and programs shall be developed, managed and evaluated to utilize the minimum amount of water required to maintain plant health.

B. Irrigation controller Scheduling and Programming Parameters to be conducted by a CLCA Certified Irrigation manager and submitted to the local agency as part of the Certificate of Completion.

C. Parameters used to set the automatic controller shall be developed for each of the following:
1. Plant establishment period
2. Established landscape period
3. Temporary irrigated area (if applicable)

D. Each irrigation schedule shall consider for each station all of the following that apply:
1. Irrigation interval (days between irrigation)
2. Irrigation run times (hours or minutes per irrigation event to avoid runoff
3. Number of cycle starts required for each irrigation event to avoid runoff
4. Amount of applied water scheduled to be applied on a monthly basis
5. Application rate setting
6. Root depth setting
7. Plant type setting
8. Soil type
9. Slope factor setting
10. Shade factor setting

11. Irrigation uniformity or efficiency setting

E. Total annual applied water shall be less than or equal to Maximum Applied Water Allowance (MAWA). Actual irrigation schedules shall be regulated by automatic irrigation controllers using current reference evapotranspiration data (CIMIS or soil moisture sensor data).

3.06 Backfill and Compacting

A. General: After system is operating and required tests and reviews have been made, backfill excavations and trenches with clean soil, free of debris.

B. Backfill for All Trenches: Regardless of the type of pipe covered, compact to minimum 95% density under pavements and 85% under planted areas.

C. Finishing: Dress off areas to finish grades. Re-dress any areas which subsequently settle.

D. Owner's testing agency will test backfill compaction in areas under paving.

3.07 Maintenance

A. The entire sprinkler irrigation system shall be under full automatic operation for a period of 2 days prior to any planting.

B. The Owner's Representative reserves the right to waive or shorten the operation period.

C. Maintain/repair system for full duration of plant maintenance period.

3.08 Reviews Prior to Acceptance

A. Notify the Owner's Representative in advance for the following reviews, according to the time indicated:
1. Supply line pressure test and control wire installation - 72 hours.
2. Coverage and controller test - 72 hours.
3. Final review - 7 days.

B. No reviews will commence without record drawings, without completing previously noted corrections, or without preparing the system for review.

3.09 FINAL REVIEW AND CLEANUP, PER SECTION 01 74 00.

A. Operate each system in its entirety for the Owner's Representative at time of final review. Any items deemed not acceptable by the Owner's Representative shall be reworked to the complete satisfaction of the Owner's Representative.

B. Provide evidence to the Owner's Representative that the Owner has received all accessories and equipment as required before final review can occur.

C. Final acceptance and start of warranty period will occur no earlier than the end of the plant maintenance period.

D. For time of final review, Contractor shall arrange a meeting with the Owner's maintenance personnel to demonstrate the operation of the irrigation systems automatically in order to verify acceptance and to familiarize the maintenance personnel with the system and recommended programming.

End of Section

SECTION 32 9300

PLANTING

PART 1 GENERAL

1.01 DESCRIPTION

A. Furnish labor, material and equipment for the installation of the planting work and the maintenance complete in place as shown on the drawings and as specified.

1.02 RELATED SECTIONS

A. Qualifications:
   1. Experience: Assign a full-time employee to the job as foreman for the duration of the Contract with a thorough understanding of standard industry landscape practices and a minimum of four (4) years of experience in turf management, landscape installation and maintenance supervision, with experience or training in turf management, entomology, pest control, soils, fertilizers, and plant identification.
   2. Labor Force: Provide a landscape installation and maintenance force thoroughly familiar with, and trained in, the work to be accomplished to perform the task in a competent, efficient manner acceptable to the District

B. Requirements:
   1. Supervision: Provide direct supervision of the work force at all times by a foreman. Foreman to be present during the entire installation. Notify District of all changes in supervision.
   2. All vegetation and lighting shall be installed and maintained in accordance with recommended CPTED Guidelines.
   3. Identification: Provide proper identification at all times for landscape firm's vehicles and a labor force uniformly dressed in a manner satisfactory to District.

C. Reference Standards:
   1. Manufacturer's recommendations.
   2. Nomenclature: "Western Garden Book," Sunset Publishing Co., Menlo Park, CA, 2001 edition or current edition.
   3. Plant Material Standards: American Standards for Nursery Stock," American Association of Nurseryman, 230 Southern Building, Washington, D.C. 20005, 1996 or current edition.
   4. Staking and guying procedures: "Staking Landscape Trees," University of California Extension, Publication #2576 or current publication.
   5. Pruning procedures: "Tree Pruning Guidelines," International Society of Arboriculture, Savoy, IL, 1995 or current edition, conforming to ANSI-A300-1995 tree pruning specifications and guidelines.
   6. California Department of Transportation (CalTrans), Standard Specifications, 1992 Edition or current edition. Where referenced herein.
   7. Marin Countywide Stormwater Pollution Prevention Program (MCSTOPP) or member agency having jurisdiction over the project work.
   8. US Composting Council Compost Analysis Program (CAP)
   9. Test Methods for the Evaluation of Composting and Compost (TMECC)

D. Plant Material Standards:
   1. Quality and Size of Plants: Conform to the State of California Grading Code of Nursery Stock, No. 1 grade. Use only nursery-grown stock that is free from insect pests and diseases. Any required clearances shall be obtained prior to shipment of plant material.

Comply with Federal and State laws requiring inspection for plant diseases and infestations. Submit inspection certificates required by law with each shipment of plants, and deliver certificates to the District. Obtain clearance from the County Agricultural Commissioner as required by law, before planting plants delivered from outside the County in which planted.

E. Testing: Performed by approved testing agency: Waypoint Analytical, Perry Laboratory, Soil and Plant Laboratory, Inc. or accepted equal. Submit test results, analysis and recommendations for site soil, import soil, fertilizer, and organic amendment together, as a package. Components of the test shall include all major nutrients, pH, salinity, boron, sodium, micronutrients, copper, zinc, manganese and iron, adsorption rate, organic content and texture.

1.04 SUBMITTALS: SUBMIT TWO WEEKS AFTER AWARD OF CONTRACT OR AS NOTED.

A. Procedures: In accordance with Section 013300.

B. Product Data: Supply product data for all proprietary products specified herein. Submit manufacturer's current catalog cuts and specifications for the following:
1. Fertilizers
2. Herbicide
3. Tree Tie and Stake – For 36" box and smaller trees
4. Root Guard
5. Iron Sulfate

C. Materials Data: Submit complete materials list of plants, soils, amendments, fertilizers and non-proprietary items to be provided under this Section, including source/supplier, size, and quantity.

D. Samples:
1. Soil Amendment: Submit 1-pint sample.
2. Import topsoil: Submit 1-quart sample to the Landscape Architect two weeks before starting the contemplated hauling of soil.
3. Plants: Submit typical sample of each variety to site for approval by Landscape Architect.
4. Organic Mulch: Submit 1-pint sample.

E. Certificates of Compliance for the following:
1. Sod: If accepted by the District, submit information of Sod Farm Company and type and percentage of sod mixture for approval by Landscape Architect.
2. Soil amendment, chemical and physical properties. Do not deliver amendment to the site without prior approval of submittals by Landscape Architect.
3. Quantity of soil amendment delivered to site and incorporated into soil preparation.
4. Import soil, chemical and physical properties.

F. Plants: Submit documentation to the Landscape Architect within 60 days of proposed installation that all plants listed on the plans have been ordered. Substitution of size or species due to unavailability must be requested in writing within 60 days of proposed installation.

G. Topsoil Analysis: After approval of rough grading and topsoil placement, obtain three representative samples of topsoil taken from approved site locations and submit to approved testing agency for "agricultural suitability" analysis report, including evaluation of physical and chemical properties of soil and recommendations for adding amendment and fertilizers to the soil. Request testing agency to send one copy of test results directly to the Landscape Architect and one copy to the District. Upon approval of the Laboratory's report by the Landscape Architect, the report recommendations become a part of the Specifications. Adjust the quantities of soil amendment, fertilizer and other additives to conform to the report.

H. Remediation of planting areas proposed for current built or paved areas: Three representative samples from area shall be taken and kept separate from the other required samples, to allow analysis and recommendations to counteract possible lime treatment. Submit detailed schedule of planting material delivery and staging dates. Request testing agency to send one copy of test results directly to the Landscape Architect and one copy to the District. Upon approval of the Laboratory's report by the Landscape Architect, the report recommendations become a part of the Specifications. Adjust the quantities of soil amendment, fertilizer and other additives to conform to the report.

1.5 PROJECT SITE CONDITIONS

A. Site Visit: At beginning of work, visit and walk the site with the District's Representative to clarify scope of work and understand existing project site conditions. Identify location of utilities and other improvements. Notify Landscape Architect of conflicts prior to start of work for resolution.

1.6 DELIVERY, STORAGE AND HANDLING

A. Deliver, store, and protect products under provisions of Section 016100 and as specified below.

B. Materials Delivery and Storage: Deliver manufactured materials in original containers with brand and maker's name marked thereon. Materials in broken containers or showing evidence of damage will be rejected and must be immediately removed from the site. Odorous materials shall not be brought to the site until they are to be used. Deliver quantities necessary to complete the work shown on the Drawings. Any discrepancy in the quantities given on the plans shall not entitle Contractor to additional remuneration.

C. Deliver Bulk materials to the job site and store to deter mixing with other bulk materials, saturation by rainwater, contamination and/or contact with other deleterious substances or materials.

D. Plants: Maintain plant material in healthy growing condition at all times. Protect plants from sun and drying winds. Keep plants that cannot be installed immediately in the shade, watered and protected. Landscape Architect reserves the right to reject plants that decline in quality after delivery to site.

1.07 SUBSTITUTIONS

A. Substitutions shall be per Section 012510 – Products Options and Substitutions and as follows:
   1. If proof is submitted to the Landscape Architect that any plant specified is not obtainable, a proposal will be considered for use of nearest equivalent size or variety with an equitable adjustment of Contract Price.
   2. Substantiate and submit proof in writing to the Landscape Architect within 10 days after the effective date of Notice to Proceed.

1.08 WARRANTIES AND REPLACEMENT

A. Provide written guarantee, on Contractor's letterhead of the following:
   1. Plant material and installation: Warrant that all installed plant material will be vigorous, healthy, free of dead or dying branches and branch tips, bearing foliage of normal density and color, and will comply with these Specifications for a period of one year from date of final acceptance.
   2. Replacements: Without cost to District, in a timely manner and as directed by the Landscape Architect, replace all plants not meeting the requirements above during and at the end of the Warranty Period. Replace plants that are identified, within one year, as not being true to name as specified or accepted substitution, with the specified plant. Match replacement plants with specimens of the same species in size, and comply with all

requirements of this Specification.

PART 2 PRODUCTS

2.01 PLANTS

A. Plant nursery grown specimens of the variety, quantity and size. Leave on supplying nursery's labels listing genus, species and variety and do not remove until 10 days before end of maintenance period. The total quantity tabulated is considered approximate and furnished for convenience only.

B. Install healthy, vigorous, shapely, well branched plants, densely foliated when in leaf, well rooted with no evidence of having been root bound, restricted or deformed, with a structure typical of the species or variety, properly pruned, free of disease, insect pests, eggs or larvae, and free from physical damage or adverse conditions that would prevent thriving growth.

C. Trees to have sufficient trunk taper and strength so as to remain upright without nursery staking support. Select straight trunks with the central leader intact, undamaged and uncut with all old abrasions and cuts completely callused over. Tree cultivars shall be guaranteed by the nursery to be free of any graft incompatibility defects. Primary lateral scaffold branches shall be no closer than 6 vertical inches apart and radially distributed around the trunk, free of included bark and excessively narrow angles of attachment. All primary lateral scaffold branches shall be established 6.5 feet above the soil grade unless specified as multi – trunk form. No more than 25% of the branches shall have been removed from the tree in the previous six months.

1. Tree Form: Trees shall have a symmetrical form as typical for the species/cultivar and growth form.
   a. Central Leader for Single Trunk Trees: Trees shall have a single, relatively straight central leader and tapered trunk, free of co dominant stems and vigorous, upright branches that compete with the central leader. Preferably, the central leader should not have been headed; however, in cases where the original leader has been removed an upright branch at least ½ the diameter of the original leader just below the pruning point shall be present.
   b. Potential Main Branches: Branches shall be evenly distributed radially around and appropriately spaced vertically along the trunk, forming a generally symmetrical crown typical for the species.
   c. Headed temporary branches should be distributed around and along the trunk as noted above and shall be no greater than 3/8" diameter, and no greater than ½ diameter of the trunk at point of attachment.
2. Tree Trunk
   a. Trunk diameter and taper shall be sufficient so that the tree will remain vertical without the support of a nursery stake.
   b. Trunk shall be free of wounds (except properly made pruning cuts), sunburned areas, conks (fungal fruiting-bodies), wood cracks, bleeding areas, signs of boring insects, galls, cankers and/or lesions.
   c. Tree trunk diameter at 6" above the soil surface shall be within the diameter range shown for each container size below, except where shown otherwise:

Container	Trunk Diameter in inches	Soil level from Container Top
5 gallon	0.5" to 0.75"	1.25 to 2"
15 gallon	0.75" to 0.5"	1.75 to 2.75"
24" Box	1.5" to 2. 5"	2.25 to 3"

d. Tree trunks shall be undamaged and uncut with all old abrasions and cuts completely callused over. Do not prune plants prior to delivery.

3. Tree Roots
   a. Trunk root collar (root crown) and large roots shall be free of circling and/or kinked roots. Contractor may be required to remove soil near the root collar in order to verify that circling and/or kinked roots are not present.
   b. The tree shall be well rooted in the container. When the trunk is lifted the trunk and root system shall move as one and the rootball shall remain intact.
   c. The top-most roots or root collar shall be within 1" above or below the soil surface. The soil level in the container shall be within the limits shown in above table.
   d. The rootball periphery shall be free of large circling and bottom-matted roots.
   e. On grafted or budded trees, there shall be no suckers from the root stock.

D. Shrubs
   1. Each shrub must stand upright without support.
   2. All container shrubs shall be free of girdling roots, defined as those roots greater than 1/8" diameter circling the periphery of the rootball. The top of the rootball shall be free of "Knees" (roots) protruding above the soil, and the bottom shall be free of matted roots.

E. Take precautions to ensure that the plants will arrive at the site in proper condition for successful growth. Protect plants in transit from windburn and sunburn. Deliver plants with root balls moist and showing no indication of drought stress. Protect and maintain plants on site by proper storage and watering.

F. Do not prune plants before delivery.

G. All plants to be inspected by the Landscape Architect. The District reserves the right to reject any or all plants due to health or structural defects and to inspect plant material prior to shipment after receiving order confirmation from supplying nursery. Notify Landscape Architect 10 days in advance of all required inspections and delivery to site. In case the sample plants reviewed are found to be defective, the Landscape Architect reserves the right to reject the entire lot(s) of plants represented by the defective sample. Remove unsuitable plants and immediately dispose of off the site.

2.02 GRASSES

A. Sod: Penn Blue Sports Turf available from Pacific Coast Sod, or approved equal. Machine cut sod to a uniform thickness of 3/4-inch excluding top growth and thatch. Each individual sod piece shall be strong enough to support its own weight when lifted by the ends, in vigorous condition, dark green in color, free of disease, weeds and harmful insects. Broken pads, irregularly shaped pieces, and torn and uneven ends will be rejected. No web or mesh.

2.03 FERTILIZERS

A. Commercial fertilizer, pelleted or granular form, conform to the requirements of Chapter 7, Article 2, of the Agricultural Code of the State of California for fertilizing materials as follows:

Type A: 6% Nitrogen, 20% Phosphorus Acid and 20% Potash, (6-20-20).

Type B: 21 gram planting tablets 20% Nitrogen, 10% Phosphoric Acid and 5% Potash (20-10-5) available from Agriform.

Type C: Complete fertilizer 21% Nitrogen, 7% Phosphoric Acid and 14% Potash (21-7-14).

B. Maintenance Fertilizer: Type C

C. Sod Fertilizer: Provided by grower.

2.04 SOIL AMENDMENT: COMPOSTED YARD WASTE AMENDMENT:

A. Composted Yard Waste Amendment will be considered if the in situ planting soil salinity and soil structure is favorable for the inclusion of recycled yard waste organic matter, as approved by the Landscape Architect. It is the Contractor's responsibility to secure test samples of both the planting soil and the proposed composted yard waste amendment (2 quart samples) and submit to Perry Laboratory or Soils and Plant Laboratory for evaluation and recommendations per code A05-1 for the soil sample and A91-0 for the amendment sample. The composted yard waste amendment sample shall be a grab sample from the currently available material.

B. Based on the laboratory evaluation, the addition of composted yard waste amendment shall not be acceptable if it creates a leaching requirement. The addition of the compost shall result in a final ECe of the amended soil of less than 4.0 dS/m @ 25 degrees C. as determined in a saturation extract. Use the following table to determine the maximum allowable Ece (dS/m of saturation extract) of compost at desired use rate and allowable Ece increase.

DESIRED USE RATE		MAXIMUM ALLOWABLE Ece INCREASE FROM AMENDMENT		
Cu. Yds. Amendment Per 1000 Sq. Ft. for Incorporation to 6" depth	Volume percentage of amendment	1 dS/m	2 dS/m	3 dS/m
		Maximum ECe of Compost		
1	5	14	28	42
2	11	7	14	21
3	16	5	9.5	14
4	22	3.5	7	10.5
5	27	3	5.5	8.5
6	32	2.5	4.5	7

Example: Specification calls for 6 cu. Yrds. Compost per 1000 sq. ft. for incorporation to 6" depth, and site soil has an ECe of 2.0. In order to avoid exceeding ECe of 4 in final blend, compost ECe shall be less than 4.5 dS/m.

C. Composted Yard Waste Soil Amendment properties as follows:

1. Gradation:

Percent Passing by weight	Sieve Designation		
90		1/2"	
85-100	9.51 mm	3/8"	
50-80	2.38 mm	No. 8	8 mesh
0-40	500 micron	No. 35	32 mesh

2. Organic Content: Minimum 50% based on dry weight and determined by ash method. Minimum 250 lbs. organic matter per cubic yard of compost.
3. Carbon to nitrogen ratio: Maximum 35:1 if material is claimed to be nitrogen stabilized.
4. pH: 5.5 – 8.0 as determined in saturated paste.
5. Soluble Salts: See B. above.
6. Moisture Content: 35-60%.
7. Contaminants: The compost shall be free of contaminants such as glass, metal and visible plastic.
8. Maturity: Physical characteristics suggestive of maturity include:
   a. Color: Dark brown to black.
   b. Acceptable Odor: None, soil-like, musty or moldy.
   c. Unacceptable Odor: Sour, ammonia or putrid.

d. Particle Characterization: Identifiable wood pieces are acceptable but the balance of the material shall be soil-like without recognizable grass or leaves.

D. Submit planting soil and composted yard waste amendment samples along with laboratory report from Soils and Plant Laboratory for degree of compliance as specified above to the Landscape Architect a minimum of 3 weeks prior to beginning soil prep. The laboratory report shall include recommendations for adjusting fertilizer and amendment quantities. Upon approval of the Laboratory's report by the Landscape Architect, the recommendations in the report shall become a part of the Specifications and the quantities of soil amendment and fertilizer shall be adjusted to conform with the report at no additional cost to the owner.

2.05 IRON SULFATE: DRY FORM.

2.06 PLANT BACKFILL: USE A MIXTURE OF 2 PARTS SOIL FROM THE HOLE, AND 1 PART AMENDMENT WITH IRON ADDED AT THE FOLLOWING RATES:

1 gallon can plants	-	iron, 1/4 cup
5 gallon can plants	-	iron, 1/3 cup
15 gallon can plants	-	iron, 1/2 cup
24" box and larger	-	iron, 1 cup

Mix the iron, amendment and soil thoroughly.

2.07 SOIL SULFUR – AS REQUIRED BY SOILS ANALYSIS.

2.08 MULCH

A. Organic Mulch -
Recycled Mulch: WM Earthcare Mulch, color: Muir Woods Brown. 100% clean recycled ground wood mulch of uniform enhanced color, free from weeds, seeds, sawdust and shall not contain eucalyptus, resin, tannin, salts or other compounds detrimental to plant life. Available thru Waste Management, 510.613.8771.

B. Submit samples of organic mulch to the Landscape Architect for approval within two weeks of award of Contract. Resubmit until acceptable to Owner, at no extra cost.

2.09 TREE SUPPORT POLES: PEELED, LODGE POLE PINE LOGS, CLEAN, SMOOTH, NEW, AND SIZED AS FOLLOWS:

A. Two-inch (2") diameter by eight feet (8') long for trees less than 8' high and 1" caliper.

B. Three-inch (3") diameter by eight feet (8') long for trees greater than 8' high and 1" caliper.

C. Bamboo Support Poles. For use when the tree caliper is small and the tree's central leader does not have stability to stay erect on its own without a nursery stake. Typically, the nursery stake abrades the trunk and is so stiff that the trunk does not move and develop its own rigidity. In order to stabilize the trunk so that it is stable but not rigid the contractor is to add a bamboo stake secured to the trunk with flexible nursery tape that extends from the top flex point of the tree to 2" above the top of the root ball. The bamboo stake will assist in holding the trunk up if it is weak and allows for movement of the trunk in the wind which releases hormones that cause the formation of reaction wood, which is what thickens the trunk. The nursery stakes shall be removed and replaced with the bamboo stakes during installation and be removed at the end of maintenance period if the tree trunk can stand on its own.

2.10 TIES

A. Flexible strap, 24-inch minimum length without sharp edges adjacent to trunk, V.I.T. (contact phone no.) cinch-tie, or approved equal.

2.11 ROOT GUARD

A. UBP 24-2 for use along curbs as manufactured by Deep Root Corporation (800/898-0563), or approved equal.

2.13 PLANTING SOIL (TOPSOIL):

A. Planting soil is defined as on-site surface soil (in-situ) or import topsoil for new planting areas and/or as required to complete the project. Satisfactory planting soil shall be free of subsoil, heavy or stiff clay, lumps, stones, and other objects over 2" in diameter, and without weeds, roots, and other objectionable material.

2.14 IMPORTED TOPSOIL:

A. Import topsoil in all areas that were originally paved, new planting areas or with poor soils and as needed to complete the job with the following properties:
   1. Fertile, friable, natural, productive, even textured soil containing a normal amount of humus, capable of sustaining healthy plant life, free of subsoil, heavy or stiff clay, rocks, gravel, brush, roots, weeds, noxious seeds, sticks, trash or other harmful substances, with no nematodes or other noxious animal life or toxic substances. Obtain soil from well-drained, arable land, where no noxious weeds such as Morning Glory, Sorrel, or Bermuda Grass are growing. "Sandy Loam" or "Loam" as classified in accordance with USDA Standards.
   2. Imported planting soil pH value to be between 6.0 and 7.5 with boron concentration of the saturation extract of less than 1 ppm, salinity of the saturation extract at 25 degrees C. of less than 4.0 millimoles, and a sodium absorption rate (SAR) of less than 8.
   3. Silt and clay content of imported planting soil is not to exceed that of the existing soil it is to be placed over.
   4. Do not deliver topsoil to the site until Landscape Architect has reviewed and approved soils report and/or prior to approval of submittals by Landscape Architect.

B. Quality Control
   1. Make the site of the source of supply of planting soil available to the Landscape Architect for observation and approval prior to any hauling or placing of soil.
   2. Submit a soil analysis report by approved testing agency showing chemical analysis stating source, fertility, agricultural suitability and particle size distribution of the soil. Include testing agency's recommendations for amending the soil.
   3. Following approval of the sample, provide a one-half cubic yard sample, which shall be stored at the site of work for comparison with subsequent loads of soil. The comparison sample will be stored with the Landscape Architect until the furnishing of all soil has been completed and accepted.
   4. No topsoil shall be delivered to the site until Landscape Architect has reviewed and approved soils report and submittals.

PART 3 EXECUTION

3.01 FIELD QUALITY CONTROL

A. Progress observations: In addition to the installation observations specified below, the Landscape Architect may make periodic progress observations.

B. Installation observations: Request at least 4 working days in advance:
   1. Observation of finish grading.
   2. Observation of plant material upon delivery to site.

3. Observation of layout and placement of plant material at time of planting.
4. Observation of any planting drainage issues, as identified by Contractor.

C. Maintenance Observations: For the purpose of establishing the start of Maintenance Period and observing completion of the Work of this Section through Final Acceptance. Request at least 7 working days in advance:
1. Observation for Maintenance Period commencement.
2. Observation for Final Acceptance.

3.02 ORDERING, REVIEW AND ACCEPTANCE OF PLANT MATERIAL

A. Ordering: 60 days before start of planting work, submit written certification to Landscape Architect of the quantity, species and source of plant material ordered.

B. Upon plant delivery, arrange material so that canopies or branch tips are not touching so that Landscape Architect can review plant material at project site.

C. Do not install material that has not been reviewed and accepted by Landscape Architect.

D. Arrange and pay for permits and inspections required for delivery of plant material.

3.03 FINE GRADING AND SOIL PREPARATION

A. Planting Soil Placement:
1. Inspect planting areas and remove all asphalt, concrete, base rock and other foreign material. Spread type A Fertilizer (6-20-20) over all subgrade areas at the rate of 15 pounds per 1,000 square feet prior to ripping. Rip in two directions all planting areas full depth of compacted fill (to a minimum of 12 inches) into undisturbed native soil prior to backfilling. Scarification of any planting area that cannot be accomplished with a tractor shall be accomplished by an alternative method approved by the Landscape Architect to the specified depth to ensure proper drainage. Uniformly distribute and spread planting soil backfill in planting areas in layers not to exceed 12" and compact to a maximum of 85% relative compaction.
2. When the planting soil differs in clay and silt content from the subsoil it is to be placed upon, install a 4-inch thick lift of planting soil on the subgrade and rototill into the subgrade 6 inches deep before installing the remaining required planting soil.
3. Do not work planting soil in a wet or muddy condition or dump or spread in areas where subgrade is not in proper condition.
4. Water settling, puddling, and jetting of fill and backfill materials, as a compaction method is not acceptable.
5. Maintain moisture content of materials during compaction operations within required moisture range to obtain indicated compaction density.
6. Provide a minimum of 18 inches depth in planting areas as shown on drawings and as outlined in the specifications. Where soil is to be replaced by plants and organic amendments, make allowance so that when finish grading has begun, there will be no deficiency in the specified depth of prepared beds.

B. Before proceeding with the work: Carefully inspect all areas and verify all dimensions and quantities. Immediately inform the Landscape Architect of any discrepancy between the Drawings and Specifications and actual conditions and secure approval to proceed.

C. Planting operations shall be performed only during periods when beneficial results can be obtained. When excessive moisture or other unsatisfactory conditions prevail, the work shall be stopped until conditions are satisfactory.

D. Thoroughly wet down the planting areas and confirm irrigation coverage and operation. Allow

soil to dry so as to be workable.

E. Drag to a smooth, even surface. Grade to form all swales, pitch to catch basins, streets, curb, etc., to ensure uniform surface drainage. Areas requiring grading include adjacent transition areas that shall be uniformly level or sloped between finish elevations. Provide surface drainage of planted area. Correct drainage conditions that may be detrimental to the growth of plant material or which will result in excessive retention of water in tree pits. Minimum slope in landscape areas shall be two percent (2%) or as shown on drawings. Slope away from buildings.

F. Hold finish grade and/or mulch surface in planting areas 1/2-inch below adjacent pavement surfaces, tops of curbs, manholes, etc.

G. Spread soil amendment, fertilizers and other additives evenly over installed and rough graded topsoil in all planting areas including turf, ground cover and shrub areas at the rates specified in the soils analysis report. For bid basis, use the following rates:
   1. Soil Amendment: 6 cubic yards per 1,000 square feet.
   2. Fertilizer: Type A (6-20-20) at 20 lbs. per 1,000 square feet.
   3. Iron Sulfate: 10 lbs. per 1,000 square feet.
   4. Soil Sulfur: 25 lbs per 1,000 square feet. Rototill above additives into soil 6 to 8 inches deep. Keep iron sulfate off pavement and other surfaces to prevent rust staining. Correct all rust damage to work.

H. After the rototill work, float areas to a smooth, uniform grade as indicated on the drawings. Slope all planting areas to drain. Roll, scarify, rake and level as necessary to obtain true, even planting surfaces. Remove rocks, sticks and debris 2 inches or larger in size in turf areas and 3 inches or larger in shrub and ground cover areas. Secure approval of the grade by the Landscape Architect before any planting.

I. Scarify all planting areas that become compacted prior to planting.

J. For areas to receive sod, apply sufficient water to completely moisten the area to a depth of 12 inches after amendments are worked into the soil. Leave areas undisturbed for a period of not less than twenty (20) days. Water as frequently as necessary to keep areas moist during the twenty-day period.

   Weed the area after the twenty-day period has expired and the soil has dried sufficiently to permit work without excessive compaction. Restore surface to finish grade. Chemical weed control will be permitted in compliance with the District's Integrated Pest Management Policy.

   Following completion of amendment incorporation, the District reserves the right to retest the amended topsoil to test for compliance with specifications by the approved soils test. If retesting is to be done, three representative samples shall be taken in areas approved by the Landscape Architect. Send samples to the approved soils testing agency for analysis at the District's expense. Additional amendments will be supplied and incorporated by Contractor (at no additional cost to the Contract) as noted in test results. All subsequent testing for soil preparation non-compliance to be at Contractor's expense.

3.04 SODDED TURF PLANTING

A. Lightly roll surface and reshape to level humps and hollows. Secure the Landscape Architect's approval before sodding. Do not sod on dry soil.

B. Lay first strip of sod along a straight line (use a string in irregular areas). Butt joints tightly, do not overlap edges. On second strip, stagger joints. Use a sharp knife to cut sod to fit curves, edges and sprinkler heads.

C. When a conveniently large area has been sodded, water lightly to prevent drying. Continue to sod and to water until installation is complete.

D. After laying all sod, roll lightly to eliminate irregularities and to form good contact between sod and soil. Avoid a heavy roller and excessive initial watering.

E. Thoroughly water the completed sod surface to at least 8 inches deep. Repeat sprinkling at regular intervals to keep sod moist at all times until rooted. After sod is established, decrease frequency and increase amount of water per application.

F. Protect turf areas by erecting fences, barriers and signs necessary to prevent trespass. Keep barriers neat and well maintained.

3.05 HANDLING OF PLANTS

A. General: Prevent damage to plant material. Lift and handle plants only from bottom of rootball.

B. Access: Inspect Project site and become familiar with the accessing requirements and restrictions. At time of submitting bid, provide written notice of any conditions that would prevent installation of the specified plant material.

3.06 TREE AND SHRUB PLANTING

A. Do not plant material that has not been reviewed by Landscape Architect upon delivery to the project site, or that has been rejected for any reason. Do not plant under unfavorable weather conditions.

B. Landscape Architect will review, for conformance to design intent, locations of all plants in the field prior to planting. Notify Landscape Architect and schedule layout review sufficiently in advance of planting to allow for review and adjustment without disrupting construction schedule. Stake layout of trees in field before installing irrigation. Mark tree and shrub locations on site using stakes, gypsum or similar approved means and secure location approval by the Landscape Architect before plant holes are dug. Adjust as necessary prior to planting. Landscape Architect reserves the right to make minor adjustments in the layout of all plant material; adjust irrigation system as necessary.

C. Excavate container grown tree, shrub and vine pits as follows. If rocks, underground construction work, tree roots or other unknown obstructions are encountered in the excavation of plant holes; Landscape Architect may select alternate locations. Report all such conditions and cost estimate for removing the obstructions to a depth of not less than 6 inches below the required hole depth. Obtain Landscape Architect's instructions prior to proceeding with the work affected.

Excavation for	Width	Depth
Boxed Trees	Box + 24"	Box + 12"
Canned Trees (15 gc)	Can + 18"	Can + 12"
Canned Shrubs (1 or 5 gc)	Can + 12"	Can + 12"

D. Break and loosen the sides and bottom of the pit to ensure root penetration. Square off the sides of the plant pit to reduce circling rooting. Prior to planting all specified plants, 'test drain' representative sample planting areas. Fill holes with water; any retention of water in the plant pits for more than 24 hours shall be brought to the attention of the Landscape Architect before planting proceeds. Report failure of drainage test in writing to Landscape Architect for all areas not draining, and all soil conditions considered detrimental to growth of plant material. State condition, and proposal and cost estimate for correcting the condition. Obtain Landscape

Architect's instructions prior to proceeding with work affected. Repeat drainage testing and correction of conditions until tests are passed. Failure to perform drainage tests, or to notify Landscape Architect in writing of conditions specified above, renders Contractor responsible for all plant failure that occurs as a result of inadequate drainage or detrimental soil conditions, as determined by Landscape Architect.

E. Backfill plant holes with mix as specified, free from rocks, clods or lumpy material. Backfill native soil free of soil amendments under rootball and foot tamp to prevent settlement. Backfill remaining one-half of the hole with soil mix and place plant tablets (Type B fertilizer) 3 inches below surface of rootball and 1/2-inch from roots at the following rates:

1 gallon can plant - 1 tablet
5 gallon can plant - 3 tablets
15 gallon can plant - 6 tablets
24-inch box plant - 6 tablets
36-inch box plant - 8 tablets

F. Carefully remove and set plants without damaging the rootball. Do not install plants with damaged rootballs. If root bound gently tease out circling roots by hand as required. Cutting or scoring of rootballs to be done only if species is known to be tolerant of such treatment. Superficially cut tolerant plants' edge roots vertically on three sides using a knife. If trees are root bound, gently roughen sides of rootball to depth of 1 to 2 inches to loosen and spread encircling roots. Cut roots that are too stiff to untangle. Remove bottom of plant boxes before planting. Remove can or sides of boxes and nursery stakes after positioning the plant and partially backfilling.

G. Set plants in backfill with top of the rootball 2 inches above finished grade. Backfill remainder of hole and soak thoroughly by jetting with a hose and pipe section. Water backfill until saturated the full depth of the hole. Thoroughly water all plants immediately after planting, eliminating air pockets. Prevent erosion.

H. Build 6" high watering basin berms around trees and shrubs to drain through rootball. Basins are not required around trees in turf areas.

I. Stake and/or guy trees as detailed. Drive stake until solid and remove excess stake protruding above top tree tie to prevent rubbing against branches. Allow 1 to 3 inches sway in trunk or branches; do not pull tight. If caliper is small and cannot support its central leader, install bamboo stake in place of nursery stake as noted.

J. Mulch watering basins with organic mulch to 2-inch depth and thoroughly water. No mulch is required around trees in turf areas.

3.07 GROUND COVER PLANTING

A. Plant in neat, straight, parallel and staggered rows as indicated on plan. Plant first row one-half required ground cover spacing behind adjacent curbs, structures, or other plant bed limits. Plant ground cover to edge of water basins of adjacent trees and shrubs.

3.08 MULCH:

A. Mulch all shrub and ground cover areas with organic mulch to a 3-inch depth. Mulch ring at trees in lawn areas to be 3' diameter for up to 36" box. Do not pile mulch around crowns of plants. Keep root crown free of mulch.

3.9 WATERING:

A. Water all trees, shrubs and ground cover immediately after planting. Apply water to all plants as often and in sufficient amount as conditions may require to keep the plants in a healthy vigorous growing condition until completion of the Contract. Do supplemental hand watering of trees and shrubs during the first 3 weeks of plant establishment as necessary.

3.10 MAINTENANCE OF PLANTING

A. Maintain plants from time of delivery to site until final acceptance of landscape installation.

3.11 PRE-MAINTENANCE PERIOD REVIEW AND APPROVAL OF PLANTING

A. Receive approval of the installed planting prior to commencement of planting establishment maintenance period. Notify the Landscape Architect a minimum of seven (7) days prior to requested review. Before the review, complete the following:
   1. Complete all construction work.
   2. Present all planted areas neat and clean with all weeds removed and all plants installed and appearing healthy.
   3. Plumb all tree stakes.
   4. Sod or reseed all turf areas.
   5. No partial approvals will be given.
   6. Settlement: Reset plants that shift or settle before end of maintenance period. Crowns of trees shall be at the following minimum height above surrounding finish grade at end of maintenance period: 36 inch box and smaller - 2 inches.

3.12 PLANTING ESTABLISHMENT MAINTENANCE

A. General Requirements:
   1. The planting establishment maintenance period required shall be 120 calendar days after all planting is complete, turf is seeded, and installation approved. A longer period may be required if the turf is not thick, vigorous and even, or if the plant material is not acceptably maintained during the maintenance period. The maintenance period may be suspended at any time upon written notice to the Contractor that the landscaping is not being acceptably maintained, and the day count suspended until the landscape is brought up to acceptable standards as determined by the Landscape Architect.
   2. Planting establishment maintenance immediately follows, coincides with, and is continuous with the planting operations, and continues through turf installation, and after all planting is complete and accepted, or longer where necessary to establish acceptable stands of thriving plants.
   3. Protect all areas against damage, including erosion and trespass, and provide proper safeguards. Maintain and keep all temporary barriers erected to prevent trespass.
   4. Keep all walks and paved areas clean. Keep the site clear of debris resulting from landscape work or maintenance.
   5. Repair all damaged planted areas, and replace plants and reseed or resod turf immediately upon discovery of damage or loss.
   6. Check sprinkler systems at each watering; adjust coverage and clean heads immediately. Adjust timing of sprinkler controller to prevent flooding.
   7. Maintain adequate moisture depth in soil to ensure vigorous growth. Check rootball of trees and shrubs independent of surrounding soils and hand water as required.
   8. Keep Contract areas free from weeds by cultivating, hoeing or hand pulling. Use of chemical weed killers will not relieve the Contractor of the responsibility of keeping areas free of weeds over 1-inch high at all times.

B. Tree, Shrub and Ground Cover Maintenance:
   1. Maintain during the entire establishment period by regular watering, cultivating, weeding,

repair of stakes and ties, and spraying for insect pests. Prune when requested by the Landscape Architect.
2. Keep watering basins in good condition and weed-free at all times.
3. Replace all damaged, unhealthy or dead trees, shrubs, vines and ground covers with new stock immediately, size as indicated on the drawings.

C. Turf:
1. Maintain during the entire establishment period. Cut as frequently as growth of grass requires. Cut to a height of two inches (2"), unless otherwise directed by the Landscape Architect.
2. Maintain appropriate soil moisture at all times for healthy and vigorous turf grass.
3. Trim edges of turf at paving and headerboards at time of second cutting, and at each later cutting.
4. Keep the designated area under trees free of turf at all times. Do not create low area around base of tree.
5. Keep turf areas free of undesirable weeds and grasses by the application of suitable selective weed killers or hand pulling.
6. Reseed all damaged areas as soon as evident.
7. Repair any hollow, settled or eroded areas by filling, rolling and resodding. Raise irrigation heads as required to accommodate turf growth during the plant establishment maintenance period.

D. Fertilizing:
1. Upon approval and after submitting fertilizer delivery tags, fertilize all turf and ground cover areas by broad-casting Type C (21-7-14) fertilizer at the rate of 5 lbs. per 1,000 square feet evenly throughout, and reapply every forty-five (45) days until acceptable or as appropriate to prevailing climatic conditions and type of plant or turf grass.
2. Apply ammonium sulfate fertilizer as necessary to maintain vigorous, green grass between fertilizings mentioned above.

3.13 FINAL PLANTING REVIEW AND ACCEPTANCE

A. At the conclusion of the planting establishment period, schedule a final review. On such date, all project improvements and all corrective work shall have been completed. If all project improvements and corrective work are not completed, continue the planting establishment, at no additional cost to the District, until all work has been completed. This condition will be waived by the District under such circumstances wherein the District has granted an extension of time to permit the completion of a particular portion of the work beyond the time of completion set forth in the Agreement.

B. Submit written notice requesting review at least 10 days before the anticipated review.

C. Prior to review, weed and rake all planted areas, repair plant basins, mow and edge turf, plumb tree stakes and guys, remove bamboo tree stakes if acceptable, clear the site of all debris and present in a neat, orderly manner.

END OF SECTION

SECTION 33 4000

SITE DRAINAGE

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. Locate and verify invert elevations of all existing pipes at proposed points of connections.
   2. Provide and install storm and roof drain pipe and appurtenances.
   3. Provide and install storm and roof drain system structures, including clean-outs, drainage inlets, area drains, etc.

B. Related Sections include the following:
   1. Trenching, Backfilling and Compaction - Section 31 2316

1.03 SUBMITTALS

A. In accordance with Section 01 3300, Submittal Requirements:
   1. Submit choice of storm drain and roof drain pipe, trench drain, cleanouts, drainage structures, and drainage grates to Engineer for review prior to ordering.

1.04 REFERENCES

A. City of San Rafael Design and Construction Standards, latest edition (City Standards).

1.05 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Storm drain and roof drain pipe shall be delivered, handled, and stored in a way that prevents damage to the pipe and prevents entry of foreign materials into the pipe.

B. Storm drain, roof drain, and trench drain structures shall be delivered, handled, and stored in a way that prevents damage to the structures.

C. Installed pipes, precast structures, and cast-in-place structures shall be protected from damage during construction.

D. Regardless of cause, damaged pipe and structures shall be replaced with new products at the expense of the Contractor.

1.06 GRADE AND ALIGNMENT CONTROL

A. General
   1. Use necessary installation procedures to ensure the pipes are installed at the location and grade staked in the field.

B. Method
   1. One of the following methods shall be utilized to control grade and alignment:
      a. Batter boards set at 25' intervals with a string line set over at least three batter boards.
      b. Electronic "Laser" beam set at structure locations or grade breaks. At least three grade points shall be checked to verify the set grade.

c. Survey instrument set at structure to site between structures at the set grade.

C. Equipment
1. The Contractor shall furnish all equipment necessary to install and inspect the pipe installation. Grade rod shall be held to a minimum in all cases.

PART 2 PRODUCTS

2.01 STORM DRAIN AND ROOF DRAIN PIPE

A. Storm and roof drain 4" diameter to 8" diameter shall be Polyvinyl Chloride Pipe (PVC), SDR 35, Series 46, with water tight, gasketed joints, or approved equal.

B. Storm drain 10" diameter and larger shall be Polyvinyl Chloride Pipe (PVC), SDR 35, Series 46, with water tight, gasketed joints, or HDPE, Type S, with smooth interior wall and water tight joints, or approved equal.

C. Roof drain 3" diameter and smaller shall be Polyvinyl Chloride Pipe (PVC), SCH 40, with water tight, solvent weld joints, or approved equal.

2.02 DRAINAGE STRUCTURES

A. Drainage inlets (SDDI) noted on the plan as "1212" or "1818" shall be as manufactured by Oldcastle Infrastructure, or approved equal, and shall be of the model/size indicated on the plans. Grates shall be heavy duty in hard surfaced areas with ½" maximum opening bolt down grates, and standard duty in planting areas, with bolt down grates.

B. Drainage inlets (SDDI) noted on the plan as "P6" or "P8" shall be as manufactured by Dura-Drain or approved equal, and shall be of the model/size indicated on the plans. Grates shall be standard duty, with bolt down grates.

C. Catch basins (SDCB) noted on the Drawings shall be as manufactured by Old Castle Infrastructure, or approved equal, and shall be of the model/size indicated on the Drawings.

D. Clean-outs as shown on the drawing details.

E. Paving notches shall be installed where indicated on the Drawings.

PART 3 EXECUTION

3.01 GENERAL

A. All construction of the storm drain shall conform to the requirements of the City of San Rafael Standards.

3.02 VERIFY EXISTING CONDITIONS

A. The exact location and depth of the existing storm drains is unknown and is shown based on the best information available.

B. Prior to ordering of any materials, Contractor shall pot hole in the vicinity of each connection point to verify the exact location (horizontal and vertical) and size of the existing storm drain. This information shall be presented in the form of a field sketch through the RFI process for review and confirmation by the Engineer that the existing line and proposed design is adequate to serve the project.

3.03 STORM DRAIN PIPE

A. Trenching shall be as indicated in Section 31 2316, Trenching, Backfilling and Compaction.

B. Pipe laying shall be as indicated in paragraph 3.05 herein.

C. No pipe shall be installed which is cracked, damaged or otherwise unsuitable for use in the opinion of the Engineer.

3.04 STORM DRAINAGE STRUCTURES

A. Excavation and backfill shall conform to Section 31 2316, Trenching, Backfilling and Compaction.

B. Joints shall be made watertight. Any visible leaks shall be permanently plugged.

3.05 PIPE LAYING

A. No pipe shall be laid when trench conditions are unsuitable to allow performing the job in a workmanlike manner.

B. Where ground water occurs, pumping shall continue until backfilling has progressed to a sufficient height to prevent flotation of the pipe. Water shall be disposed of in such a manner as to cause no property damage or be a hazard to public health. In accordance with Section 31 2316, Trenching, Backfilling and Compaction.

C. Pipe shall be laid with bell ends facing in the direction of laying, and shall progress uphill.

D. Pipe deflections where permitted shall not exceed that recommended by the pipe manufacturer.

E. Every precaution shall be taken to prevent foreign material from entering the pipe. If necessary, a heavy, tightly woven canvas bag of suitable size shall be placed over each end and left there until the connection is to be made to the adjacent pipe. During laying operations, no debris, tools, clothing, or other materials shall be placed in the pipe. If foreign materials do enter the pipe, they shall be removed continuously as work progresses.

F. At times when pipe laying is not in progress, the open ends of laid pipe shall be closed by a water-tight plug.

3.06 CLEAN UP

A. Remove all debris and stains resulting from the work of this section.

B. Properly repair all surfaces disturbed by construction.

END OF SECTION